Washoe County

REGIONAL HAZARD MITIGATION PLAN ANNEXES

2025

THIS PAGE INTENTIONALLY LEFT BLANK

City of Reno Hazard Mitigation Program

The City of Reno has a fully integrated approach to hazard mitigation planning and program implementation. Throughout the 2025 update process, the following Regional Hazard Mitigation Plan (RHMP) participation roles were recorded:

Name	Position	Department
Andrew Ancho	Division Chief, City Emergency Manager	Reno Fire Department
Douglas Buck	Planning Manager	Development Services
Kaytlin Canner	Clean and Safe Manager	City Manager's Office
Cynthia Esparza	Chief Equity and Community Relations Officer	City Manager's Office
John Flansberg	Administrator	Regional Infrastructure
Kayla Garcia	Management Analyst	Regional Infrastructure
Suzanne Groneman	Sustainability Manager	City Manager's Office
Lauren Knox	Senior Planner	Development Services
Robert Larson	Commander	Reno Police Department
Trina Magoon	Director	Utility Services
Mark Meranda	Building Official	Development Services
Oliver Miller	Deputy Chief	Reno Police Department
Jon Simpson	Engineering Manager	Utility Services
Eric Sparks	Safety and Training Administrator	City Manager's Office
Travis Truhill	Director	Maintenance & Operations
Nathan Ullyot	Director	Parks & Recreation
Khalil Wilson	Associate Director	Public Works

What's New in the 2025 Update?

With the 2025 RHMP update, Washoe County and its regional partners have recognized changes in planning priorities by placing an added emphasis on incorporating actionable strategies into the mitigation implementation plan and moving away from including ongoing coordination activities. Recent disasters and emerging hazards have also influenced planning priorities and the development of mitigation actions for the 2025 RHMP update.

The 2025 update of the RHMP includes the following major revisions to the 2020 plan:

- Incorporation of additional hazards and more comprehensive risk assessments;
- Expanded capability assessment;
- Additional mitigations.

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

Plan Adoption

44 CFR §201.6(c)(5) requires that an HMP be formally adopted by elected officials from each participating jurisdiction. City Council formally adopted the 2020 update of the Washoe County RHMP on August 13, 2025.

This RHMP was approved by FEMA Region IX on September 24, 2025. Once the plan is approved and signed, a copy of the City of Reno's adoption resolution will be placed in Appendix E of the Base Plan.

Community Profile

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, and six members representing each of the six districts—or wards—of Reno. The mayor and council members serve a four-year term. The council sets priorities and approves budgets and through the City Manager empowers city departments to advance these priorities. The City of Reno website identifies the following strategic priorities and goals for 2023-2025 (City of Reno Vision, Mission, and Priorities, n.d.).

Goals:

- Fiscal Sustainability
- Public Safety
- Economic Opportunity, Homelessness, and Affordable Housing
- Economic and Community Development
- Infrastructure, Climate Change, and Environmental Sustainability

- Arts, Parks, and Historical Resources

Areas of Focus for 2023–2025:

- Fiscal Responsibility
- Police and Fire Services
- Housing Affordability
- Master Plan Implementation
- Community Sustainability
- Downtown Revitalization

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

- Business Licensing
- City Attorney
- City Clerk
- City Manager's Office
- Civil Service Commission
- Code and Parking Enforcement
- Communications
- Development Services
- Department of Information Technology
- Economic Development/ Redevelopment
- Equity and Community Relations
- Finance
- Fire Department
- Housing and Neighborhood Development
- Human Resources
- Maintenance & Operations
- Municipal Court
- Parks & Recreation
- Police Department
- Public Safety Dispatch
- Public Works
- Regional Infrastructure
- Utility Service

Geography and Climate

Reno is 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 23 miles northeast of Lake Tahoe and covers 111.7 square miles.

The Truckee River, one of the few terminal rivers in the United States, flows from Lake Tahoe (located in both Nevada and California) through downtown Reno to Pyramid Lake in Nevada.

The city of Reno originally developed along the banks of the Truckee River "as a crossing point for travelers heading to the California gold rush in the late 1840s and 1850s."[1] "Reno was officially established in 1868, the same year that the transcontinental railroad, which paralleled the Truckee River, reached the town."[2]

Reno has a steppe climate, like Jaipur, India, or Murcia, Spain, which means it ranges 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 occurring between April and October. Extreme highs have reached 104–108 degrees Fahrenheit, and lows have reached -16 to -17. The city averages 252 days of sunshine per year. Figure 1 shows the City of Reno's average temperatures and precipitation. According to a 2024 report by Climate Central, Reno is among the fastest-warming cities in the U.S.[3]

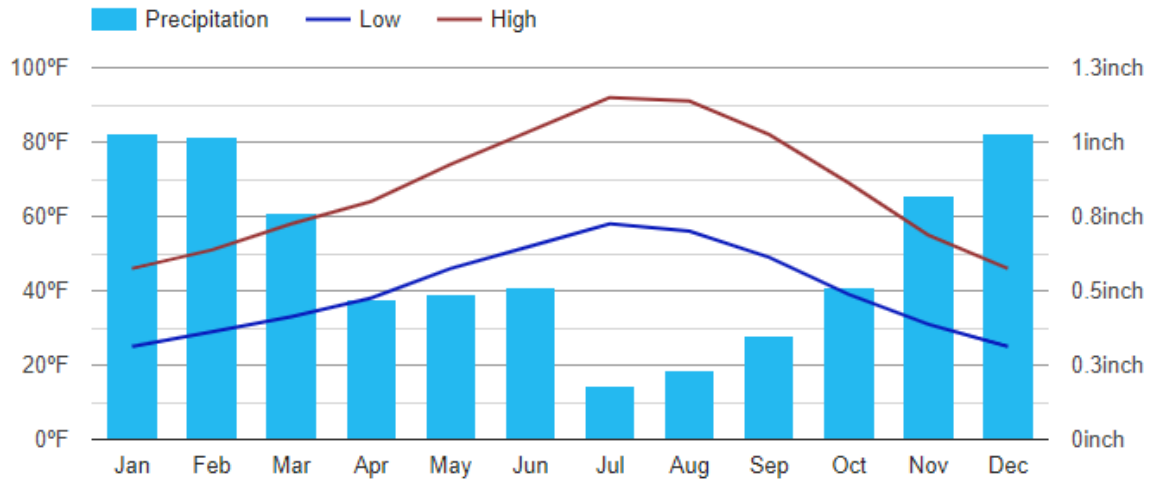


Figure 1: Climate in Reno, 2024

Population and Demographics

The 2023 Census recorded a population of 274,915 people in Reno.[4] The population grew by approximately 4.1% between 2020 and 2023, to an estimated 274,915 people in 2023. (see Table 1).

[1] Washoe County Nevada, "Regional-HMP-2020." https://www.washoecounty.gov/em/files/Regional-HMP-2020.pdf
[2] City of Reno, "Historic Markers." https://www.reno.gov/community/arts-culture/historic-preservation/history-of-reno
[3] Climate Central, "Earth Day: Fastest-Warming Cities and Record Clean Investment." https://www.climatecentral.org/climate-matters/earth-day-fastest-warming-cities
[4] United States Census Bureau, "QuickFacts." https://www.census.gov/quickfacts/fact/table/renocitynevada/PST045224

Table 1: Demographics of the City of Reno

Metric	City of Reno (%)	Nevada (%) (2024)
Population by age, 2024		
Under 5 years old	5.3%	5.4%
Under 18 years old	20%	21.5%
65 years and older	16.3%	17.4%
Women, 2024	49.3%	49.7%
Race/Ethnicity, 2024		
White	63.5%	71.5%
Black	3.2%	11%
American Indian, Alaskan Native	1.0%	1.7%
Asian alone	7.0%	9.7
Native Hawaiian, other Pacific Islander	0.8%	0.9%
Hispanic or Latino, any race	24.6%	39.9%

Between 2019 and 2023, an estimated 8.4% of Reno's population under the age of 65 years is disabled, and 12.4% of the city's population under the age of 65 does not have health insurance. The median household income from 2019-2023 was $78,448, with 12.5% of the city's population living in poverty. In the time range between 2019 and 2023, approximately 23.2% of the population aged five and older spoke a language other than English at home.

Between 2019 and 2023, 49.4% of housing units in Reno were owner-occupied, and the median value of these homes was $498,600. During this time, 95.7% of households owned a computer, and 88.4% had a broadband internet subscription.

The 2023 American Community Survey 5-year estimates reported that approximately 66.9% of the city's population over 16 years old was employed. The city's per capita income in 2023 was $45,180.

Economy

- **Industry Characteristics:** Reno's economy is predominantly service-providing, with around 80% of the workforce employed in service-providing industries and the remaining 20% in goods-producing industries. The city serves as a major outdoor resort hub, thanks to its proximity to recreational activities such as skiing and golfing, as well as legalized gambling. While gaming and recreational activities still play a significant role in the economy, Reno's business base is expanding into distribution, warehousing, and manufacturing. Over the past two decades, the proportion of Reno's workforce employed in casino-hotels has

decreased from 15% to 7%, while the percentage of workers in construction, manufacturing, transportation, warehousing, public utilities, and financial activities has increased from 25% to 33%. [5]

Table 2: Businesses in the City of Reno 2022

Category	Number
All firms	7,675
Men-owned firms	4,312
Women-owned firms	S(Suppressed)
Minority-owned firms	1,335
Veterans-owned firms	391

Source: U.S. Census Bureau 2023[6]

- **Population Growth:** According to the Reno Gazette Journal, the population of Reno, NV, increased from 264,146 in 2020 to 274,915 in 2023. This represents an increase of 4.1%.
- **Economic Growth:**The casino-hotel sector in the city of Reno is still recovering from the impact of the Great Recession. Although Reno's economy is mainly driven by service-providing industries, with 80% of the workforce employed in these fields, the city is seeing growth and development in distribution, warehousing, and manufacturing facilities.

Land Use and Ownership Trends

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 northwest and southwest areas, and properties in between Reno and the Reno Stead Airport to the north, are in areas where slopes range from 10–30%.[7] Much of the City's new growth in the last 10 years has occurred in the North Valleys and southeast areas.

[5] U.S. Bureau of Labor Statistics, "Western Information Office." https://www.bls.gov/regions/west/news-release/occupationalemploymentandwages_reno.htm#TableA

[6] United States Census Bureau, "QuickFacts." https://www.census.gov/quickfacts/fact/table/renocitynevada/SBO001217

[7] City of Reno, "City of Reno Jurisdiction-Specific Annex-Washoe County Regional Hazard Mitigation Plan."

LAND USE PLANNING

The growing city currently measures 112 square miles. The city abuts large swaths of U.S. Forest Service lands in the Sierra Nevada.

The 2019 Truckee Meadows Regional Plan describes the type, location, and pattern of growth desired for the Region. The plan highly prioritizes infill and core development supported by adequate facilities and services, and strongly discourages development in fringe areas. This is accomplished through a framework consisting of a Regional Land Designation tiering system and accompanying policies. Although The Truckee Meadows Regional Plan was recently updated and adopted in the fall of 2024, the overall substance and concepts of the 2019 plan were maintained.

Median housing prices are increasing in Reno and the surrounding region, making it likely that the development of new housing in and around the city will increase if the national economy continues to be strong. The Truckee Meadows Housing Study[8] 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 in which the cost of owning 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%. Building on the Housing Study, in 2019, the Regional Strategy for Affordable Housing was developed, with an aim to produce more affordable rental housing, diversify housing options, expand access to homeownership, preserve affordability, and protect residents from displacement. The 2019 Regional Strategy for Affordable Housing contains a community profile and a strategy roadmap for solutions and implementation over the next ten years.[9]

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 called ReImagine Reno. It covers all of the land within the city limits and its Sphere of Influence. The ReImagine Reno Master Plan has a planning horizon through the year 2036. The Master Plan supports the community desire of Reno to become a base for outdoor activities, an art and culture center, and a technology center and university town. To achieve this, the Master Plan contains foundational guiding principles and goals, citywide policies, area-specific policies, a

---

https://ieminc4.sharepoint.com/sites/WashoeCountyNVMJHMPUpdate/IEM%20Internal%20Documentation/Forms/AllItems.aspx?id=%2Fsites%2FWashoeCountyNVMJHMPUpdate%2FIEM%20Internal%20Documentation%2FPrior%20Plan%2FReno%5FJurisdiction%20Annex%2Epdf&viewid=4c93d35a%2D64af%2D49de%2D8b83%2D0908815c6f42&parent=%2Fsites%2FWashoeCountyNVMJHMPUpdate%2FIEM%20Internal%20Documentation%2FPrior%20Plan

[8] Truckee Meadows Regional Planning Agency, "TMRPA 2016 Housing Study." https://tmrpa.org/affordable-housing/#HousingStudy

[9] Truckee Meadows Regional Planning Agency, 2022, "2019 Regional Strategy for Housing Affordability"

growth and reinvestment framework, and an implementation plan. The ReImagine Reno Master Plan is consistent with the Regional Plan in that it highly encourages core area and infill development to ensure efficient delivery of public services and reduce the impact on the surrounding natural areas.

- **Transportation:** Numerous initiatives are underway to improve public transportation in Reno. The Regional Transportation Commission (RTC) is currently working on an Active Transportation Plan for the Truckee Meadows to create a vision and identify measures to improve walking and biking infrastructure throughout the county. RTC has recently issued a draft Street Typology Guide which represents a systematic approach to prioritizing the safety and comfort of pedestrians and cyclists in the City and in Washoe County. (rtcwashoe.com) The City of Reno and RTC are working together on a downtown Micromobilty study which included a pilot Project in 2022 The City of Reno and RTC are paving the road for a more vibrant, safe, and strong downtown Reno by building on the Downtown Reno Action Plan. The City is focused on improved walking, biking, and transit connectivity to make it safer and easier for the public to take advantage of more sustainable ways to visit downtown, the Truckee River, the University of Nevada, Reno, and surrounding local businesses while enhancing road safety for all users. The Micromobility Pilot Project focuses on transportation improvements for small, low-speed, human or electric-powered transportation devices such as bicycles, scooters, and e-bikes, collectively referred to as "micromodes." This project is one part of meeting the strategic goals outlined in adopted plans and addressing converging needs in transportation management, public health, and climate.[10]
- **Public Parkland:** The City of Reno currently owns, operates, and maintains 89 parks and recreation facilities, totaling approximately 927 acres. In November of 2023, the city adopted a new Parks, Recreation, and Open Space Master Plan, which builds off of the community expressed desires and concepts in the ReImagine Reno Master Plan. ReImagine Reno has set goals for the preservation and enhancement of interconnection between the parks network and to support non-motorized transportation in the city.
- **Sustainability, Resiliency, and Reno Resilience.** Reno is a 3-STAR Community under the STAR Communities Rating System, which helps communities track and gain points in the 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 by 20% by 2025. The program is part of the U.S. Department of Energy's Better

[10] City of Reno, "Micromobility Pilot Project." https://www.reno.gov/community/sustainability/bicycling-and-micromobility/micromobility-pilot-project

Buildings Challenge. The city supports participants with technical assistance on benchmarking, education, financing options information, and recognition.

LEED is the world's most widely used green building program, created by USGBC as a leadership standard defining best practices for healthy, high-performing green buildings. In December 2022, Reno was advanced to a LEED Gold Certified City and was ranked #33 in LEED Cities for 2024.[11]

NATURAL RESOURCES

The following major natural systems are present in the Truckee Meadows basin:

- **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 that water that falls in the basin stays there until it evaporates or is removed through human activity. 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 northeast of the Reno area. Nearly 100 faults have been mapped in the Truckee Meadows. However almost all of them have remained inactive for at least 1 million years.[12]
- **Watersheds:** Reno lies in 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.[13]
- **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. The Truckee River supports the federally listed threatened Lahontan cutthroat

[11] United States Green Building Council, 2024, https://www.usgbc.org/leed/rating-systems/leed-for-cities-communities

[12] City of Reno, "City of Reno Jurisdiction-Specific Annex-Washoe County Regional Hazard Mitigation Plan." https://www.washoecounty.gov/em/files/PDFs/Hazard%20Mitigation%202020/Reno_Jurisdiction%20Annex.pdf

[13] Truckee Meadows Water Authority, "Truckee River Operating Agreement." https://tmwa.com/your-water/topics-facts/truckee-river-operating-agreement/

trout and federally listed endangered cui-ui, as well as brown, brook, and rainbow trout and mountain whitefish.

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."[14] 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 artifacts that may be found at these sites. Both the Washoe and Paiute people inhabited territory in 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.

Paiute and Washoe people in the last 1800's and early 1900's were known 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.

HISTORIC RESOURCES

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

> 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 the preservation of historic resources. The City of Reno Register of Historic Place was established in 1993.

In ReImagine Reno, the most recent City of Reno Master Plan, the plan calls attention to sustainable development principles to be adhered to for all development in 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 land at the urban–rural interface. The plan also encourages the integration of cultural and historic resources at the neighborhood design level. Adaptive reuse is encouraged.

[14] National Park Service, "Acadia." https://www.nps.gov/acad/learn/management/preserve-history.htm

Hazard Profiles and Vulnerability Assessments

This section presents hazard profiles and vulnerability assessments to determine the potential impact of hazards on 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 RHMP. Additional details are contained in the Vulnerability Assessment Section of the Base 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 Sparks]? (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 Sparks]? (Requirement §201.6(c)(2)(i)) **B3.** Is there 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 CFR 201.6(c)(2)(ii))

Washoe County has experienced several disaster declarations that may have affected the city of Reno. In total, the County has experienced 48 disaster or fire management assistance declarations since 1965. Table 3 identifies the 15 declarations since 2020 that may have affected the city of Reno.

Table 3: Disaster Declarations in Washoe County since 2020[15]

Disaster Number	Individual Assistance Program Declared	Public Assistance Program Declared	Hazard Mitigation Program Declared	Declaration Date	Title
FM-5602	No	Yes	Yes	8/2/2025	Peavine Fire
FM-5586	No	Yes	Yes	6/10/2025	Marie Fire
FM-5546	No	Yes	Yes	11/11/2024	Callahan Fire
FM-5533	No	Yes	Yes	9/7/2024	Davis Fire
FM-5530	No	Yes	Yes	8/12/2024	Gold Ranch Fire
FM-5495	No	Yes	Yes	6/12/2024	Sullivan Fire
FM-5494	No	Yes	Yes	6/11/2024	Trail Fire
FM-5448	No	Yes	Yes	08/14/2022	Joy Lake Fire
FM-5382	No	Yes	Yes	11/07/2020	Pinehaven Fire
FM-5328	No	Yes	Yes	08/15/2020	Loyalton Fire
FM-5326	No	Yes	Yes	08/03/2020	North Fire
FM-5322	No	Yes	Yes	07/21/2020	Rockfarm Fire
FM-5316	No	Yes	Yes	06/27/2020	Poeville Fire
DR-4523	Yes	No	No	04/04/2020	Biological (COVID-19)
EM-3443	No	No	No	03/13/2020	Biological (COVID-19)

The hazard profiles and vulnerability assessments contained in this annex represent a considerable amount of work performed by the Mitigation Planning Team (MPT). Planning Team members ranked hazards using several key considerations, followed by activities to

[15] FEMA, "Disasters and Other Declarations." https://www.fema.gov/disaster/declarations?field_dv2_declaration_date_value%5Bmin%5D=2015&field_dv2_declaration_date_value%5Bmax%5D=2025&field_dv2_declaration_type_value=All&field_dv2_incident_type_target_id_selective=All&field_dv2_state_territory_tribal_value%5B0%5D=NV&page=2

validate hazard analysis results and identify specific areas of risk. The City of Reno representatives to the MPT identified the following hazards for further assessment. (Refer to the HMP Base Plan for regional risk assessments for moderate and low-priority hazard profiles.)

- Avalanche and Landslide
- Criminal Acts and Terrorism
- Drought
- Earthquake
- Energy Emergency
- Flood
- Hazardous Materials Incident
- Infectious Disease
- Radiological Waste Transport
- Extreme Weather (Winter Storm, Windstorms, Extreme Heat)
- Transportation Incident
- Volcano
- Wildland Fire

Hazard Ranking Methodology

CALCULATED PRIORITY RISK INDEX

A risk assessment result for the entire county does not mean that each municipality is at the same amount of risk for each hazard. Each jurisdiction considered how it is uniquely at risk of the hazards profiled. The Calculated Priority Risk Index (Table 4) assessment resulted in hazard rankings for the City of Reno.

Table 4: Factors for Calculating Risk

Risk Index Factor	Degree of Risk Level		Criteria	Factor Weight for Degree of Risk Level
Probability *What is the likelihood of the hazard occurring?*	1	Unlikely	Less than 1 percent probability of occurrence in the next year or a recurrence interval of greater than every 100 years.	30%
	2	Occasional	1 to 10 percent probability of occurrence in the next year or a recurrence interval of 11 to 100 years.	

Risk Index Factor	Degree of Risk Level		Criteria	Factor Weight for Degree of Risk Level
	3	Likely	11 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.	
	4	Highly Likely	91 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.	
Magnitude *What will be the overall impact?*	1	Negligible	Less than 5% of the affected area's critical and non-critical facilities and structures are damaged/destroyed. Only minor property damage and minimal disruption of life. Temporary shutdown of critical facilities.	30%
	2	Limited	Greater than 5% and less than 25% of property in the affected area is damaged/destroyed. Complete shutdown of critical facilities for more than one day but less than one week.	
	3	Critical	Greater than 25%, but less than 50% of property in the affected area was damaged/destroyed. Complete shutdown of critical facilities for over a week but less than one month.	
	4	Catastrophic	Over 50% of critical and non-critical facilities and	

Risk Index Factor	Degree of Risk Level		Criteria	Factor Weight for Degree of Risk Level
			infrastructures in the affected area are damaged/destroyed. Complete shutdown of critical facilities for more than one month.	
Onset *How long will there be between when it is recognized the hazard is approaching and when the hazard will begin affect the community?*	1	Self-defined	More than 24 hours	10%
	2	Self-defined	12 to 24 hours.	
	3	Self-defined	6 to 12 hours.	
	4	Self-defined	Less than 6 hours.	
Duration *What is the length of time the hazard will remain active, including how long emergency operations will have to continue after the hazard event?*	1	Brief	Up to 6 hours.	10%
	2	Intermediate	Up to one day.	
	3	Extended	Up to one week.	
	4	Prolonged	More than one week.	
Frequency *How often has this kind of hazard resulted in an emergency or disaster?*	1	Every 10+ years	This hazard is not frequent but may still impact the area.	20%
	2	Every 5–10 years	This hazard is not as frequently occurring but it could occur in the next 10 years.	

Risk Index Factor	Degree of Risk Level		Criteria	Factor Weight for Degree of Risk Level
	3	Every 1–5 years	This hazard is likely to occur relatively often. It may have occurred more or less frequently recently, but on average, it can be expected every 1–5 years.	
	4	Annually	This hazard is a frequent occurrence which the area actively has to respond to on an approximately annual basis.	

The following is the risk factor equation:

Risk Factor Equation

RF Value = [(Probability x .30) + (Magnitude x .30) + (Onset x .10) + (Duration x .10) + (Frequency x .20)]

Table 5 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 through 4.0 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 5: Overall Risk Scores for the CPRI

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

The Washoe County base plan is comprehensive for regional assessments and effectively addresses the calculated risk indexes. It provides a thorough evaluation that highlights its commitment to risk management and community safety, while the annexes are specific to each jurisdiction. Table 6 displays the CPRI values for the City of Reno.

Table 6: Calculated Priority Risk Index for the City of Reno

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Avalanche and Landslide	1	1	1	2	1	1.1	**Low**
Criminal Acts and Terrorism	3	2	4	2	3	2.7	**High**
Drought	3	2	1	4	2	2.4	**Medium**
Earthquake	2	2	1	4	2	2.1	**Medium**
Energy Emergency	2	2	4	2	3	2.4	**Medium**
Flood	3	2	2	3	3	2.6	**High**
Hazardous Materials Incident	2	1	4	2	3	2.1	**Medium**
Infectious Disease	2	2	1	4	2	2.1	**Medium**
Radiological Waste Transport	1	2	4	2	1	1.7	**Low**

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Extreme Weather (Winter Storm, Windstorms, Extreme Heat)	4	2	1	3	4	3.0	**High**
Transportation Incident	2	1	4	2	1	1.7	**Low**
Volcano	1	1	1	3	1	1.2	**Low**
Wildland Fire	4	2	4	3	4	3.3	**High**

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 the Risk Assessment Section of the Base Plan.

Ratings: 1: 1 = lowest, 5 = highest; 2: 1 = slowest, 5 = fastest; 3: 1 = shortest, 5 = longest

NATIONAL RISK INDEX

The National Risk Index (NRI) is not included in the local jurisdiction annexes as the dataset is developed at a county and census tract level, and it is not aggregated to individual jurisdictional boundaries. While the NRI provides useful context for understanding countywide hazard overall risk data, it does not offer the resolution needed to support jurisdictional specific assessments.

Hazard-Specific Profiles and Risk Assessments

Wildland Fire

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 in 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 minimize 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, the Truckee Meadows Fire Protection District, and the Sparks Fire Department. The City of Reno Fire Department operates 14 fire stations with 17 fire companies and has 21 front-line structure engines, 4 ladder trucks, and 8 brush trucks designed to respond to wildland fires. Furthermore, the City of Reno has a minimum of two additional units dedicated strictly to emergency medical service response.

EXTENT

As economic growth continues to increase demand for residential and commercial growth outside 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. Most fires burn between June and October, and they 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.

PREVIOUS OCCURRENCE/HISTORY

While there have not been wildland fires in 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.

Wildland fires near the city between 2015 and 2023 are listed below. Based on these events and recorded historic occurrences of wildland fires, there is an estimated 35%–45% chance of a fire occurring 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 Caughlin Ranch.
- **July 2016 S Fire** – Undetermined cause, 2,554 acres in Sparks
- **June 11, 2023: Trail Fire-Nevada** – A fire began on June 11th and is burning north of Reno near the communities of Stead, Lemmon Valley, and North Valley, NV. The combined population is 73,000. The fire threatened a local watershed, power transmission lines, and road and rail infrastructure.
- **October 24, 2023, Hill Fire near Verdi area** – A fire broke out at 11:00 pm, and homes were evacuated on both the Nevada and California sides of the state line near Dog Valley Road. Truckee Meadows Fire and Protection crews worked to stop the brush fire burning in the Verdi area that ultimately burned 47 acres of land due to erratic winds and threatened to encroach on an estimated 40-60 homes on Hill Road from Bridge Street to Dog Valley Road neighborhoods.
- **August 23, 2021, California Dixie and Caldor Fires –** Dense smoke from massive wildfires burning in neighboring California created hazardous air quality in the Reno-Tahoe area, canceling flights and forcing the closure of schools, parks, and popular summer beaches. Government air monitors recorded some of the region's most hazardous conditions in years. The National Weather Service issued an air quality alert for parts of northeast Nevada's Elko County, more than 300 miles (482 kilometers) east of the closest California fires. Smoke blowing from the Dixie and Caldor fires in California blanketed northern Nevada on and off for weeks, leaving particulate matter in the air and causing ash to rain on cars in some areas.
- **November 17, 2020, Greater Reno/Carson City –** Powerful Pacific jet stream, rain shadowing, and mountain waves yielded some of the highest winds the region has seen in a few years. Still, dry vegetation and high winds contributed to several major wildfires near Reno, NV, and Walker, CA. A brief period of spillover rain and snow occurred that night into the morning of November 18.
- **November 17, 2020, Pinehaven Fire** in Caughlin Ranch area of SW Reno with wind gusts 72-77 MPH measured in the vicinity. On Tuesday, November 17, at approximately 1 p.m., a fire started on the hillside just south of Pinehaven Road and Sierra Pine Drive. Five structures were lost, twenty-four structures damaged, and 1300 homes were evacuated. The fire caused utility interruption and street closures, with a 512-acre perimeter. The Reno Police Department and Reno Fire Department responded.
- **October 4, 2020, The Baccarat Fire** started near Red Rock Road north of Reno on the 4th before being contained on the 8th. The fire burned 10,500 acres, with no structures

destroyed. However, the fire threatened 75 to 100 homes. Mandatory evacuations were ordered for some residents in the path of the fire. Firefighting costs were approximately $2.4M, according to the Carson City District Office, Nevada Bureau of Land Management. October was dry and warm, with much of the area reporting no measurable precipitation during the month.

- **June 27, 2020, Poeville Fire** – The Poeville Fire was reported burning on the east side of Peavine Mountain. High winds caused the fire to quickly grow and push into Northwest part of the City of Reno. The fire burned approx. 3000 acres and was contained on July 6, 2020. The fire threatened businesses, roads and neighborhoods and resulted in the evacuation of over 400 people. Eight structures were lost in the fire.
- **August 24, 2019, the Long Valley Fire** started near the Red Rock exit along US Highway 395 and spread across the California/Nevada border into northwestern Nevada the 24th before being contained on the 27th. The fire burned 2,438 acres, and one structure was destroyed. FEMA stated that the fire threatened 250-300 homes in and around Rancho Haven Nevada. The fire also threatened five buildings, infrastructure, utilities, equipment, farms, ranches, and a watershed in the area. Mandatory evacuations were ordered for approximately 800 people before containment was reached. Firefighting costs were approximately $600K, according to the Nevada Bureau of Land Management. The fire was caused by warm temperatures and dry conditions that occurred from the 23rd through the end of the month. Breezy conditions occurred on the 24th and 25th, but the combined effects of winds and humidity did not reach critical fire weather criteria.
- **August 24, 2019, Cold Springs** – The Cold Springs Fire burned 1,523 acres south of Silver Lake. The fire was driven by high winds and aided by abundant fuel with few natural breaks. The fire damaged or destroyed power lines in multiple locations and threatened about 100 residences, though there were no casualties.

PROBABILITY OF FUTURE OCCURRENCES

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.

The Washoe County Fire Plan[16] identified 41 communities included in the risk/hazard assessment for Washoe County. Nearly half of these areas have high and extreme fuel hazard conditions within one mile of the community boundary. In some cases, hazardous fuel conditions occur within the community boundaries. Many of the areas classified as moderate fuel hazards have a large component of cheatgrass. During years with above-normal precipitation and abundant growth of cheatgrass, perennial grass, and annual forbs, these areas can escalate into high fuel hazard conditions. Table 7 lists five primary factors that affect the

[16] Washoe County Fire Plan, 2004 Executive Summary – Washoe County Fire Plan – Nevada Community Wildfire Risk / Hazard Assessment – RCI (rci-nv.com)

potential fire hazard assessed to arrive at the community hazard assessment score: community design, construction materials, defensible space, availability of fire suppression resources, and physical conditions, such as the vegetative fuel load and topography.

Table 7: Results of Community Risk and Hazard Assessment

Community	Interface Condition	Interface Fuel Hazard Condition	Ignition Risk Rating	Community Hazard Rating
High and Extreme Hazard Communities				
Red Rock	Intermix	Low to High	High	High
Moderate Hazard Communities				
Mogul (I-80 Corridor West)	Classic	Moderate	High	Moderate
Reno-Northwest	Classic	Moderate to High	High	Moderate
Reno-Southeast	Intermix	Moderate to High	High	Moderate
Verdi	Intermix	Moderate to Extreme	High	Moderate
Low Hazard Communities				
Reno-Southwest	Classic	Low to High	High	Low
Sparks	Classic	Low to Moderate	Low	Low

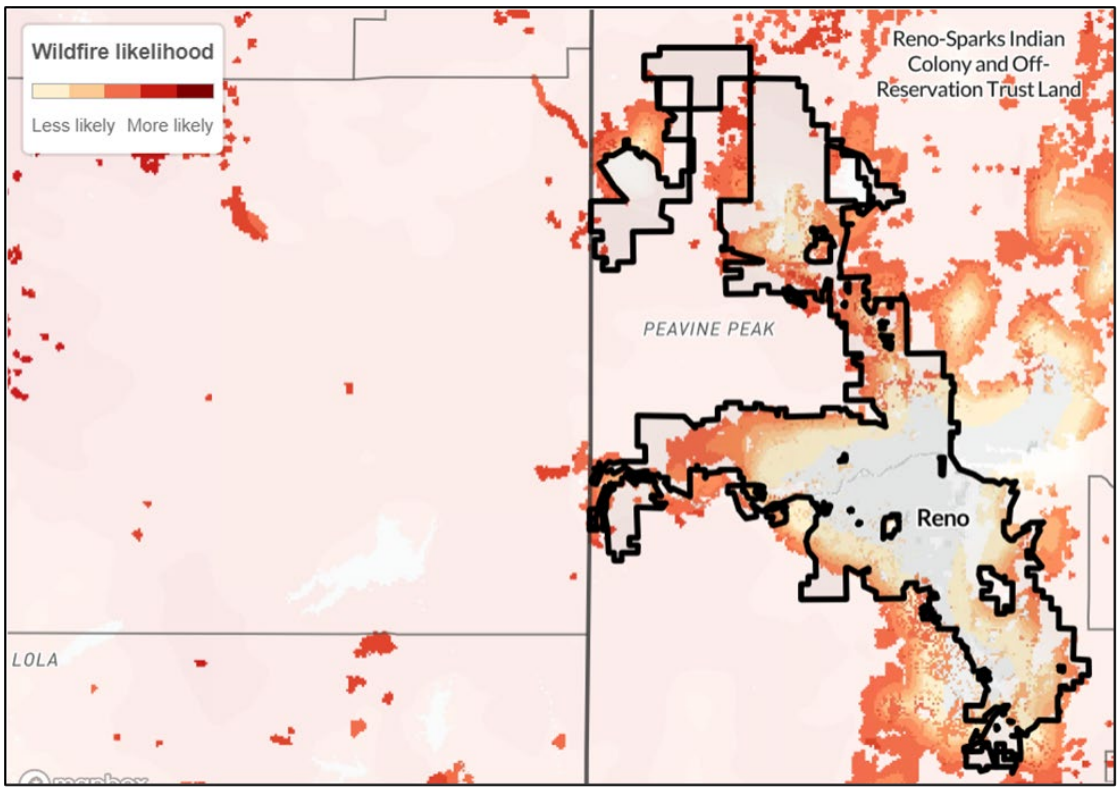


Figure 2: Populated Areas and Wildfire Likelihood in the City of Reno[17]

Populated areas in Reno have on average greater risk than 81% of communities in the U.S. and are predominantly exposed to wildfire from indirect sources, such as embers or home-to-home ignition.

VULNERABILITY ANALYSIS

According to USDA Forest Service Data on wildland fire potential, much of the northern reaches of the city of Reno and Northwest Reno, extending toward Verdi and the California border, are in high-risk zones. The Hidden Valley area and the Caughlin Ranch area are also high-risk zones. These are all areas at the outer reaches of City boundaries, where development is creeping toward the mountains.

ESTIMATED IMPACT AND POTENTIAL LOSSES

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

[17] Wildfire Risk to Communities, 2024, "City of Reno Populated Areas Wildfire Likelihood." https://wildfirerisk.org/explore/wildfire-likelihood/32/32031/3200060600/

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 up to 1,700 single-family units.

IMPACT ON COUNTY ASSETS

Several critical infrastructure facilities have a medium risk of wildland fire. Galena High School—established in 1992—is rated 3 on a scale of 1–6 for wildland fire risk. Two fire stations at lower medium risk (2 on a scale of 1–6) include Peavine near Peavine Mountain in northwest Reno and Station 39 in the wooded foothills of southwest Reno.

VULNERABLE POPULATIONS

Diminished air quality is an environmental impact that can result from a wildfire event and pose a potential health risk. The smoke plumes from wildfires can contain potentially inhalable carcinogenic matter. Fine particles of invisible soot and ash that are too small for the respiratory system to filter can cause immediate and possibly long-term health effects. The elderly, those with compromised respiratory systems, and the unsheltered community may be more vulnerable to the effects of diminished air quality after a wildfire event.

2020 SARS-CoV2 studies conducted in Reno Nevada indicated that wildfire smoke may have greatly increased the number of COVID-19 cases in Reno. The results substantiate the role of air pollution in exacerbating the pandemic and can help guide the development of public preparedness policies in areas affected by wildfire smoke, as wildfires were likely to have coincided with the COVID-19 pandemic in 2021.[18]

[18] Kiser, D., Elhanan, G., Metcalf, W. J., et al. “SARS-CoV-2 Test Positivity Rate in Reno, Nevada: Association with PM2.5 during the 2020 Wildfire Smoke Events in the Western United States”. *J Expo Sci Environ Epidemiol* 31, 797–803 (2021). https://doi.org/10.1038/s41370-021-00366-w

Table 8: Demographics of the City of Reno by Vulnerability to Wildfire[19]

Vulnerable populations
All areas in Reno

Indicator	Number	Percent
Families in poverty	4,751 ±529	6.3% ±0.7%
People with disabilities	36,039 ±1,523	11.6% ±0.5%
People over 65 years	49,764 ±1,627	15.9% ±0.6%
People under 5 years	18,473 ±1,269	5.9% ±0.4%
People of color	117,190 ±7,202	37.5% ±2.4%
Black	8,377 ±1,078	2.7% ±0.3%
Native American	4,202 ±629	1.3% ±0.2%
Hispanic	73,239 ±3,497	23.4% ±1.2%
Difficulty with English	9,749 ±1,087	3.3% ±0.4%
Households with no car	9,753 ±735	7.6% ±0.6%
Mobile homes	6,265 ±572	4.9% ±0.7%

[19] Wildfire Risk to Communities, 2024. "City of Reno Population Demographics by Vulnerability to Wildfire." https://wildfirerisk.org/explore/vulnerable-populations/48/48409/

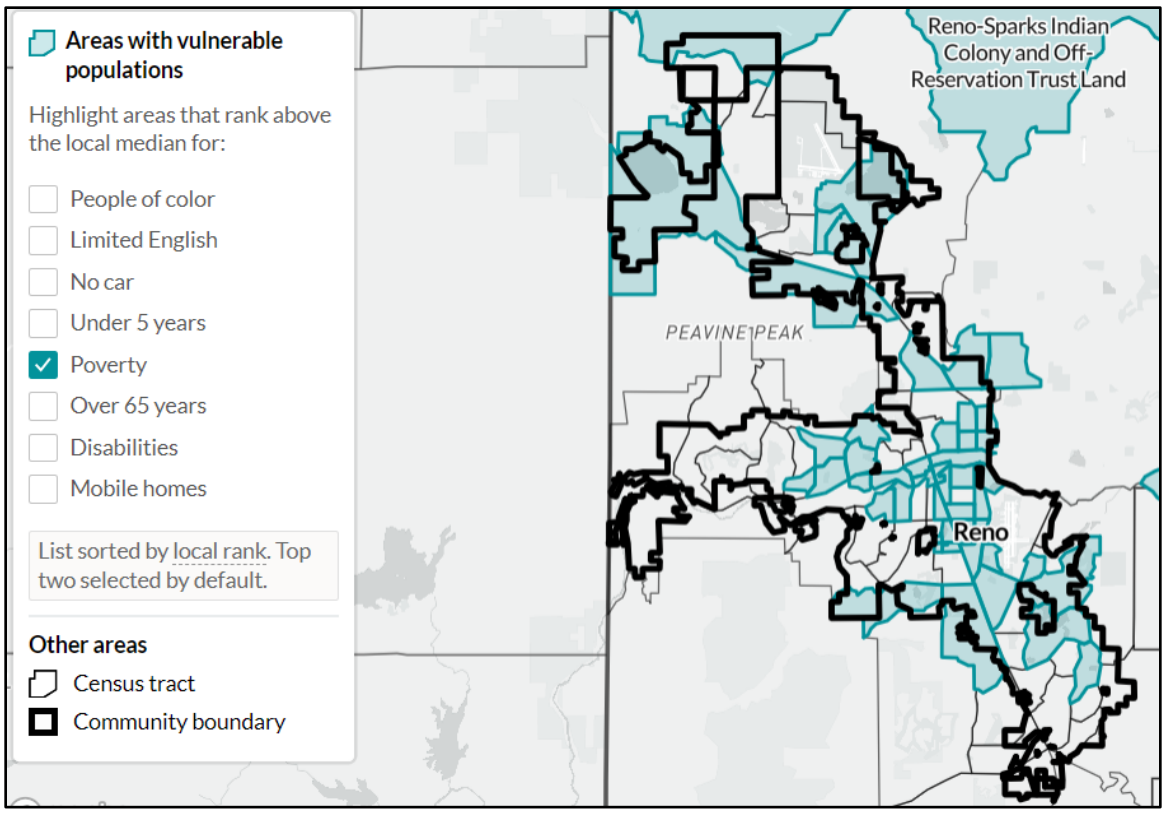


Figure 3: Areas in the City of Reno with Vulnerable Populations – Poverty[20]

The Climate and Economic Justice Screening Tool from the U.S. Climate Resilience Toolkit was used to determine what vulnerabilities impacted Washoe County. According to this tool, which uses 2020 U.S. Census data, Washoe County has 27 disadvantaged populations by census tract, depending on the portion of the County, because it meets the threshold for more than one of the following categories: climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development. According to the Climate and Economic Justice Screening Tool, the portion of Reno considered disadvantaged is represented in Figure 4.

[20] Wildfire Risk to Communities, 2024, "City of Reno Areas with Vulnerable Populations." https://wildfirerisk.org/explore/vulnerable-populations/32/32031/3200060600/

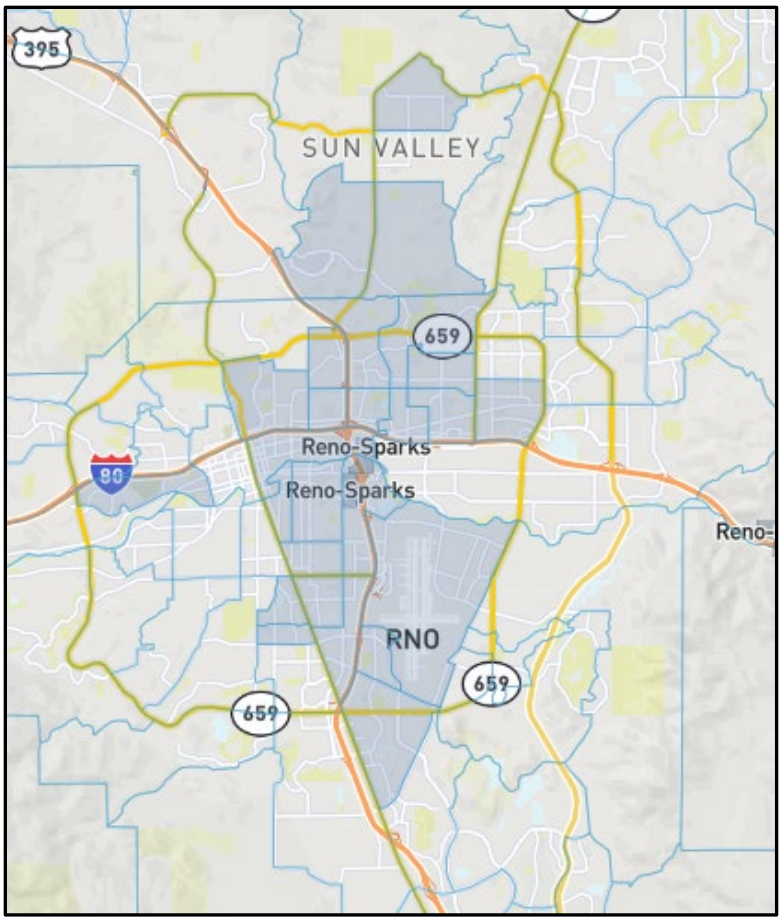


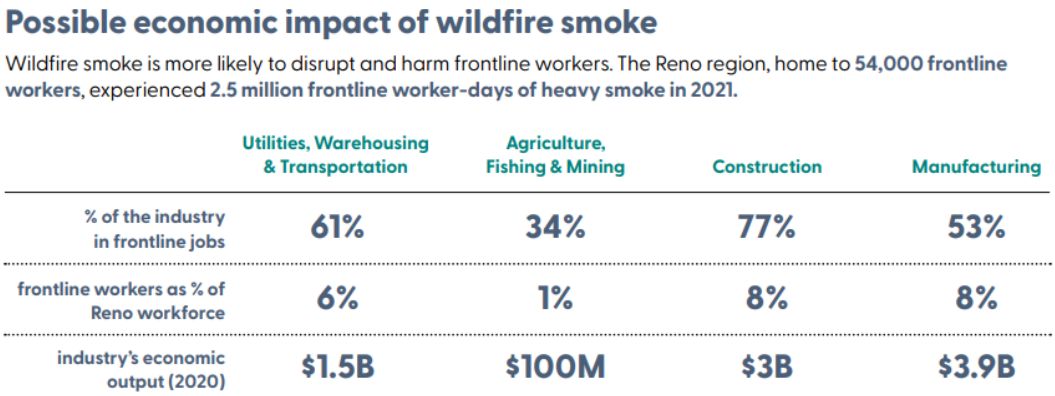
Figure 4: 27 Census Tracts in Washoe County Designated as Disadvantaged (in Gray)[21]

DEVELOPMENT TRENDS

- **Economic:** Regional economic development has resulted in demographic changes and increased urban growth that has put more people and structures in the WUI (Increased Vulnerability).
- **Land Use:** Recent development in unincorporated areas of the County near the cities of Reno and Sparks has occurred in the WUI (Increased Vulnerability).
- 2024 Washoe County Lands Bill would convey 15,860 acres of public land around Reno and Sparks to be sold at auction to developers; an additional 3,400 acres are designated for

[21] Climate & Economic Justice, 2024, "Washoe County-27 Census tracts designated as disadvantaged in gray" Explore the map – Climate & Economic Justice Screening Tool (geoplatform.gov)

specific purposes, including roadway expansions, regional parks, and K-12 school sites, increasing the WUI.[22]



Possible economic impact of wildfire smoke

Wildfire smoke is more likely to disrupt and harm frontline workers. The Reno region, home to **54,000 frontline workers**, experienced **2.5 million frontline worker-days of heavy smoke in 2021.**

	Utilities, Warehousing & Transportation	Agriculture, Fishing & Mining	Construction	Manufacturing
% of the industry in frontline jobs	61%	34%	77%	53%
frontline workers as % of Reno workforce	6%	1%	8%	8%
industry's economic output (2020)	$1.5B	$100M	$3B	$3.9B

Figure 5: Possible Economic Impact of Wildfire Smoke in the Reno Metro Area in 2021[23]

Continued regional growth and development pressure is likely to lead to additional development outside the urban centers of Reno and Sparks in the WUI. As new areas are developed, additional fire response resources will be needed to quickly respond to reported fires and limit damage.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 9 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 through 4.0 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 9: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**

[22] Gabby Birenbaum, The Nevada Independent, 2024, "Exclusive: Rosen Introduces Washoe County Lands Bill Years in the Making," https://thenevadaindependent.com/article/exclusive-rosen-introduces-washoe-county-lands-bill-years-in-the-making

[23] San Francisco Fed, 2021, "Snapshot: Wildfire Smoke in the Reno Metro Area." https://www.frbsf.org/community-development/wp-content/uploads/sites/3/2023-wildfire-smoke-impact-snapshots-reno.pdf

Risk Factor Value	Overall Risk
0 – 1.9	**Low**

Table 10 provides the Calculated Priority Risk Index (CPRI) for wildland fire impacts in City of Reno based on the current plan's hazard risk assessment results. The City of Reno assigned wildland fire a risk factor value of 3.3, reflecting high probability, quick onset, and high frequency impacts. This risk factor value falls in the range of 2.5 to 4, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 10: Calculated Priority Risk Index for Wildland Fire in the City of Reno

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Wildland Fire	4	2	4	3	4	3.3	High

EXISTING MITIGATION CASE STUDY

The world's largest public-facing network of wildfire detection cameras, an AI-assisted system, delivers early alerts about new fires, improving response times and helping firefighters put out small fires before they become major incidents. The ALERTWest system is the result of a merger of systems developed by the University of Nevada, Reno, along with the University of California San Diego and the University of Oregon's Oregon Hazards Lab. ALERTWest includes about 1,200 cameras providing a real-time view of wildfire prone areas. The cameras, which typically are mounted on top of tall mountains, lookout towers, or high-rise buildings to allow a 360-degree view of the landscape, can zoom, rotate, and tilt, enabling fire managers to monitor conditions in real time or later through time-lapse footage. The ALERTWest operating software uses artificial intelligence to continuously monitor for new wildfire ignitions and deliver timely alerts to firefighters and dispatch centers. One benefit of the ALERTWest network is that the public is able to access the cameras and see what the fire is doing so that communities and individuals can make more informed decisions.[24]

COMMUNITY WILDFIRE PROTECTION PLAN

A Community Wildfire Protection Plan (CWPP) is a collaborative strategy crafted by communities and stakeholders to mitigate the risks posed by wildfires. These plans involve assessing local vulnerabilities, engaging residents, government agencies, fire departments, and

[24] KOLOTV News Now, May 6, 2024, "Western Wildfire Camera Network Now Largest of Its Kind." https://www.kolotv.com/2024/05/06/western-wildfire-camera-network-now-largest-its-kind/

other stakeholders in the planning process, and outlining specific measures to reduce the potential impacts of wildfires. Key CWPP components include conducting risk assessments, implementing mitigation strategies, such as creating defensible spaces around homes and infrastructure, improving emergency access routes, and enhancing community preparedness and evacuation planning. CWPPs are often mandated or encouraged by government agencies at various levels to promote wildfire resilience and public safety. For example, the City of Reno's CWPP is tailored to address the specific challenges and opportunities presented by its urban-wildland interface, focusing on prevention and response strategies to safeguard lives, property, and natural resources while fostering a resilient community.[25]

Energy Emergency

LOCATION

Energy emergencies can affect any portion of the planning area. Rural and populated areas alike are known to experience power outages during winter and windstorms that can last anywhere from several hours to several weeks. The overall effects of a widespread energy emergency would be concentrated in population centers, but the condition is likely to be present throughout the planning area. The electric utility provider for the planning area is NV Energy (formerly Sierra Pacific Power Company). NV Energy owns and operates no facilities that are rated "critical" according to the Department of Homeland Security criteria for National Critical Facilities.

EXTENT

The overall magnitude and potential severity of impacts of energy emergencies is considered Low in Washoe County. Typical energy emergency events are handled at the regional level, and economic impacts could affect the entire County. Considering a worst-case scenario, an energy emergency could require federal support, impact critical facilities, disrupt services for several days, and have national economic impacts. According to the Nevada Office of Energy, multiple alternative energy sources are in place, which may reduce the extent of a possible energy emergency by providing alternatives in the event of a failure.

PREVIOUS OCCURRENCE/HISTORY

Historically, utility disruptions have been caused by both natural and human-caused events. These events include earthquakes, wildland fires, floods, and human activities. Most energy emergencies can be traced back to weather events. Outages can affect fewer than 20 customers in rural areas or more than 50,000 in the cities of Reno and Sparks.

[25] City of Reno, 2024, "Community Wildfire Protection Plan." https://www.reno.gov/government/departments/fire-department/fire-prevention/wildfires-and-living-in-the-wildland-urban-interface

Between 2009 and 2015, there were nine large weather outages in the County, resulting in power loss ranging from 8 to 31 days. The 2013 State of Nevada Enhanced HMP lists an additional six significant outages between 2009 and 2014. NV Energy provided updated data on outages across its system for the 2020 RHMP update (Table 11).

Table 11: Power Outages between 2014 and 2018

Year	Number of Outages	Average Duration (minutes)
2014	934	201
2015	1,323	412
2016	962	219
2017	1,134	223
2018	1,042	192
Grand Total	**5,395**	**259**

The 2018 Nevada State Enhanced HMP references a major power outage in Washoe County due to a weather-related event. From November 9 to 10, 2015, a severe winter storm resulted in numerous broken tree branches because of heavy, wet snow. Over 35,000 customers were without power in Washoe County due to downed power lines.

- **In January 2019,** another winter storm caused 4,000 homes in Washoe County to lose power, requiring 10 specialized NV Energy trouble crews and 50 power line technicians working for over 12 hours to address the issue.[26]
- **On April 11, 2022**, more than 4,400 customers were without power across Northern Nevada. NV Energy reported that the biggest outages were in Washoe and Humboldt counties and Carson City. The biggest outage in Washoe County was in Sparks and affected more than 700 customers. More than 1,200 customers in Carson City were affected.[27]

[26] 2 News Nevada, "Northern Nevada's Power Outages: Causes and Cures." https://www.2news.com/townnews/electricity/northern-nevadas-power-outages-causes-and-cures/article_715b0b56-6289-56bf-8cdf-6f80b7e17a56.html

[27] 2News Nevada, 2022, "Power Restored to 600+ NV Energy Customers Across Northern Nevada." https://www.2news.com/news/power-restored-to-600-nv-energy-customers-across-northern-nevada/article_f2cb5036-b9e5-11ec-a4cf-b3896e39fa68.html



Figure 6: Utility Pole with Power Lines and Transformers[28]

- **On March 2, 2024, March 26, 2024, and June 1, 2023,** Electrical Outages at the Truckee Meadows Water Reclamation Facility (TMWRF) – Several pieces of equipment were corrupted or were otherwise damaged or destroyed. Off-shift personnel were required to respond to the wastewater treatment plant, incurring overtime costs, battery backups for operations technology and information technology were drained, causing a hard shutdown of the servers. Upon startup, there were significant challenges due to degraded or failed mechanical, electrical, IT, and controls equipment. Lack of control systems, accumulation of water in the collection system, storm conditions, and the failure of 25% of the granular media filtration process caused significant hydraulic bottleneck conditions in the filter process. As a result of this hydraulic constraint, several areas of the treatment facility, including the filter building, post-aeration tank, spent backwash tank, pipe trench A, pipe trench B, and nitrification tower moats, experienced flooding. In spite of severe complications due to the power outage, TMWRF staff prevented permit violations.
- **On March 3, 2024**, NV Energy reported numerous outages across Norther Nevada. More than 2,700 customers across Northern Nevada were without power. In a release, NV Energy stated the outages were related to severe wind and significant snow. NV Energy stated that poor visibility and road conditions increased restoration times.[29]
- **On January 21, 2024**, NV Energy reported that over 2,100 NV Energy customers were without power in parts of Northern Nevada. Around 6 a.m., 6,000 NV Energy customers did not have power in the region, but that number dwindled to about 1,100 people by 7:30 p.m., according to NV Energy's website. NV Energy's outage map showed that most of the

[28] Reno Gazette Journal, 2015, Jupiter Images, http://www.jupiterimages.com
[29] 2News Nevada, 2024, "NV Energy Reports Numerous Outages Across Northern Nevada, Sierra." https://www.2news.com/news/nv-energy-reports-numerous-outages-across-northern-nevada-sierra/article_81fa8778-d86a-11ee-9b8d-2f235ac728ad.html

outages were concentrated in and around Reno and Carson City, with the largest single outage in Reno impacting 845 people.[30]

PROBABILITY OF FUTURE EVENTS

Due to the sporadic history of occurrences, the broad range of potential causes, the unpredictability of these causes, and the improvements in energy supply systems because of previous failures, the probability of future occurrence is difficult to measure for this hazard. The overall probability of future energy emergency events is considered medium.

The probability of energy emergencies may increase because of climate change. According to NV Energy, "changes in the climate and environment are contributing to an increased risk of wildfires and other natural disasters. We're responding to these changes in a number of ways to protect our customers, community, and equipment from the risk of extreme weather. This includes public safety outages and other measures."

One way that climate change could impact the odds of an energy emergency is due to increased demand. As temperatures rise and extreme heat events become more frequent, there is increased demand for power to keep cool, which could cause widespread power outages. Extreme weather events due to climate conditions could further increase the risk of weather-related equipment damage as well.

NV Energy implemented the Public Safety Outage Management (PSOM) program to plan power outages to more areas in Northern Nevada with elevated fire risk, recognizing safety as a priority. The goal of the program is to protect customers and the community from the risk of wildfires in extreme and elevated fire-risk areas of Nevada by shutting off power in one or more of its extreme or elevated fire-risk zones when certain environmental conditions are met, and an evaluation of risk is done with guidance from local emergency management teams and other stakeholders. This helps prevent power lines, things that are blown into power lines, and other equipment from causing a wildfire. Residents in Carson City, Washoe, would be affected by the scheduled power outages. NV Energy monitors weather patterns seven to 10 days ahead for any concerning weather patterns. By the 72-hour mark, NV Energy will begin to communicate with local emergency management officials and discuss where they see risks.

[30] Taylor Lane, Las Vegas Review Journal, January 14, 2024, "Thousands Go Without Power in Nevada After High Winds Down Power Lines." https://www.reviewjournal.com/local/local-nevada/thousands-go-without-power-in-nevada-after-high-winds-down-power-lines-2981606/

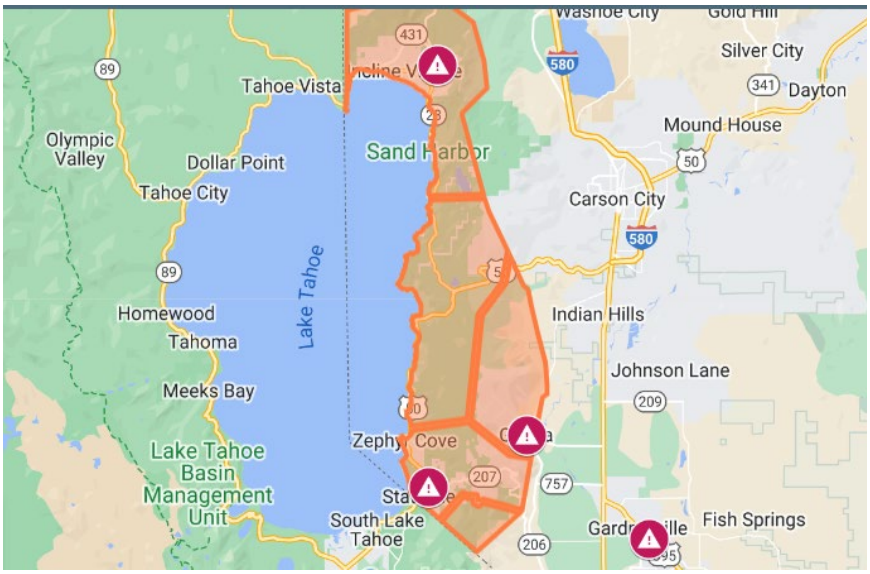


Figure 7: The Northern Nevada Public Safety Outage Management Zone

VULNERABILITY ANALYSIS

Prolonged power outages can cause health emergencies and increased demand for emergency medical services, especially in Nevada, where vulnerable people may be exposed to extreme summer or winter weather conditions. Power outages can also cause disrupted utilities or damaged infrastructure, such as frozen pipes, and economic impacts due to the loss of perishable food and other items. Depending on the cause, a power outage or other energy emergency can cause cascading impacts—most significantly, wildland fires—if an outage was caused by a downed line or other physical damage.

ESTIMATED IMPACT AND POTENTIAL LOSSES

Nevada Governor's Office of Energy Status of Energy Report 2023 states that Nevada's economy relies on the production of safe and affordable energy. It provides essential services to Nevadans and serves as a magnet for new businesses, new industries, and new jobs. For this reason, in 2023, Governor Joe Lombardo outlined a comprehensive and balanced energy policy for Nevada that embraces a wide range of fuels, technologies, and supporting infrastructure. The policy goal is to develop and maintain a robust and diverse energy portfolio that will ensure that Nevada's energy needs are met, making significant progress toward this objective on multiple fronts.[31]

The estimated impacts and potential losses to the City of Reno due to an energy emergency can be significant. Economically, businesses that rely on energy may face operational disruptions,

[31] Nevada Governor's Office of Energy, "Status of Energy Report 2023." https://www.energy.nv.gov/siteassets/content/home/features/2023_Status_of_Energy_Report.pdf

leading to financial losses, especially for small businesses that could temporarily or permanently close.

Public services, including water supply and emergency services, could also be strained, raising public health concerns. Job losses may occur in industries affected by energy shortages, increasing unemployment and destabilizing the local economy.

Additionally, property damage is a risk, particularly for businesses with perishable goods or reliance on machinery, leading to further economic repercussions. Infrastructure may also suffer, as power outages disrupt traffic signals and public transportation, posing safety hazards for residents.

Socially, residents may experience reduced quality of life due to lack of heating or cooling and limited access to information from internet outages. Increased costs for emergency responses and repairs could strain the district's budget.

Finally, the long-term economic effects of energy emergencies could deter investment in the region, making it crucial for local leaders to implement effective energy management strategies and resilience planning.

VULNERABLE POPULATIONS

In addition to the human toll, utility failures, such as power outages, can disrupt daily routines and activities. They can cause transportation delays, canceled trips, and difficulties commuting to work, school, or other important engagements. They can also disrupt access to essential services, such as clean water, electricity, healthcare facilities, and communication networks, compromising people's health, safety, and quality of life. Populations with disabilities or limited mobility face heightened vulnerability. Inaccessible infrastructure because of power failures, such as access to ramps, elevators, or accommodations for visual or hearing impairments, can hinder their ability to evacuate, access emergency services, or receive timely information during incidents.

NV Energy states that some outages occur because of events beyond their control, such as extreme weather conditions and vehicle accidents involving utility poles and equipment. Customers who rely on electricity to power their electrically operated medical equipment must plan to have a backup power supply or make alternate plans for using those devices and refrigerating medications. Also, periods of high heat, high winds, and winter snowfall can cause power outages, and extended outages could impact the community; for example, closing stores, transportation, banks, and gas stations.

DEVELOPMENT TRENDS

- **Economic:** NV Energy has been working to expand its energy generation facilities to incorporate more renewable energy facilities and replace aging equipment on a regular basis. Nevada leads the nation in solar power potential and has already made significant

strides in growing its solar energy capacity. Since 2016, the state's solar energy generation has nearly tripled. As of 2022, solar energy generation accounts for 23 percent of the state's total electricity. Currently, 37 percent of Nevada's electricity comes from renewable sources, helping meet the growing demands of the state, and ensuring that homes and businesses can rely on a robust and secure energy supply (Decreased Vulnerability).

- **Land Use:** The County's upward trend in development increases the overall demand on utilities (Increased Vulnerability).
- **Future development** will create increased demand for utility services. In general, utility providers plan for and complete capital improvements to meet future demands. Factors such as budget constraints or the need to construct new utility plants, like wastewater treatment plants or power generation facilities, may affect the ability of utility providers to serve a significant number of new customers.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 12 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 through 4.0 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 12: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 13 provides the Calculated Priority Risk Index (CPRI) for energy emergency impacts in City of Reno based on the current plan's hazard risk assessment results. The City of Reno assigned energy emergency a risk factor value of 2.4, reflecting a quick onset, and medium frequency impacts. This risk factor value falls in the range of 2.0 to 2.4, which is considered a medium-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 13: Calculated Priority Risk Index for Energy Emergency in the City of Reno

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Energy Emergency	2	2	4	2	3	2.4	Medium

Extreme Weather (Windstorms)

EXTENT

The NOAA National Center for Environmental Information (NCEI) database reports 193 High Wind events for Sparks from 2019 to 2024, resulting in $5k in property damage, 2 injuries, and one death.

- **July 14, 2019:** A long wave trough moved across the northwestern US from the 13th through the 17th and brought breezy conditions each afternoon to western Nevada. A 9-year-old Reno girl died on 19 July from injuries she suffered when strong winds blew an inflatable bounce house with three children inside into power lines. The Washoe County Sheriff's Office says the bounce house was uplifted about 10 feet and got caught on the lines in a south Reno neighborhood.
- Deputies and firefighters rescued the children. They treated two for minor injuries at the scene and transported the 9-year-old girl to the hospital, where she succumbed to her injuries 19 July. The incident occurred on the afternoon of 14 July around 3 p.m. PST. Authorities told KOLO-TV that the bounce house seemed to be secured to the ground but was caught by an especially strong gust of wind. Winds were sustained 15-20 mph with gusts 20-25 mph at nearby Reno-Tahoe International Airport around the incident time.

PROBABILITY OF FUTURE EVENTS

The probability of severe windstorms is **High**, and the potential impact of future climate conditions could increase the risk of Extreme weather events. However, since extreme weather occurs each year, Reno has a number of mechanisms in place to promote safety.

DEVELOPMENT TRENDS

- **Economic:** Over $30 million from the City and one billion dollars in private/other public investment has been made in downtown Reno to modernize and beautify infrastructure and facilities (Increased Vulnerability).
- **Land Use:** The City'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 of extreme weather (Increased Vulnerability).

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 14 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 14: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 15 provides the Calculated Priority Risk Index (CPRI) for extreme weather (including windstorms) impacts in City of Reno based on the current plan's hazard risk assessment results. The City of Reno assigned extreme weather a risk factor value of 3, reflecting high probability, medium duration, and high frequency impacts. This risk factor value falls in the range of 2.5 to 4, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 15: Calculated Priority Risk Index for Extreme Weather in the City of Reno

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Extreme Weather	4	2	1	3	4	3.0	High

VULNERABLE POPULATIONS

In Reno, several populations may be particularly vulnerable to extreme windstorms. One of the most affected groups includes the elderly. Older adults often face mobility challenges, making it difficult for them to evacuate or seek shelter during severe weather events. Additionally, they may rely on external assistance for basic needs, which can be disrupted during such storms.

Another group at risk is low-income residents. Many individuals in this demographic may lack the resources to prepare for extreme weather, such as purchasing necessary supplies or accessing transportation to safer areas. Their living conditions may also be less stable, with homes that are not as well-equipped to withstand harsh winds, increasing the likelihood of damage and resulting displacement.

The homeless population is also particularly vulnerable. Without access to safe housing or emergency shelters, individuals experiencing homelessness are exposed to the elements during windstorms, facing serious health risks. Community outreach and support services become essential in these situations to ensure that they receive protection and assistance.

Children and families are also at risk, especially those living in mobile homes or inadequately constructed housing. These structures are more susceptible to damage from windstorms, and young children may rely on their guardians to make decisions regarding safety and evacuation.

Ultimately, individuals with disabilities may encounter distinct challenges during windstorms. They may require specific accommodations or support to navigate evacuations or access emergency services safely.

Earthquake

An earthquake is sudden motion or trembling of the ground caused by shifting tectonic plates. Earthquakes are potentially catastrophic and capable of causing multiple fatalities and major structural and infrastructure damage, including disruption of utilities, communications, and transportation systems. Secondary effects can include landslides, seiches, liquefaction, fires, and dam failure.

Earthquakes occur abruptly, with little or no warning time. However, seismic monitoring in certain cases can detect increases in geologic and seismic activity that precede an earthquake event. The duration of earthquakes ranges from a few seconds to a few minutes. Aftershocks can recur over hours, weeks, or months, usually with diminishing frequency and intensity.

LOCATION

The State of Nevada is the third most seismically active state in the United States, and Washoe County is in one the most seismically active areas in Nevada. Overall, any area of the County is susceptible to noticeable effects of earthquakes. The most hazardous fault zones in Washoe County are the Mount Rose fault zone, the West Tahoe fault, and the Pyramid Lake fault. In

addition, dozens of smaller faults are in developed areas throughout the County. Fault zones in the Earth's crust are the result of shear motion between tectonic plates and are the causal locations of most earthquakes.

Seiches, or standing waves in a closed body of water, can cause inundation impacts similar to a tsunami. Areas near the shorelines along Lake Tahoe and Pyramid Lake may be affected by seiches following an earthquake. The potential inundation zone surrounding Lake Tahoe includes shoreline areas with an elevation of 6,260 feet.

The location of seismic activity in the State of Nevada from the 1840s through 2015 is indicated in Figure 8. Southern Washoe County, near Reno, Sparks, and north of Lake Tahoe, has higher probabilities of occurrence and more severe potential impacts due to population densities.

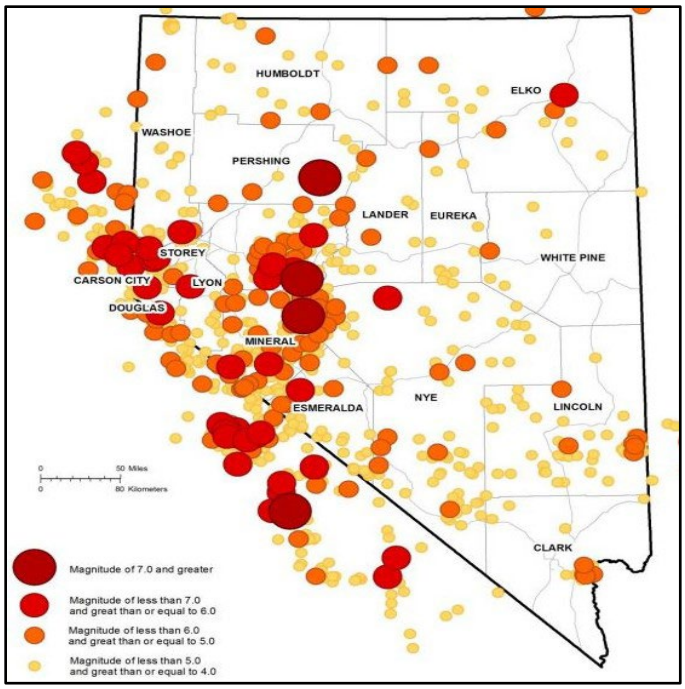


Figure 8: Earthquakes of Magnitude ≥4 in Nevada and Adjacent States, 1840s–2015[32]

EXTENT

There are many methods for measuring the power of an earthquake. The Richter Scale was developed in 1935 by Charles F. Richter of the California Institute of Technology as a mathematical device to compare the size of earthquakes. On the Richter Scale, magnitude is expressed in whole numbers and decimal fractions. For example, a magnitude 5.3 might be computed for a moderate earthquake, and a strong earthquake might be rated as a magnitude 6.3. Velocity, acceleration, and amplitude (displacement) are examples of aspects of ground

[32] 2018 State of Nevada Enhanced Hazard Mitigation Plan, Nevada Seismological Lab, Nevada Bureau of Mines and Geology, "Earthquakes in Nevada Magnitude 4.0 or Greater, 1840-2015."

motion that can be directly measured. The amount of energy released during an earthquake is commonly expressed on the moment magnitude scale and is a measure of energy released from the fault or epicenter, as recorded on seismographs. The use of the moment magnitude scale has largely replaced the use of the Richter Scale.

Another measure of earthquake magnitude is intensity. Intensity is an expression of the amount of shaking at a given location on the surface as felt by humans and is defined by the Modified Mercalli Intensity (MMI) Scale. It is typically the greatest cause of losses to structures during earthquakes and is determined by many factors, including distance from epicenter and soil types. Table 16 features abbreviated descriptions of the 12 levels of intensity of the Modified Mercalli Intensity Scale.

Table 16: Magnitude/Intensity Comparison for Earthquakes[33]

Magnitude	Typical Maximum MMI	Abbreviated Modified Mercalli Intensity Scale
1.0–3.0	I	I. Not felt except by a very few under especially favorable conditions.
3.0–3.9	II–III	II. Felt only by a few persons at rest, especially on upper floors of buildings.
		III. Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
4.0–4.9	IV–V	IV. Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
		V. Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
5.0–5.9	VI–VII	VI. Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
		VII. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary

[33] US Geological Survey, "Magnitude/Intensity Comparison for Earthquakes" http://earthquake.usgs.gov/learn/topics/mag_vs_int.php, page last modified September 29, 2014)

Magnitude	Typical Maximum MMI	Abbreviated Modified Mercalli Intensity Scale
		structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
6.0–6.9	VIII–IX	VIII. Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
		IX. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
7.0 and higher	X and Higher	X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
		XI. Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.
		XII. Damage total. Lines of sight and level are distorted. Objects thrown into the air.

Figure 9 is the National Seismic Hazard model illustrating the chance of slight (or greater) damaging earthquake shaking (MMI VI or greater) in 100 years. Washoe County is in the 75-95% greater chance range.

Earthquakes can cause significant, widespread structural damage throughout the region. Most critical facilities in Washoe County are in areas that may experience relatively high seismic ground motion hazards. These facilities may experience peak ground acceleration with a 2% probability of exceedance in 50 years of greater than 48% gravity, which would be experienced as severe shaking likely to cause moderate or heavy damage to structures. For most critical facilities in the County, smaller earthquakes (resulting in peak ground acceleration with a 10% probability of exceedance in 50 years) could produce ground motion ranging from 16% to 64% gravity. These levels of peak ground acceleration would be experienced as strong to severe shaking and could cause light to heavy damage to structures.

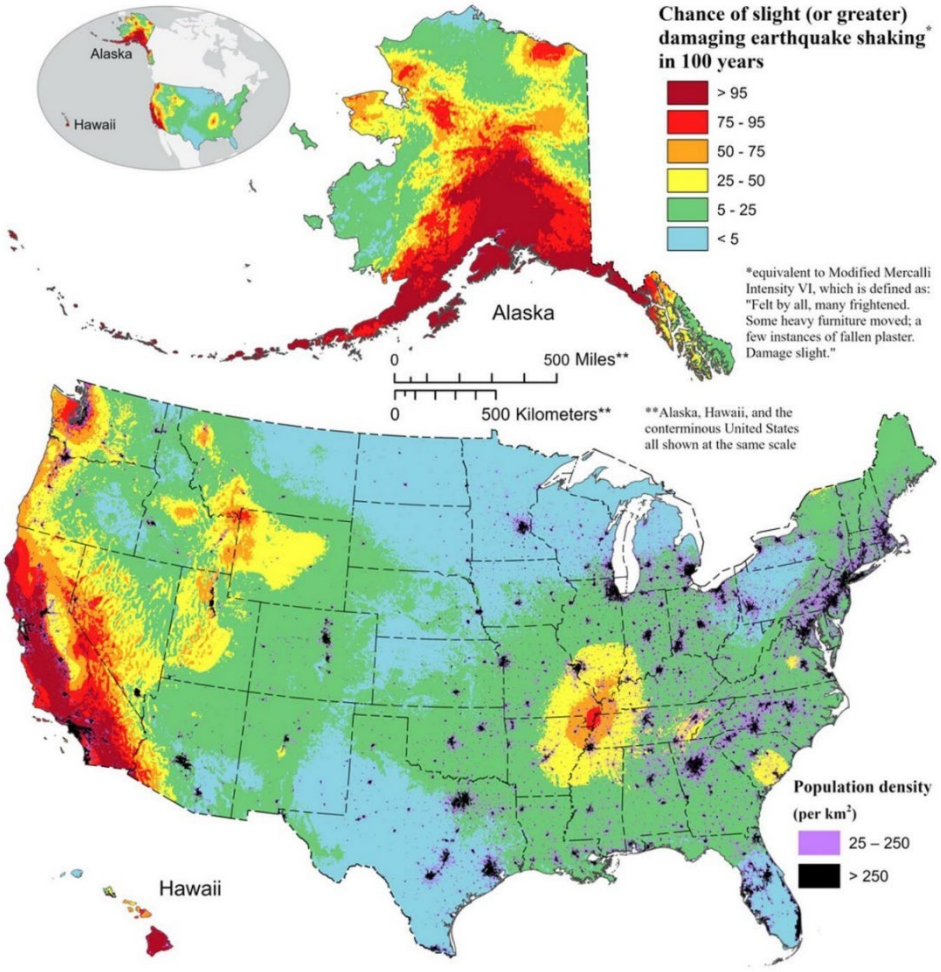


Figure 9: National Seismic Hazard Model[34]

PREVIOUS OCCURRENCE/HISTORY

The National Center for Environmental Information (NCEI) storm database, one source of historic information presented in the data of this plan, does not capture earthquake events in the same way as other hazards. Previous earthquake data in Washoe County were extracted from the Nevada Seismological Laboratory and the USGS online archives (Nevada Seismological Laboratory 2010; USGS n.d.). Magnitudes less than five on the MMI Scale are likely to be felt by many people but are unlikely to cause damage to property. At a magnitude of 5 or greater on the MMI Scale, earthquakes are felt by most people, and some unstable objects may be broken or overturned. Previous earthquake occurrences are highlighted when an occurrence resulted in a magnitude of 5 or higher on the MMI Scale between 1852 and 2023.

[34] USGS, 2023, "National Seismic Hazard Model." https://www.usgs.gov/media/images/national-seismic-hazard-model-2023-chance-damaging-earthquake-shaking

The following earthquakes of M5 or greater occurred in Washoe County between 1852 and 2023:

- May 30, 1868: M6.0
- December 27, 1869: M6.7
- July 10, 1877: M5.0
- June 3, 1887: M5.5
- November 18, 1894: M5.5
- February 18, 1914: M6.0
- April 24, 1914: M6.4
- April 27, 1914: M5.0
- May 25, 1937: M5.0
- June 18, 1937: M5.3
- May 9, 1942: M5.1
- December 3, 1942: M5.9
- December 29, 1948: M6.0
- May 9, 1952: M5.1
- September 26, 1953: M5.5
- September 26, 1959: M5.3
- April 25, 2008: M5.0

The largest earthquake in the past 50 years in Washoe County occurred on April 25, 2008. Small earthquakes began in the western Reno, Nevada, region in February 2008 and grew in size and frequency until mid-April. On April 15, 2008, seismic activity greatly increased, producing four events of magnitude 3 and above. The earthquake swarm increased again on April 24, 2008, with two magnitude 4 events. The mainshock occurred on April 25, 2008, with a magnitude of 5 and caused violent shaking at Mogul and Somersett. A vigorous aftershock sequence followed into the summer of 2008.

Figure 10 illustrates recorded earthquakes in and near Reno Nevada at magnitude 5 or greater between 2018 and March 2024.

While buildings overall survived the shock well, reports indicated that the violent rocking of buildings led to some structural damage, such as cracked paint and plaster along drywall seams, wall and ceiling corners, and doors and entryways. There were some instances of cracked stucco on outside walls and dislodged roof tiles. These types of repairs to a home can cost a couple thousand dollars. In fewer cases, garage walls were displaced from the foundation. More complicated repairs such as this are estimated to cost $5,000–$10,000. There was significant nonstructural damage due to the earthquake. Many homes and businesses withstood damage to household items and merchandise. One utility, a water canal used as a source for local water treatment, withstood damage from the earthquake (Figure 11).

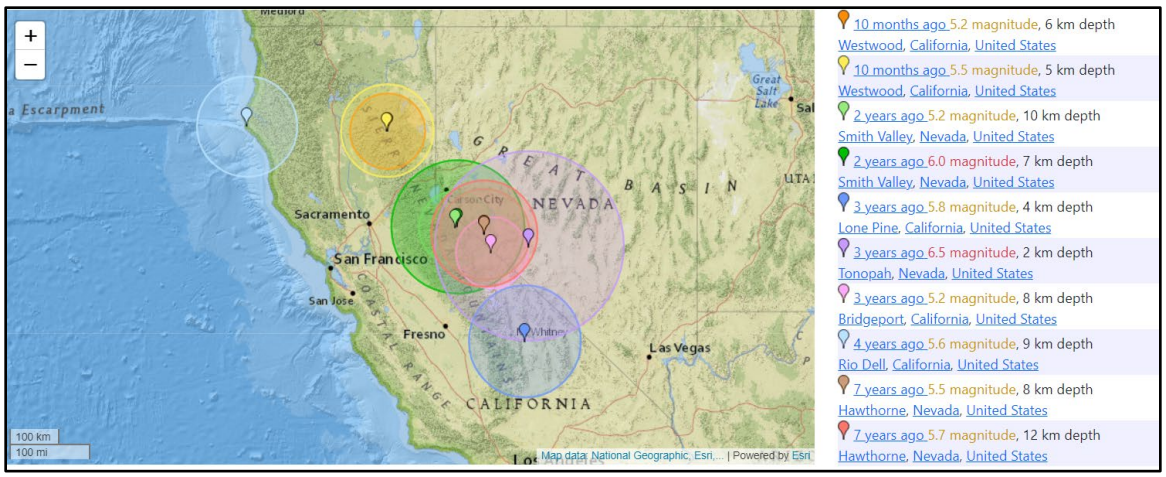


Figure 10: Earthquakes >M5 Near Reno Nevada (As of 4/1/2024)[35]



Figure 11: Water Flume Damaged by the 2008 Mogul–Somersett Earthquake[36]

PROBABILITY OF FUTURE EVENTS

Figure 12 maps the potential intensity of earthquakes in Nevada at a common level of peak ground acceleration. The map shows the intensity of peak ground acceleration with a 2% probability of exceedance in 50 years. The recurrence interval for an event with this probability is 2,500 years. The region of Washoe County with the highest predicted peak acceleration is centered on the Reno/Carson City metropolitan area. The peak ground acceleration range at this probability for the city of Reno is 80–120% percent gravity.

[35] Earthquaketrack.com, 2024, "Earthquakes M5> recorded Near Reno Nevada (As of 4/1/2024)." Earthquakes in Reno, Nevada, United States – Most Recent > 5.0M (earthquaketrack.com)

[36] 2020 Regional HMP, "2008 Mogul-Somersett Earthquake Damage Rock fall damage to water flume" (Nevada Bureau of Mines and Geology, University of Nevada, Reno; dePolo 2008)

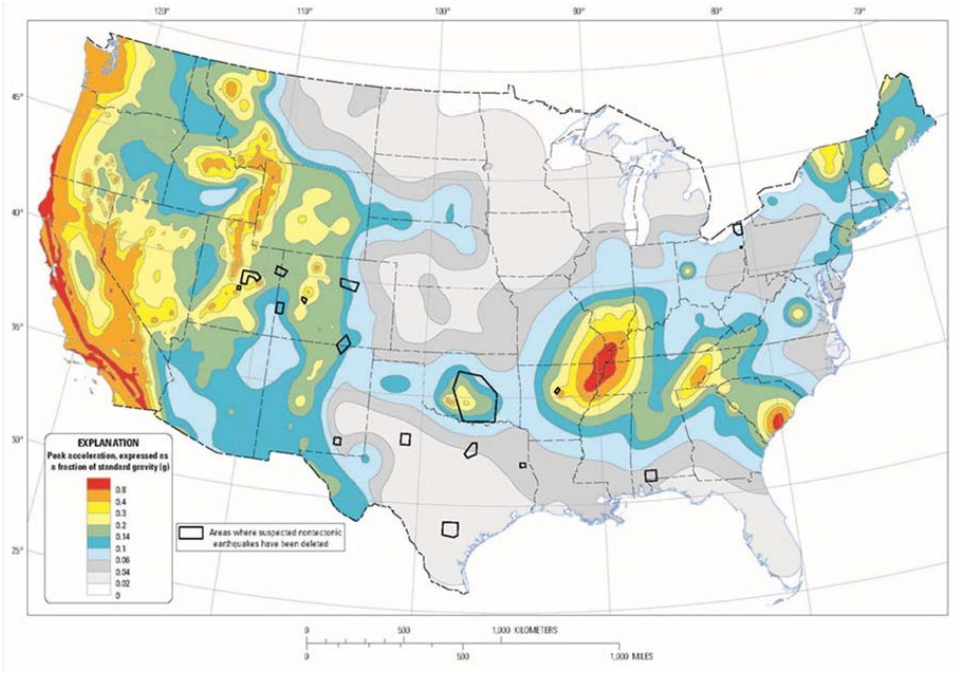


Figure 12: Peak Ground Acceleration (%g) with 2% Probability of Exceedance in 50 Years[37]

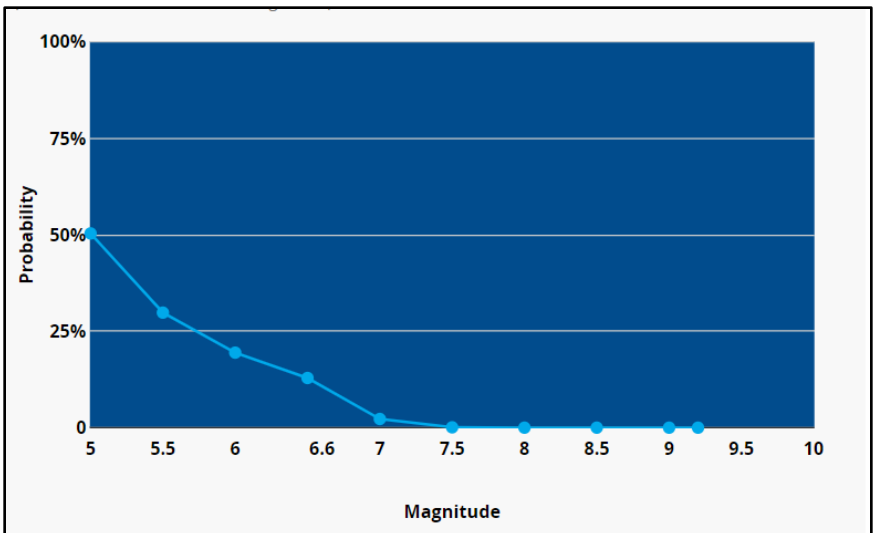
According to the previous lists of earthquake occurrences in Washoe County, 17 earthquakes with a magnitude >5 have occurred in the last 150 years. The probability of future occurrence can be estimated at 10%; this means that there is roughly a 10% chance of an earthquake with a magnitude >5 to occur every year. The overall probability of future occurrence of an earthquake measuring 5.0 magnitude or higher is considered Medium, with an estimated 1%–10% chance of occurrence in a given year.

Future climate conditions are unlikely to have any effect on earthquake magnitude, severity, or probability.

VULNERABILITY ANALYSIS

The 2018 Enhanced State Hazard Mitigation Plan (SHMP) states that earthquakes are responsible for the formation of the Nevada mountain ranges, which continue to develop. Seismicity, earthquake faults, and geodetically measured deformation all indicate that future large earthquakes can occur anywhere in the state. In the short term, personal preparedness, emergency response planning, and community recovery planning are critical. In the long term, constructing seismically resilient buildings, planning future development around earthquake faults, and developing earthquake early warning systems will help reduce injuries and damage from future earthquakes.

[37] 2020 Regional HMP, USGS 2014, "Peak Ground Acceleration (%g) with 2% Probability of Exceedance in 50 Years." https://www.washoecounty.gov/em/files/Regional-HMP-2020.pdf



MAGNITUDE	PROBABILITY	MAGNITUDE	PROBABILITY	MAGNITUDE	PROBABILITY
5.0	50.33%	6.0	19.44%	7.1	1.37%
5.1	45.29%	6.1	18.02%	7.2	0.82%
5.2	45.29%	6.2	16.78%	7.3	0.43%
5.2	40.71%	6.3	15.57%	7.4	0.22%
5.3	36.61%	6.4	14.30%	7.5	0.09%
5.4	32.98%	6.5	12.87%	7.6	0.01%
5.5	29.81%	6.6	9.70%	7.7	0.00%
5.6	27.05%	6.7	7.41%	7.8	0.00%
5.7	24.68%	6.8	5.57%	7.9	0.00%
5.8	22.65%	6.9	3.80%	8.0	0.00%
5.9	20.91%	7.0	2.25%	8.1	0.00%

Figure 13: Washoe County Earthquake Probability and Magnitude[38]

ESTIMATED IMPACT AND POTENTIAL LOSSES

Due to its seismic activity, the estimated impacts and potential losses to the city of Reno from earthquakes can be significant. Structural damage to buildings and infrastructure is a primary concern; older structures, particularly at risk, could face severe repair costs and even collapse.

[38] Homefacts, 2024, "Earthquake Information for Washoe County, Nevada." https://www.homefacts.com/earthquakes/Nevada/Washoe-County.html#:~:text=Washoe%20County%2C%20NV%20has%20a%20high%20earthquake%20risk%2C,County%2C%20NV%20was%20a%204.8%20Magnitude%20in%201993

These damages lead to economic implications, as business interruptions can decrease revenue and affect local tourism, which is crucial for the economy.

Emergency services would likely be overwhelmed after a major earthquake, resulting in substantial costs for response and recovery efforts. Additionally, injuries and fatalities could strain healthcare systems and raise public safety concerns. Disrupting essential services like water and electricity can create prolonged outages, complicating recovery efforts.

The local insurance market may also be affected, with increased claims potentially leading to higher premiums for property owners. Preparing for these risks through comprehensive assessments and resilient infrastructure is vital for minimizing potential losses and ensuring community safety in Reno.

Washoe County's building codes require all development to meet building standards based on seismic zones. The codes that have been adopted are the 2018 International Building Code and the 2018 International Residential Code (IRC) with the Northern Nevada Amendment package.

SEISMIC DESIGN

Washoe County has established the following requirements for structures:[39]

- **International Building Code (IBC), Chapter 16, Section 1613, amended:** The seismic design for structures in Washoe County shall be based on the response parameters and equations of Chapter 16. See ASCE 7-16 as referenced in the IBC.
- **International Residential Code (IRC), Chapter 3 for single-family residential structures:** Use Category "D2."

Most earthquake-related property damage and death are caused by the failure and collapse of structures due to ground shaking. Other damaging earthquake effects include landslides, the down-slope movement of soil and rock (in mountain regions and along hillsides), and liquefaction. According to USGS data, damage caused by an earthquake will begin at a level of ground shaking (peak ground acceleration, or PGA) of approximately ten percent of the force of gravity (0.1g, or 10%g). Below this level, damage is typically very slight except in unusually vulnerable facilities. Damages from ground shaking at 10%g–20%g tend to be minor to moderate, with only unusually poor buildings being subject to potential collapse. Events in the range of 20%g to 50%g may cause significant damage in some modern buildings and very high levels of damage (including collapse) in poorly designed buildings. Events of more than 50%g may cause higher levels of damage in many buildings, even those designed to resist seismic forces.

[39] Washoe County, Nevada, 2024, "Building: Design Requirements." https://www.washoecounty.gov/building/ConstructionDesign%20Requirements.php

Earthquakes can cause a variety of impacts, such as structural damage to buildings, fires, damage to bridges and highways, initiation of slope failures, and liquefaction. The types of impacts depend on factors, such as the location of the earthquake, the level of development of the area, and the ability of infrastructure to withstand shaking. Earthquakes can also cause death, injury, destruction of homes, disruption of transportation and communication networks, and water supply contamination. This is all dependent upon the magnitude of the earthquake, the depth of the focus, the distance from the epicenter, the population density, and the mitigation actions in effect to disrupt the impacts of the earthquake. Cascading impacts of earthquakes of high magnitude, potentially resulting in the need for additional mitigation actions, include landslides, utility failures, infrastructure failures, conflagration, food, hydration, medical supply shortages, and economic disruption.

The overall magnitude and potential severity of impacts of earthquakes is considered High in Washoe County. Events are handled at the county level; they disrupt services for one to three days, and their economic impacts affect a city or community. In a worst-case scenario, earthquakes can require federal support, can impact critical facilities and disrupt services for more than 20 days, and can have national economic impacts.

Figure 14 illustrates the National Risk Index rating the Expected Annual Loss for City of Reno at $1.8 Million from earthquake, with a rating of relatively moderate expected annual losses, and a risk score of 96.7.

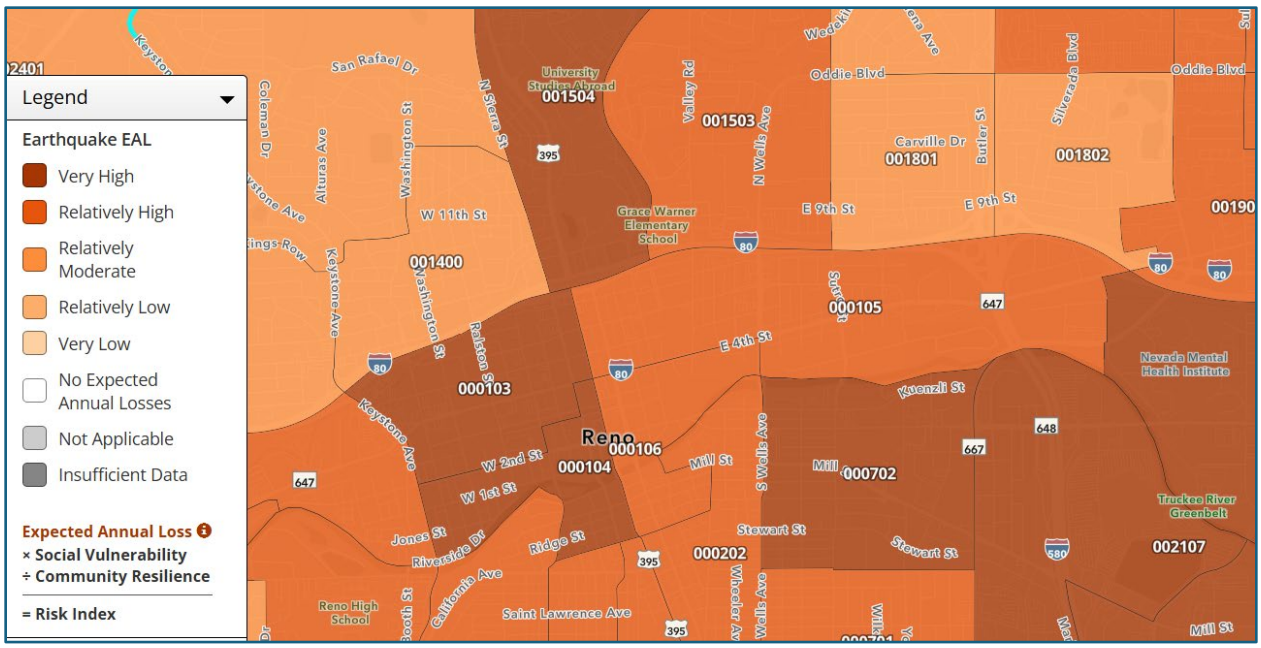


Figure 14: City of Reno NRI Earthquake Expected Annual Loss[40]

VULNERABLE POPULATIONS

When an earthquake damages buildings and infrastructure, the people around and within are in danger. Individuals and families can suffer injury and death during and following an earthquake. Debris and damage can trap people in buildings, creating unknown survival conditions,

[40] FEMA, National Risk Index, "City of Reno, Nevada Earthquake Expected Annual Loss Score, Map and Legend." https://hazards.fema.gov/nri/map

depending on the extent of building damage and resources available. When buildings collapse, roads crack, or bridges suffer damage, resulting injuries to those in the vicinity can range from minor to extensive to the point of permanent disability or death. Following a severe earthquake with extensive damage, entire communities can become homeless, and emergency services can be stressed beyond capacity. This type of devastation can have lasting effects on people's physical, emotional, and mental well-being.

Earthquakes can have immediate and long-term impacts on health. Immediate heath impacts include trauma-related deaths and injuries from building collapse and trauma-related deaths and injuries from secondary effects, such as burns from fires. Long-term health effects from earthquakes can include conditions such as posttraumatic stress disorder (PTSD), depression, and severe anxiety. Earthquakes strike quickly with no warning, putting those in impacted areas in danger. Because of the unpredictable nature of earthquakes, it is normal for people to experience emotional distress. Feelings such as overwhelming anxiety, trouble sleeping, and other depression-like symptoms are common responses to these types of disasters.

Long-term impacts on the community following an earthquake may include displacement, disruption of government services, economic impacts, and health risks because of increased airborne particulate matter or contamination of water or soils from hazardous materials spills or releases of sewage. The severity and duration of these impacts would depend on the severity of the earthquake and damage to infrastructure and buildings across the region. A significant loss of population following an earthquake because people relocating outside the region could cause an extended loss of revenue for local governments and economic impacts from a decrease in the workforce.

COMMUNITY LIFELINES

In the event of an earthquake, electrical power lines on the National Power Grid are likely to be damaged and cause extended power outages and potential fires. Downed telecommunication towers would cause a loss of communications systems throughout the county. Road debris (i.e., downed trees, powerlines, other structural debris) could block roads and cracks in road surfaces because the earthquake's impact could limit access of emergency responders.

DEVELOPMENT TRENDS

- **Economic:** While the County has implemented current seismic codes to reduce risks to new development, regional economic development in recent years has increased the potential dollar valuation of damage caused by a catastrophic earthquake (Increased Vulnerability).
- **Building codes** adopted by Washoe County require all development to meet building standards based on seismic zones. The currently adopted codes are the 2018 International Building Code and the 2018 IRC with the Northern Nevada Amendment package. Future development in Washoe County will be required to comply with current seismic codes, which will decrease vulnerability to earthquakes.

- **Land Use:** New buildings have been constructed to higher standards to withstand the potential impacts of an earthquake (Decreased Vulnerability).

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 17 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 17: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 18 provides the Calculated Priority Risk Index (CPRI) for earthquake impacts in City of Reno based on the current plan's hazard risk assessment results. The City of Reno assigned earthquake a risk factor value of 2.1, reflecting medium probability, magnitude, and frequency and high duration impacts. This risk factor value falls in the range of 2.0 to 2.4, which is considered a medium-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 18: Calculated Priority Risk Index for Earthquake in the City of Reno

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Earthquake	2	2	1	4	2	2.1	Medium

Flooding

Floods are among the most frequent and costly natural disasters in terms of human hardship and economic loss. They can cause substantial damage to structures, landscapes, and utilities and jeopardize life safety. Specific health hazards are also expected in flooding events. Standing

water and wet materials in structures can become breeding grounds for microorganisms, such as bacteria, mold, and viruses. When flooding occurs in populated areas, warnings and evacuation will reduce life and safety impacts. Please refer to the base plan, specifically pages 250 and 258, for flood maps.

- **Flash flooding** is associated with floods of significant volume and short duration. Flash floods often fall short of a 100- or 500-year flooding event and generally create impacts associated with stormwater runoff. In contrast to riverine flooding, this type usually results from heavy rainfall on a relatively small drainage area and usually occurs in the spring and summer from thunderstorms. It is important to note that even in drought, scattered summer thunderstorms can bring excessive rainfall and flash flooding, particularly near wildland fire burn scars that enhance water runoff. Flash floods produce debris flows and significant water runoff laden with burn debris and mud. Urbanization increases runoff by two to six times compared with undeveloped terrain because of the relative impermeability of surfaces in urban areas.
- **Closed-basin flooding** occurs when a lake has no outlet or a relatively small outlet that limits the lake's ability to drain during storm events. Floodwaters in closed-basin lakes accumulate over long periods and are susceptible to dramatic fluctuations in water levels that may remain for weeks, months, or years.
- **Riverine flooding** is flooding that occurs along a channel. Here, a "channel" is defined as a feature on the ground that carries water through and out of a watershed. It can be a channel, such as a river or streams, or a human-made channel, such as a drainage ditch. Riverine flooding occurs when excessive rainfall over an extended period causes a river to exceed its capacity.
- **Overbank flooding** occurs along a channel, as excess flows overflow channel banks. Overbank flooding occurs when downstream channels receive more rain or snowmelt from their watersheds than normal.
- **Urban drainage flooding** occurs when the capacity of an urban drainage system is exceeded. An urban drainage system comprises ditches, storm sewers, retention ponds, and other facilities constructed to store runoff or carry it to a receiving stream or lake.. Urban drainage flooding can also occur in areas protected by levees, as water collects on the protected side of the levee when pump capacities are exceeded during extreme weather. Storm water is a natural part of the Washoe County landscape, but too much creates public hazards and causes damage to both private and public property.

The National Weather Service (NWS) publishes public alert statements, along with watches, warnings, and advisories. Table 19 lists the categories and their descriptions.

Table 19: Watches, Warnings, and Advisories Issued by the National Weather Service

Category	Action	Interpretation
Flash Flood Warning	Take Action	A Flash Flood Warning is issued when a flash flood is imminent or occurring.
Flood Warning	Take Action	A Flood Warning is issued when the hazardous weather event is imminent or already happening. A Flood Warning is issued when flooding is imminent or occurring.
Flood Advisory	Be Aware	A Flood Advisory is issued when a specific weather event that is forecast to occur may become a nuisance. A Flood Advisory is issued when flooding is not expected to be bad enough to issue a warning. However, it may cause significant inconvenience, and if caution is not exercised, it could lead to situations that threaten life and/or property.
Flood Watch	Be Prepared	A Flood Watch is issued when conditions are favorable for a specific hazardous weather event to occur. A Flood Watch is issued when conditions are favorable for flooding. This does not mean flooding will occur, but it is possible.

The National Weather Service (NWS) categorizes the extent (magnitude or severity) of riverine and flash flooding in which a river has reached the flood stage as minor, moderate, and major. The categories are based on property damage and public threat and are as follows:

- **Minor flooding** – Minimal or no property damage but possibly some public threat or inconvenience.
- **Moderate flooding** – Some inundation of structures and roads near streams; some evacuations of people and/or transfer of property to higher elevations.
- **Major flooding** – Extensive inundation of structures and roads; significant evacuations of people and/or transfer of property to higher elevations.

100-year and 500-year floods have a 1 in 100 chance or 1 in 500 chance (i.e., 0.1% or 0.2% chance) of being exceeded in a year. Major flooding at this scale generally occurs in Washoe County as a result of two types of storm events: (1) heavy, prolonged rainfall on top of a deep snowpack in the Sierra Nevada, and (2) heavy, prolonged rainfall that spills over into the normally rain-shadowed Reno/Sparks area. A hybrid of both scenarios can lead to these levels of flooding. Floods of this magnitude occur in river systems whose tributaries may drain large geographic areas and include one or more independent river basins. Truckee River flooding, in particular, has been of primary concern to the Reno/Sparks metropolitan area. Intense storms can overwhelm local waterways and the integrity of flooding control structures.

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 and southern Sparks. Recent flash flooding in the Hidden Valley area impacted roughly 100 homes. The areas impacted most by flood waters stretch from Blue Hills Drive down to Loma Vista Lane and East Hidden Valley Drive. Moderate flooding is forecast in urban areas and near rivers and streams. The Truckee River headwaters comprise the Lake Tahoe Basin. The river drains part of the high Sierra Nevada and empties into Pyramid Lake, 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

EXTENT

The magnitude and potential severity of impacts of flooding is considered High in Washoe County. Severe floods may cause serious injuries and deaths and damage public facilities and private property. The river's height can determine the extent of flooding flows compared with flooding stages determined by USGS stream gauges throughout the area. It can also be measured by comparing water elevations to past flooding damage. Major floods may disrupt services for weeks, and response likely requires state and, potentially, federal support. In closed basins, flooding conditions may be present over a long period, ranging from months to years, because of the lack of natural drainage.

Areas of the County with poor drainage may experience limited, localized flooding annually. Major floods on the Truckee River have occurred approximately once a decade. Since 1986, closed basins in the North Valleys have flooded roughly once a decade. The highest lake elevations were measured following the winter storms in March 2017.[41]

Figure 15 illustrates a Special Flood Hazard Area (SFHA), the land area covered by the floodwaters of the base flood (red line in the figure), requiring NFIP floodplain management enforcement and mandatory flood insurance applies for federally backed mortgages. The SFHA

[41] Truckee Meadow Water Authority Water Resource Plan, "2020-2040 Water Resource Plan." https://tmwa.com/wrp2020/

designates an area that is covered by the floodwaters of the base flood; that is, a flood that has on average, a 1% chance of occurring in a given year.

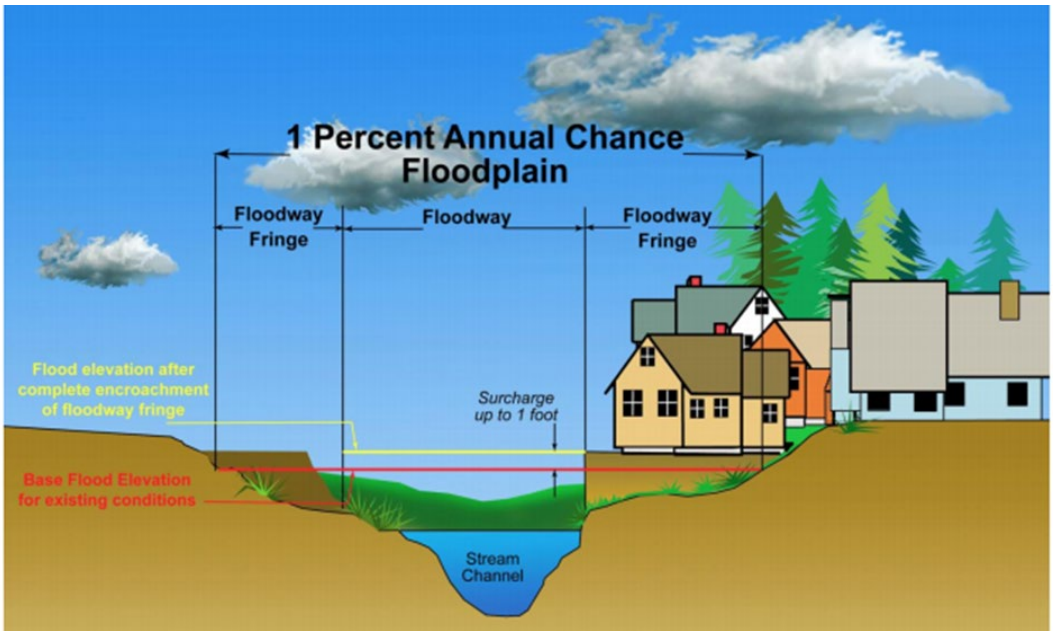


Figure 15: Schematic of 100-Year Floodplain[42]

PREVIOUS OCCURRENCE/HISTORY

NOAA's NCEI Storm Events Database records 9 flooding episodes (flash flood, flooding, and lakeshore flooding) in Washoe County (Greater Lake Tahoe Area, Greater Reno-Carson City-Minden Area, Western Nevada Basin and Range including Pyramid Lake, Northern Washoe County) between 2018 and 2024 causing no recorded property damage or crop damage, and no injuries.

The FEMA web site (www.fema.gov/disasters) documents no major disaster declaration for Washoe County due to flooding.

Numerous major flooding events have impacted the county. The most significant impact events include the following:

- **December 2022–April 2023:** Back-to-back atmospheric rivers and widespread flooding impact residential areas. Irrigation ditches ice dams and overtopping, resulting in flooding of downstream residential areas. Stream and creek flooding. Sustained high Truckee River flows, resulting in erosion and concerns at bridge crossings.
- Hidden Valley, July 25, 2024

[42] Nebraska Department of Natural Resources, "Interactive Maps." https://dnr.nebraska.gov/floodplain/interactive-maps

- Steamboat, March 9–10, 2023
- Huffaker Hills, August 5, 2022
- Sparks, December 23, 2021
- Harold's Trapshoot SP, December 23, 2021
- Washoe City, July 1, 2021
- Sparks, June 30, 2021
- Reno Stead Airport, July 25, 2019
- Closed-basin flooding in Lemmon Valley, January and February 2017
- Truckee River and tributary flooding
  - December 24, 2005, to January 3, 2006
  - December 16, 1996, to January 6, 1997
  - February 11 to February 20, 1986

There was considerable flooding of Swan Lake in December 2017. Figure 16 shows efforts by Washoe County to control the flooding, while Figure 17 is an aerial photograph of the flooding.



Figure 16: Flood Barriers Being Set Up on the Edge of Swan Lake by Washoe County[43]

[43] Reno Gazette Journal, March 5, 2018, photo credit Jason Bean
https://www.rgj.com/story/news/2018/03/05/



Figure 17: Aerial Photograph of Swan Lake Flooding, March 23, 2017[44]

REPETITIVE FLOOD LOSSES

The NFIP tracks Repetitive Loss (RL) properties, which are NFIP-insured properties that, since 1978 and regardless of any changes in ownership during that period, have experienced any of the following:

- Four or more paid losses in excess of $1,000.
- Two paid losses in excess of $1,000 in any rolling 10-year period.
- Three or more paid losses that equal or exceed the current value of the insured property.

SEVERE REPETITIVE FLOOD LOSSES

The NFIP also tracks Severe Repetitive Loss (SRL) properties, which are NFIP-insured properties that, since 1978 and regardless of any changes in ownership during that period, have experienced any of the following:

- Four or more separate claim payments have been made under a Standard Flood Insurance Policy issued pursuant to this title, with the amount of each such claim exceeding $5,000, and with the cumulative amount of such claims payments exceeding $20,000; or
- At least two separate claims payments have been made under a Standard Flood Insurance Policy, with the cumulative amount of such claim payments exceeding the fair market value of the insured building on the day before each loss.

PROBABILITY OF FUTURE EVENTS

The probability of flooding in the planning area is High. Given a potential increase in high-intensity precipitation events, particularly in the winter months, and increasing development

[44] Photo credit: Tech Sgt. Emerson Marcus/Nevada National Guard.

resulting in additional impervious surface, the County may be impacted by the rise in the probability of future floods and closed-basin flooding.

IMPACTS OF CLIMATE TRENDS AND VARIATIONS

Even though it is known as the driest state, Nevada has experienced many catastrophic floods. Because a warmer atmosphere can carry more water, the most extreme storms are expected to become even more extreme. For example, projected near-term and long-term changes in peak annual runoff rates (the maximum daily runoff rate occurring during the average year) are projected to increase more than 25% to 50% above historical peak rates across much of the state, especially in and around many mountain ranges.[45] Flooding impacts related to climate change include increased high-intensity precipitation events in the winter months, increased intensity of winter storms, and changing flooding regimes and return patterns.

VULNERABILITY ANALYSIS

The magnitude and potential severity of impacts of flooding is considered High in Washoe County. Severe floods may cause serious injuries and deaths and damage public facilities and private property. The river's height can determine the extent of flooding flows compared with flooding stages determined by USGS stream gauges throughout the area. It can also be measured by comparing water elevations to past flooding damage. Major floods may disrupt services for weeks, and response likely requires state and, potentially, federal support. In closed basins, flooding conditions may be present over a long period, ranging from months to years, because of the lack of natural drainage.

ESTIMATED IMPACT AND POTENTIAL LOSSES

All types of flooding can cause widespread damage throughout rural and urban areas, including but not limited to: water-related damage to the interior and exterior of buildings; destruction of electrical and other expensive and difficult-to-replace equipment; injury and loss of life; proliferation of disease vectors; disruption of utilities, including water, sewer, electricity, communications networks and facilities; loss of agricultural crops and livestock; placement of stress on emergency response and healthcare facilities and personnel; loss of productivity; and displacement of persons from homes and places of employment. Any type of agricultural, commercial, residential, and recreational development and natural communities (e.g., wetlands, marshes) in a floodplain (inland or coastal) are vulnerable to flooding. Increased urbanization, and thus an increase in paved surfaces, enhances the threat of flooding where drainage systems cannot cope with the increased input of stormwater runoff and decrease in natural water infiltration into the soil (increasing runoff). In rural areas, property damage caused by flooding can be devastating to farmers. When flooding occurs during the growing season, farmers can suffer widespread crop loss. Livestock farmers may lose livestock if they

[45] University of Nevada, College of Agriculture Extension Program, 2024, "Climate Change Impacts in Nevada." https://extension.unr.edu/publication.aspx?PubID=3957

are unable to find safe ground during rising floodwaters. This threat to agricultural areas is primarily associated with flash flooding.

Flooding can also pose several threats to industrial, residential, and commercial properties. Industrial facilities of all types typically handle and store various quantities of hazardous materials for their operations. These materials can come into contact with flood waters and be released into the environment, impacting local water sources and natural resources and threatening public health. Buildings can experience significant water-related damage, sometimes beyond repair, because of flooding. Household furnishings and business inventories can be lost if there is not adequate time to remove items to safe locations. Besides being at risk because of floodwater, people face the threat of explosions and fires caused by leaking gas lines, along with the possibility of being electrocuted.

Even wild animals, forced out of their homes and brought into contact with humans by floodwaters, can be a threat. Post-flood concerns could include mold growth on structures, creating an increased health concern. Severe flooding can cause extensive damage to public utilities and disrupt the delivery of services. Loss of power and communications can be expected. Drinking water and wastewater treatment facilities may be temporarily out of operation. The impacts of flooding on transportation are particularly noteworthy. Flooded streets and roadblocks make it difficult for emergency vehicles to respond to calls for service. Floodwaters can wash out sections of roadway and bridges. Most importantly, most fatalities that occur in floods are the result of people trying to drive on roads covered by floodwaters.

Figure 18 illustrates the National Risk Index rating the Expected Annual Loss for Washoe County at $310K from riverine flooding, with a rating of very high expected annual losses, and a risk score of 95.1.

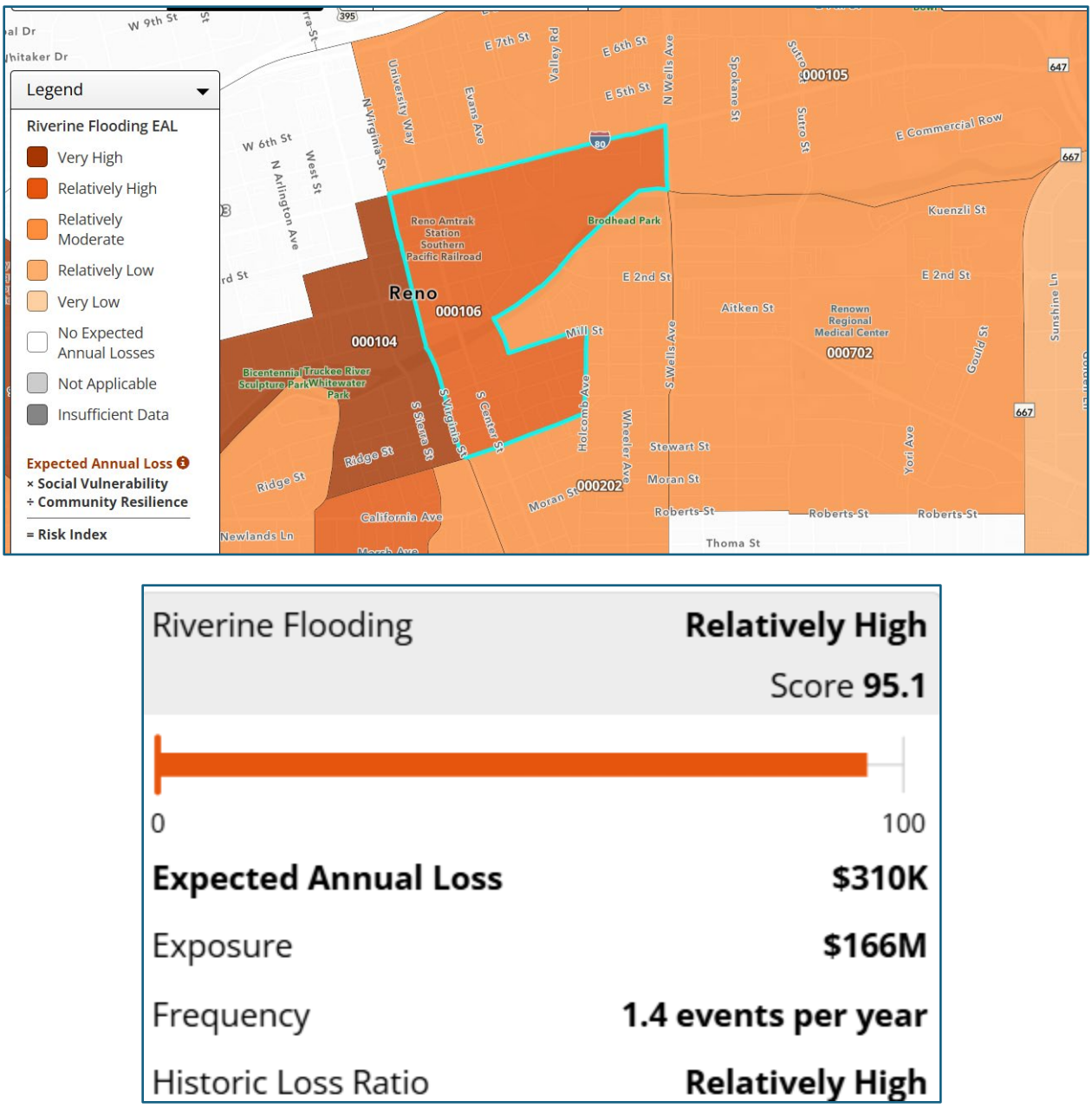


Figure 18: City of Reno NRI Riverine Flooding Expected Annual Loss Score, Map, and Legend[46]

IMPACT ON COMMUNITY ASSETS

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

[46] FEMA, National Risk Index, "City of Reno Riverine Flooding Expected Annual Loss Score, Map and Legend," https://hazards.fema.gov/nri/map

flooding can affect smaller creeks and streams and areas near burn scars, and critical facilities outside of mapped floodplains may be affected.

Closed-basin flooding in Washoe County occurs in and around playas, which may become shallow lakes during periods of increased precipitation. Development on a playa or in adjacent low-lying areas is most vulnerable to the impacts of closed-basin flooding. Vulnerable areas in Washoe County include established residential neighborhoods on the shorelines of Swan Lake and commercial and residential areas near Silver Lake and White Lake. Closed-basin flooding of these lakes also affects public facilities and infrastructure, including US Highway 395, Village Parkway, Lemmon Drive, Lemmon Valley Elementary School, and the Reno-Stead Water Reclamation Facility. See Appendix B for an additional discussion of closed-basin flooding hazards in Washoe County.

Major floods 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.

PROPERTY

- Sixteen critical facilities, including 14 dams and two fire stations, are at least partially in the 100-year floodplain.
- Three critical facilities, including one hospital and two schools, are at least partially in the 500-year floodplain.

VULNERABLE POPULATIONS

Social vulnerability is a broad concept that examines the differential impact of hazards on society based on existing socio-demographic and socio-economic conditions and community characteristics. A person's vulnerability to disaster is influenced by many factors, exacerbated by the increasing number of natural hazard events and disasters in the U.S., a trend that is expected to continue to affect "the capacity to anticipate, cope with, resist, and recover from the impact" of a discrete and identifiable disaster in nature or society. However, there are many more actions that can be taken on the local scale to combat hazard- and climate-related inequalities.

Flooding is the deadliest natural disaster that occurs in the U.S. each year, and it poses a constant and significant threat to the health and safety of the people in the Washoe County planning area. Impacts to the planning area can include the following:

- Flood-related rescues may be necessary at swift and low water crossings or in flooded neighborhoods where roads have become impassable, placing first responders in harm's way.

- Evacuations may be required for entire neighborhoods because of rising floodwaters, further taxing limited response capabilities and increasing sheltering needs for displaced residents.
- Health risks and threats to residents are elevated because contaminated floodwaters (untreated sewage and hazardous chemicals) and mold growth typical in flooded buildings and homes remain after the floodwaters have receded.
- Significant flood events often cause widespread power outages, increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.

Extended power outage can cause an increase in structure fires and/or carbon monoxide poisoning as individuals attempt to cook or heat their homes with alternative, unsafe cooking or heating devices, such as grills.

- Floods can destroy or make residential structures uninhabitable, requiring the shelter or relocation of residents in the aftermath of the event.
- First responders are exposed to downed power lines, contaminated and potentially unstable debris, hazardous materials, and generally unsafe conditions, elevating the risk of injury to first responders and potentially diminishing emergency response capabilities.
- Emergency operations and services may be significantly impacted because of damaged facilities.
- Significant flooding can cause the inability of emergency response vehicles to access areas of the community.
- Critical staff may suffer personal losses or otherwise be impacted by a flood event and unable to report for duty, limiting response capabilities.
- City or county departments may be flooded, delaying response and recovery efforts for the entire community.

Private sector entities that the jurisdiction and its residents rely on, such as utility providers, financial institutions, communication and media outlets, and medical care providers, may not be fully operational and may require assistance from neighboring communities until full services can be restored.

- Damage to infrastructure may slow economic recovery, since repairs may be extensive and lengthy.
- Some businesses not directly damaged by the flood may be negatively impacted, while utilities are being restored or water recedes, further slowing economic recovery.
- When the community is affected by significant property damage, it is expected that funding would be required for infrastructure repair and restoration, temporary services and facilities, overtime pay for responders, and normal day-to-day operating expenses.

- Displaced residents may not be able to immediately return to work, further slowing economic recovery.
- Residential structures substantially damaged by a flood may not be rebuilt for years, and uninsured or underinsured residential structures may never be rebuilt, reducing the tax base for the community.

Large floods may cause dramatic population fluctuations, as people are unable to return to their homes or jobs and must seek shelter and/or work outside the affected area.

- Businesses that are uninsured or underinsured may have difficulty reopening, which results in a net loss of jobs for the community and a potential increase in the unemployment rate.

Recreation activities, such as fishing, boating, and camping activities may be unavailable, and tourism can be unappealing for years following a large flood event, devastating directly related local businesses and negatively impacting economic recovery.

- Flooding may cause significant disruptions of clean water and sewer services, elevating health risks and delaying recovery efforts.
- The psycho-social effects on flood victims and their families can traumatize them for long periods of time, creating long-term increases in medical treatment and services.
- Extensive or repetitive flooding can lead to decreases in property value for the affected community.
- Flood poses a potential catastrophic risk to annual and perennial crop production and overall crop quality, leading to higher food costs.
- Flood-related declines in production may lead to an increase in unemployment.
- Large floods may cause loss of livestock, potential increased livestock mortality because of stress and water-borne disease, and increased cost for feed.

The overall extent of damage caused by floods is dependent on the extent, depth, and duration of flooding, and the velocities of flows in the flooded areas. The level of preparedness and pre-event planning done by government, businesses, and citizens will contribute to the overall economic and financial conditions in the aftermath of a flood event.

DEVELOPMENT TRENDS

- **Economic:** The Truckee River Flood Management Authority, a joint powers authority created under an Interlocal Cooperative Agreement among Washoe County, the City of Reno, and the City of Sparks, is continuing to implement the Truckee River Flood Management Project by constructing, maintaining, and operating infrastructure designed to reduce flooding risks. The Flood Project has evolved over decades of study, consideration, and community involvement. The current plan represents the outcomes of countless meetings, community input, and local and federal planning. The Flood Project extends approximately 33 miles along the Truckee River, from downtown Reno (near Jones Street)

to the town of Wadsworth, Nevada (near Pyramid Lake).[47] Once completed, the Flood Project will reduce flood damage from a 100-year event throughout the Truckee Meadows – economic benefits have been estimated at $2 billion (Decreased Vulnerability).

- **Land Use:** Areas targeted for new development are generally outside mapped floodplains. The City requires the potential impacts of new development on floodplains to be mitigated to avoid downstream flooding impacts. Residential and commercial development has resulted in the creation of additional impervious surfaces in the closed basins of the North Valleys (Increased Vulnerability).

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 20 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 20: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 21 provides the Calculated Priority Risk Index (CPRI) for flooding impacts in City of Reno based on the current plan's hazard risk assessment results. The City of Reno assigned flooding a risk factor value of 2.6, reflecting high probability, quick onset, and high frequency impacts. This risk factor value falls in the range of 2.5 to 4, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

[47] Truckee River Flood Management Authority, 2024, "The Flood Project." https://trfma.org/

Table 21: Calculated Priority Risk Index for Flooding in the City of Reno

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Flooding	3	2	2	3	3	2.6	High

EXISTING MITIGATION CASE STUDY

Lemmon Valley and Swan Lake Flood Prevention Measures

Lemmon Valley, with a population of about 5,000, is one of several basins north of the City of Reno that has no natural outlet for water. With nowhere else to go, stormwater collects at the valley floor—filling Swan Lake—until it infiltrates into the ground or evaporates. If there is too much water, flooding occurs. In 2019, three Lemmon Valley property owners were awarded $1.2M in damage, interest, and costs after their homes were damaged. After a court decision held that the City of Reno was liable for the flooding at Swan Lake in 2017, because their decision to develop properties nearby caused more runoff to reach Swan Lake.[48] Since 2017, Washoe County has developed a proactive flood management plan. It monitors the lake levels and surrounding snowpack and implements certain responses dictated by the conditions and lake levels. Washoe County has prepared for rising Swan Lake water levels by constructing protective berms in certain areas around the lake and installing high-flow pumps to manage water that flows down from the surrounding areas.[49] Washoe County Engineering monitors lake elevations and takes regular measurements, reviews weather forecasts and precipitation patterns, performs field inspections of the stormwater infrastructure (drainage channels, cross pipes, roadside ditches, etc.), and is prepared to respond should rapidly rising lake levels and flooding occur. The linked Swan Lake Elevations data are used by the Washoe County team to assess necessary operation changes to protect public safety.[50]

[48] 2News Nevada, March 2021, "City of Reno Reaches Global Settlement For Swan Lake Flooding Damages." https://www.2news.com/city-of-reno-reaches-global-settlement-for-swan-lake-flooding-damages/article_aa9e2c7e-a017-58b7-a7f8-c899da0f9820.html

[49] WashoeLife, Bethany Dryesdale, 2023, "Lemmon Valley and Swan Lake Flood Prevention Measures." https://washoelife.washoecounty.gov/washoe-county/lemmon-valley-and-swan-lake-flood-prevention-measures/

[50] Washoe County, NV, 2024, "Swan Lake Monitoring" and "Silver Lake Monitoring." https://www.washoecounty.gov/csd/engineering_capitalprojects/drainage_and_flooding/monitoring_response/swan_silver_lake.php

Extreme Weather (Winter Storm)

LOCATION

High elevations of the western portion of Washoe County experience the effects of winter storms, oftentimes snowstorms, with greater frequency. City of Reno locations often affected by snowstorms 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. Flooding is generally exacerbated by a rain on snow event. Extreme cold temperatures often accompany severe winter storms in Washoe County.

EXTENT

The magnitude and potential severity of impacts of extreme weather is considered Low. Typical extreme weather events are handled at the city or county level, can disrupt local government and business services for a period of days to weeks, and can have economic impacts on a statewide scale. Considering a worst-case scenario, an extreme weather event could require federal-level support, could impact critical facilities and disrupt services for more than 20 days, and could have nationwide economic impacts.

The severity of the effects of snowstorms increases as the amount and rate of precipitation increase. In addition, storms with a low forward velocity are in an area for a longer duration and become more severe in their effects. Storms that are in full force during morning or evening rush hours tend to have their affects magnified because more people are out on the roadways and directly exposed.

PREVIOUS OCCURRENCE/HISTORY

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.). Most snowfall occurs from December through February. The City of Reno Public Works Department notes that 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 20 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 damage.

- **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**: A 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.
- **February 22, 2022:** Another inside slider tracked through the region with more snow and wind. This inside slider-type system moved into the region late Sunday through Tuesday. It brought periods of snow showers, increased wind, travel difficulties, and much lower temperatures to the region through Wednesday night. Snow Monday and into Tuesday morning overperformed in some areas, with several inches of new snow falling in bands over parts of the eastern Sierra, and western NV. A vehicle crash occurred the morning of Tuesday, February 22, around 6:00 a.m. PST involving two vehicles and three passengers were injured. A slider-type weather system moved over the region late Sunday, February 20, into the morning of Tuesday, February 22, producing a couple rounds of snowfall.
- **December 10, 2022:** A stronger winter storm brought another round of heavy snow, strong winds, and travel impacts on Sierra passes December 9–11. Peak snowfall totals occurred through the period of December 10–11, with 2–4 feet of snow widely reported in Sierra locations and northeast CA. Storm total snowfall amounts even exceeded 5 feet over parts of the Sierra crest. Several inches of new snow also fell over some western Nevada valleys, with a foot plus falling across some eastern Sierra foothill areas as well. Strong winds having gusts of 65-75 mph in far western Nevada resulted in reports of $8M in damage across parts of Sparks during the early morning of December 10.
- **January 6, 2023:** City of Reno emergency declaration Widespread downed trees, power outages, travel impacts.

PROBABILITY OF FUTURE EVENTS

The probability of extreme weather is High, and the potential impact of future climate conditions could increase the risk of Extreme weather events. However, since extreme weather occurs each year, Reno has a number of mechanisms to promote safety.

On its website, the City of Reno provides mapped Snow and Ice Control Routes (revised 2023) 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 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 uses 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.

VULNERABILITY ANALYSIS

Vulnerabilities from winter storms include those related to power outages and impairments to transportation. Because nearly all social and economic activity depends 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.

ESTIMATED IMPACT AND POTENTIAL LOSSES

Power outages may disrupt businesses, especially facilities without back-up generators, potentially increasing the economic impact of extreme weather events. Members of the community who are isolated or have disabilities may be more vulnerable, especially those who may be trapped in their homes from power failures, heavy snow and ice, and debris from falling trees and power lines. Snowstorms can also adversely impact employees without certain benefits, as closures may result in unpaid time away from work.

IMPACT ON COUNTY ASSETS

The impacts of severe winter storms, extreme heat, and windstorms on community assets in Reno can be significant and multifaceted. One primary concern is the damage to infrastructure. Severe winter storms and windstorms can lead to the deterioration of roads, bridges, and public buildings. Snow and ice accumulation create hazardous driving conditions, while strong winds can uproot trees and bring down power lines, resulting in power outages and safety hazards for residents.

Public health is another critical area affected by extreme weather. High temperatures during heatwaves pose serious risks, particularly for vulnerable populations, including the elderly and those with pre-existing conditions. This can lead to an increase in heat-related illnesses and place additional pressure on local healthcare systems. Conversely, winter storms can obstruct access to medical facilities, leaving those in need without timely care due to blocked transportation routes.

The economic impact of severe weather is also notable. Local businesses may experience disruptions due to temporary closures during storms, leading to financial losses. Retail and service industries often see reduced customer traffic during extreme weather events, while

prolonged heat can heighten electricity demand as residents turn to air conditioning, straining the local power supply and potentially resulting in outages.

Environmental considerations come into play as well, as extreme weather can lead to erosion, damage to local ecosystems, and harm to parks and green spaces. Severe storms can uproot trees and disrupt wildlife habitats, resulting in long-term consequences for local biodiversity. Additionally, these weather challenges underline the need for improved community preparedness and resilience strategies. Local governments may need to invest in better emergency response systems and infrastructure capable of withstanding such extreme conditions.

VULNERABLE POPULATIONS

In Reno, several populations are particularly vulnerable to winter storms. First and foremost, the elderly are at a higher risk. Many seniors may have mobility issues that make it difficult for them to navigate icy sidewalks and streets. Additionally, they may rely on heating systems that can fail during severe weather, putting them at risk for hypothermia.

Low-income residents also face significant challenges during winter storms. Those who live paycheck to paycheck may lack the resources to prepare adequately for harsh weather, such as purchasing emergency supplies or accessing heat. Additionally, housing instability can lead to situations where families are forced to live in inadequate shelters that are ill-prepared for winter conditions.

Another vulnerable group is individuals experiencing homelessness. A sudden winter storm can pose life-threatening conditions for those without adequate shelter. Access to warm and safe spaces becomes critically important during extreme weather events, and not all areas may have sufficient resources to aid those in need.

Children are also a vulnerable demographic, especially if they depend on school systems for meals and warmth. Snow days can disrupt routine and access to necessary support services.

Finally, individuals with chronic health conditions or disabilities may find winter storms especially challenging. These individuals might require regular medical attention or have specific needs regarding heating and mobility that can be compromised during severe winter weather.

DEVELOPMENT TRENDS

- **Economic:** Over $30 million dollars of city and one billion dollars in private/other public, investment has been made in downtown Reno to modernize and beautify infrastructure and facilities (Increased Vulnerability).
- **Land Use:** The City'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 of extreme weather (Increased Vulnerability).

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 22 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 22: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 23 provides the Calculated Priority Risk Index (CPRI) for extreme weather (including winter storms) impacts in City of Reno based on the current plan's hazard risk assessment results. The City of Reno assigned extreme weather a risk factor value of 3, reflecting high probability, medium duration, and high frequency impacts. This risk factor value falls in the range of 2.5 to 4, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 23: Calculated Priority Risk Index for Extreme Weather in the City of Reno

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Extreme Weather	4	2	1	3	4	3.0	High

Extreme Heat

DESCRIPTION

An emerging hazard for Washoe County is extreme heat. Extreme heat occurs when summertime temperatures are much hotter and/or more humid than average. Historically, the seasonal maximum heat index is 90.17 degrees, but it is expected to increase to over 96 degrees by mid-century.[51] Extreme heat conditions are determined by comparing temperature and humidity to average conditions for the affected location at that time of year.[52] Extreme heat can have negative health impacts, particularly on populations with underlying health risks. Extreme heat can also increase the negative impacts of drought and the probability of wildfire.

LOCATION

Extreme heat may also occur anywhere in Washoe County. However, urban areas are more likely to experience extreme heat conditions because of the heat island effect, in which the impervious surfaces concentrated in cities increase the surrounding area's temperature higher than temperatures in more rural areas.[53] Figure 19 shows areas of urban heat island effects in Washoe in 2020, according to heat severity data provided by the Trust for Public Land. The data comprised of readings from Landsat 8 imagery and ground-level thermal sensors to show where certain areas of cities are hotter than the average temperature for the whole city.

[51] ClimRR Climate Projection Report, Washoe County. https://climrr.anl.gov/climateprojections
[52] Center for Disease Control and Prevention, 2024. https://www.cdc.gov/heat-%20health/about/index.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fextreme-%20heat%2Fabout%2Findex.html
[53] United States Environmental Protection Agency, “Heat Island Effect.” https://www.epa.gov/heatislands#:~:text=Heat%20islands%20are%20urbanized%20areas,as%2%200forests%20and%20water%20bodies

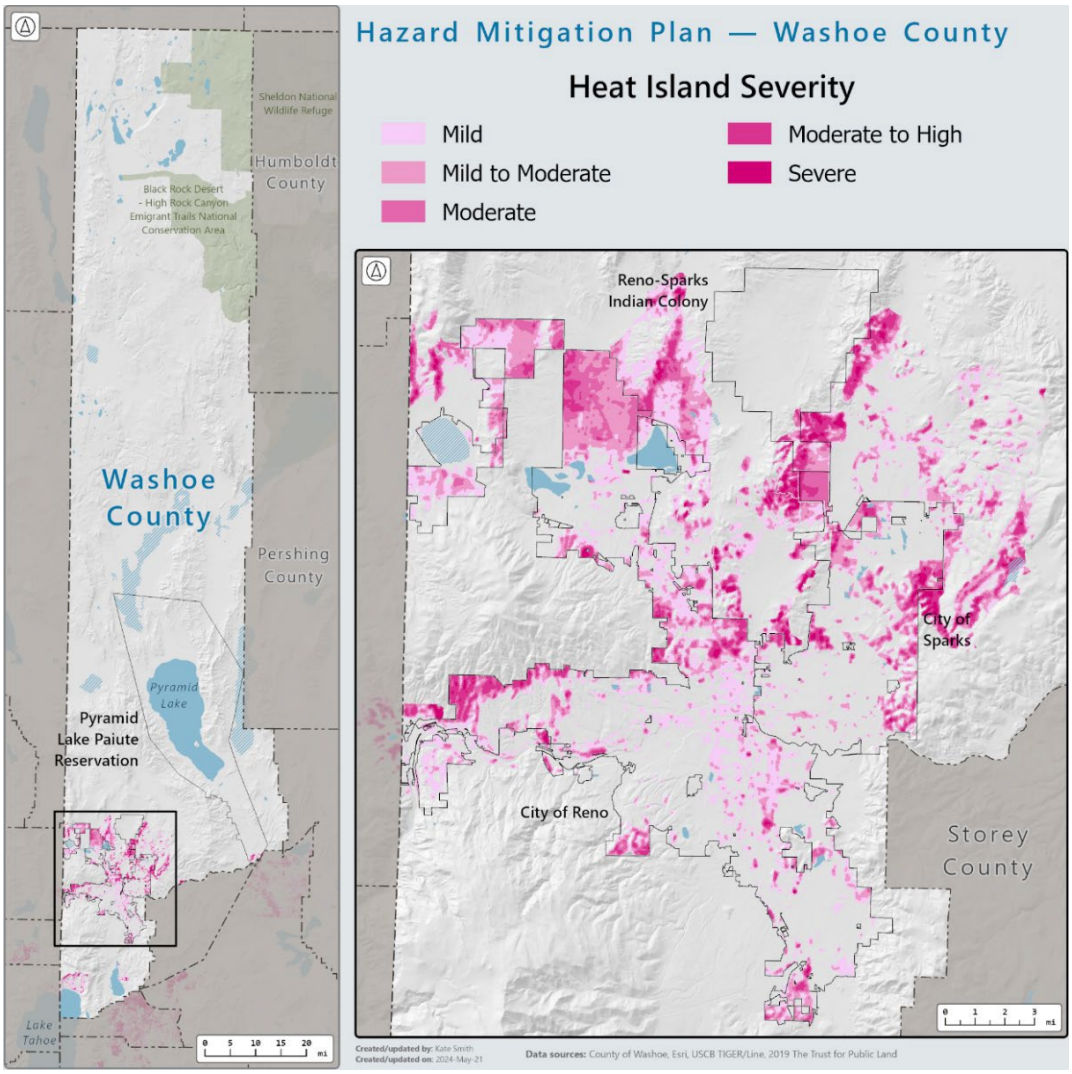


Figure 19: Heat Severity in Washoe County

EXTENT

The magnitude and potential severity of impacts of Extreme weather is considered Low. Typical Extreme weather events are handled at the city or county level, can disrupt local government and business services for a period of days to weeks, and can have economic impacts on a statewide scale. Considering a worst-case scenario, an extreme weather event could require federal-level support, could impact critical facilities, and disrupt services for more than 20 days, and could have nationwide economic impacts.

The heat index is what the temperature feels like to the human body when relative humidity is combined with air temperature. There is a direct relationship between air temperature and relative humidity and the heat index. As air temperature and relative humidity increase, the

heat index increases.[54] When the heat index is high, the body has more difficulty cooling itself through evaporation of perspiration to maintain a comfortable temperature. The potential for negative health consequences increases with higher heat index values.

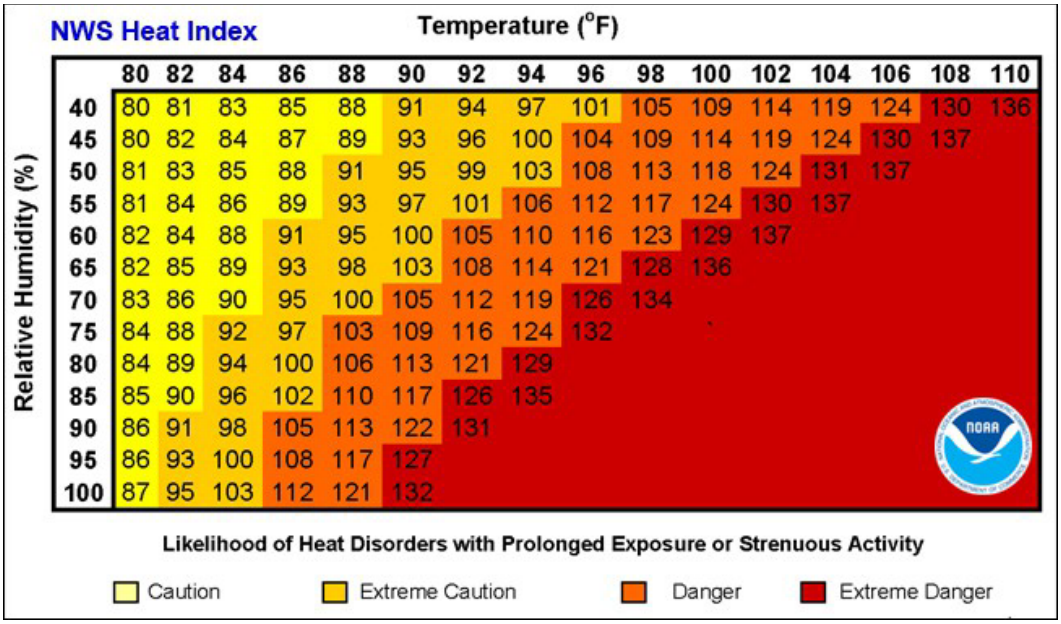


Figure 20: National Weather Service Heat Index[55]

PREVIOUS OCCURRENCE/HISTORY

No excessive heat events have been recorded for Washoe County in the NCEI Storm Events Database. However, excessive heat watches and warnings have occurred in recent years, including in 2021[56] and 2023.[57] These warnings included information to help individuals avoid heat-related illness and the locations of cooling centers.

Figure 21 shows a maximum temperature of red days at 27 per year (minimum temperature days 5), maximum temperature orange days at 34 per year (minimum temperature days 16), and maximum temperature yellow days at 97 per year (minimum temperature days 55), maximum temperature green days at 120 per year (minimum temperature days 202). All

[54] National Weather Service, "What is the Heat Index?" https://www.weather.gov/ama/heatindex
[55] National Weather Service, "What is the Heat Index?" https://www.weather.gov/ama/heatindex
[56] Reno Gazette Journal, "Excessive heat warning issued for Reno area beginning Sunday," https://www.rgj.com/story/news/2021/06/26/excessive-heat-warning-reno-area-beginning-sunday/5357958001/
[57] Reno Gazette Journal, "Reno expecting 102-degree temps this weekend; excessive heat watch into next week." https://www.rgj.com/story/news/2023/07/10/reno-expecting-102-degree-temps-this-weekend-heat-watch-through-monday-july-17-evening/70398343007/

temperature readings were recorded at the Reno Airport. The top right of the graph shows the dates in 2024 when heat warnings, advisories and conditions were issued, between June 11 and August 7.

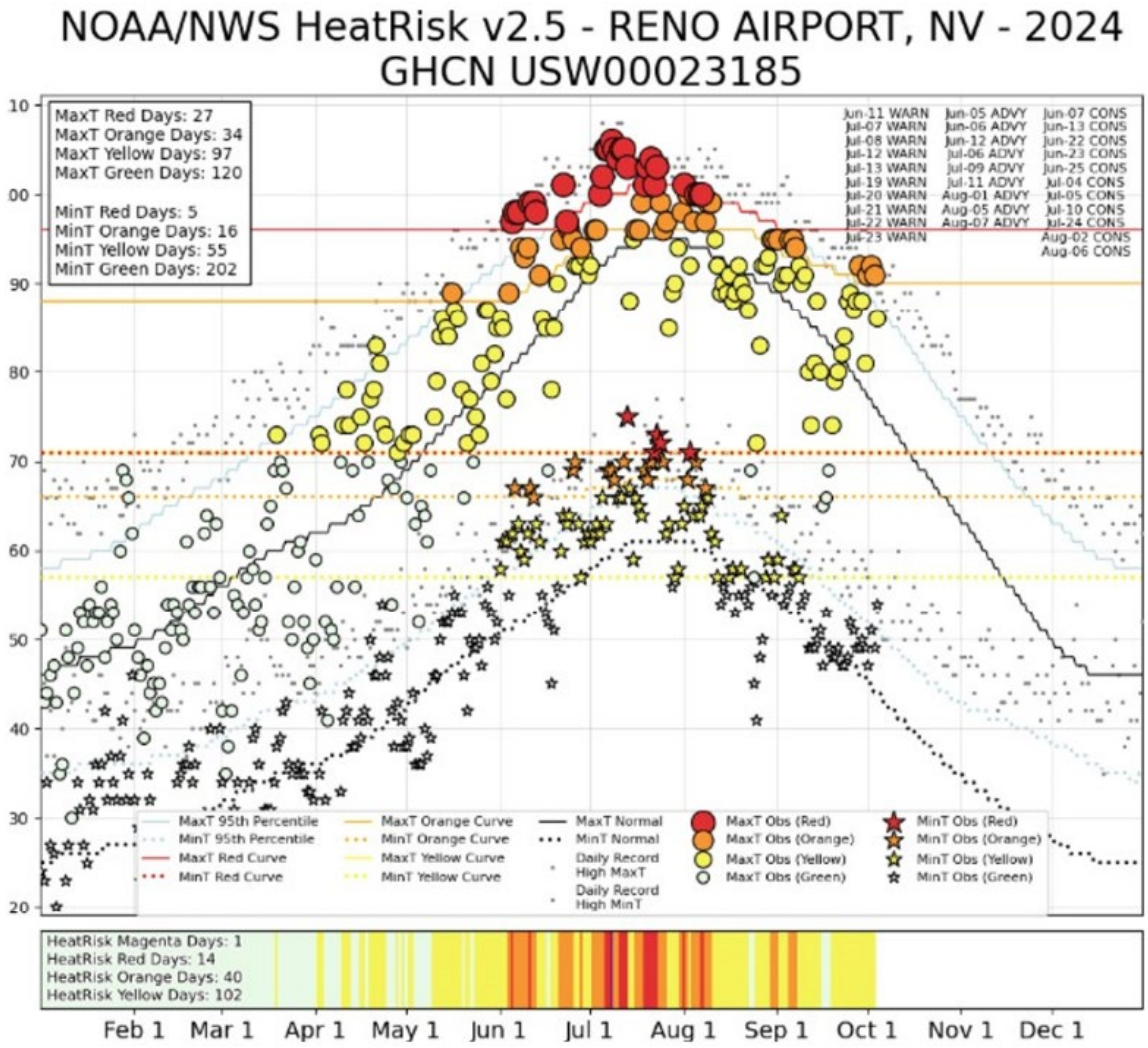


Figure 21: NOAA/NWS Heat Risk Graph, 2024 Reno Airport[58]

PROBABILITY OF FUTURE EVENTS

The probability of future extreme heat events is considered Medium. There have not been a significant number of historic events, but occurrences are expected to increase in the future. The overall probability of an Extreme weather event is High, and the potential impact of future climate conditions could increase the risk of Extreme weather events. However, since Extreme

[58] National Oceanic and Atmospheric Administration, National Weather Service, "HeatRisk Information, Reno Airport," https://www.wpc.ncep.noaa.gov/heatrisk/historical/

weather occurs every year in Washoe County, local and state jurisdictions and emergency response personnel are experienced in responding to such scenarios.

Table 24 provides the Calculated Priority Risk Index of each jurisdiction as per the current plan hazard risk assessment results. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4.

Table 24: Calculated Priority Risk for Extreme Weather in Washoe County

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value
Extreme Weather (Winter Storm, Windstorms, Extreme Heat)	4	2	1	4	3	2.9

IMPACTS OF CLIMATE CHANGE AND VARIATIONS

The 2018 Nevada Enhanced SHMP provided the following statement related to future climate conditions: There are some aspects to Nevada Extreme weather for which we have better confidence in anticipating the impacts of climate change, while for many other aspects much is unknown.

Based on the most recent long-range simulations, climate change can be expected to lead to more episodes of extreme heat in Nevada, especially in southern Nevada. The number of 105°+ days will likely increase, making the duration and severity of heat waves more extreme. Perhaps of more importance, based on the scientific consensus and what has already been observed, average overnight low temperatures are projected to increase, perhaps considerably, in the coming decades. This will remove the mitigating effect of cooling off at night, which has helped northern Nevada minimize health impacts from recent heat waves.

Recent studies conducted by the Desert Research Institute conclude that climate change and an intense urban heat island have made Reno the fastest warming city in the U.S. The warming temperatures pose risks to Reno's communities, as heat is the number one weather-related cause of death in the U.S.



Figure 22: NOAA Mapping of Heat Islands, Including Reno-Sparks, Nevada[59]

The following represent the potential impacts on future climate conditions of extreme heat:

- Continuing increase in average temperatures across the region, along with increases in extreme heat events.
- Prolonged exposure to extreme heat can cause heat-related illnesses like heat exhaustion and heat stroke, especially in vulnerable groups such as the elderly, children, and those with existing health issues. It can also worsen chronic respiratory and cardiovascular conditions.
- Higher temperatures increase air conditioning use, straining energy supplies and risking power outages, which can worsen public health during heat waves.
- Extreme heat disrupts outdoor work, reducing labor productivity in agriculture, construction, and other outdoor industries, which can negatively impact local economies.
- Higher temperatures often lead to lower precipitation, worsening drought conditions. This results in water shortages that affect agriculture, drinking water supplies, and natural ecosystems.
- Extreme heat can dry out vegetation, raising wildfire risks. This threatens lives and property and can have lasting ecological impacts.

[59] Desert Research Institute, "Reno/Sparks selected to be part of Urban Heat Mapping Campaign," 2024. https://www.dri.edu/reno-sparks-selected-to-be-part-of-urban-heat-mapping-campaign/

- Urban areas face extreme heat from the heat island effect, where buildings absorb and retain heat. This leads to higher temperatures in cities, increasing health risks and energy demands.
- Extreme heat impacts wildlife behavior and distribution, potentially endangering species that cannot adapt to rising temperatures.

VULNERABILITY ANALYSIS

Extreme heat is associated with more fatalities than any other severe weather event in the United States. During extreme heat events, a person's body temperature may rise faster than it can cool itself, which can lead to heat-related illnesses, such as heat exhaustion or heat stroke. Older adults, young children, pregnant women, and individuals with chronic diseases, such as cardiovascular or respiratory conditions, are at the highest risk. Outdoor workers and unhoused populations are also particularly vulnerable. People who live in social isolation, including linguistic isolation or those living alone with few social relationships, also are at higher risk.

Social factors, including race and ethnicity, income, and educational attainment, are correlated with many health outcomes, including heat-related illness. Lower-income individuals may not live in housing with air conditioning and are at risk. Those living and working near urban heat islands may be more vulnerable.

Extreme heat events can also have negative impacts on worker productivity, such as time lost on the job when people need to take more frequent or longer breaks to avoid overheating or when it is too hot to work at all. Extreme heat can also affect the agricultural sector, such as livestock health and crop yields.

Heat waves can damage transportation infrastructure and pose challenges for maintenance and construction. Higher temperatures can put stress on bridge infrastructure through thermal expansion of bridge joints and paved surfaces, and deterioration of steel, asphalt, protective cladding, coats, and sealants. When the roadway surface expands at a crack or joint, heat can cause the pavement to buckle and warp, sometimes requiring closure for urgent repairs.

Extreme heat can accelerate the deterioration or threaten the integrity of some types of asphalt pavement through the softening, rutting, and migration of liquid asphalt.

Extreme heat is also related to wildfire risk. High temperatures contribute to drying out of vegetation, which may burn more rapidly once ignited. These conditions are exacerbated if they occur during times of drought.

ESTIMATED IMPACT AND POTENTIAL LOSSES

Extreme heat impacts public health, leading to illnesses like heat exhaustion and heat stroke, particularly among vulnerable groups such as the elderly. It intensifies dehydration and respiratory issues, placing additional strain on healthcare systems during heat waves.

In agriculture, extreme heat can reduce crop yields and harm livestock, impacting food supply and potentially driving up prices. The economic effects are broad; productivity declines in outdoor jobs, and energy demand surges for cooling, which can strain power grids and lead to outages that disrupt businesses.

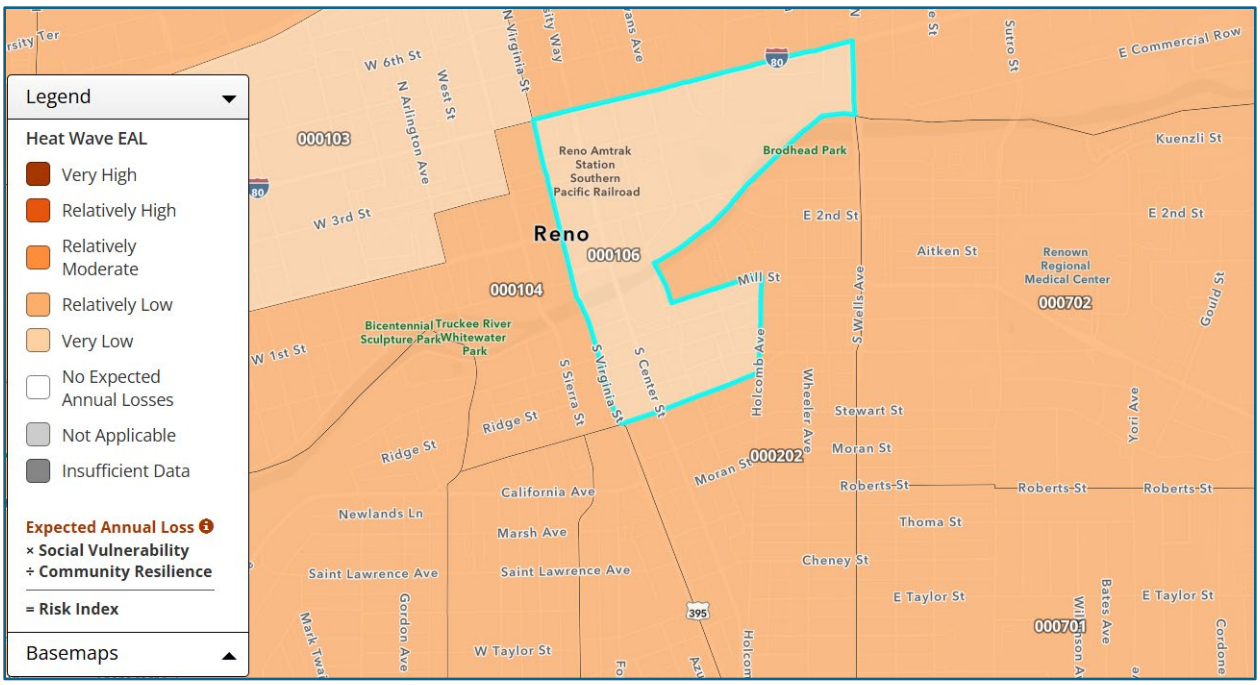
Infrastructure also suffers, with roads and buildings at risk of damage from heat-related expansion, resulting in costly repairs. Additionally, extreme heat can worsen drought conditions and threaten water quality, impacting ecosystems and biodiversity.

The social ramifications are significant, as communities may face increased public health risks, crime rates, and social unrest during extreme heat events, especially if access to cooling resources is limited.

Cascading impacts of extreme heat include:

- Health Risks
- Increased Energy Demand
- Water Supply Stress
- Agricultural Impacts
- Wildfire Risks
- Economic Consequences
- Social Disparities
- Ecosystem Disruption

Figure 23 shows NRI Expected Annual Loss from Heatwaves for City of Reno at $133K, with a rating of very low expected annual losses, and a risk score of 62.0.



Heat Wave	**Very Low**
	Score **17.7**
0	100
Expected Annual Loss	**$195**
Exposure	**$8.5B**
Frequency	**0.5 events per year**
Historic Loss Ratio	**Very Low**

Figure 23: City of Reno NRI Heatwave Expected Annual Loss Score, Map, and Legend[60]

VULNERABLE POPULATIONS

In Washoe County, certain populations are particularly vulnerable to the impacts of extreme heat. One of the most affected groups is the elderly. Older adults often face challenges related

[60] FEMA, "National Risk Index City of Reno Heat Wave Score, Map, and Legend." https://hazards.fema.gov/nri/map

to mobility and health, making it difficult for them to prepare for or respond to severe weather conditions adequately. Their increased susceptibility to heat can put them at greater risk during extreme events.

Children also represent a vulnerable population during such weather occurrences. Young kids may require supervision and assistance, especially during heat waves. This group relies on caregivers to ensure their safety, which can be especially challenging during times of inclement weather.

Low-income families are another critical demographic at risk. Economic constraints often limit their access to proper shelter and cooling resources, making them more susceptible to the adverse effects of extreme temperatures. This vulnerability can be dangerous during heat waves, when access to safe and insulated housing is crucial.

Additionally, the homeless population faces significant challenges during severe weather events. Without stable housing, individuals experiencing homelessness are left without adequate protection from the elements, putting them at heightened risk for health issues during extreme weather.

Individuals with disabilities are also disproportionately affected. Those with physical or cognitive impairments may experience difficulties accessing necessary resources during extreme heat events. This can exacerbate their vulnerability when timely action is needed.

Medical patients who rely on electrically powered devices, such as oxygen concentrators, may face life-threatening situations during extreme heat, especially if power outages occur.

Outdoor workers, including construction and agricultural laborers, are particularly affected by extreme heat. Their exposure to harsh weather conditions without proper protection can lead to severe health risks.

Lastly, individuals with limited English proficiency may struggle to understand safety protocols. This language barrier can impede their ability to seek help or take necessary precautions during extreme heat events.

DEVELOPMENT TRENDS

Recent Development Trends

- Economic: Increased regional economic development continues to increase the potential for disruptions during and after severe weather 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: Future development in more remote areas of the County may increase the cost of responding to extreme heat events and increase the risk to residents, particularly the elderly or those with medical conditions.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 25 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 25: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 26 provides the Calculated Priority Risk Index (CPRI) for extreme weather (including extreme heat) impacts in City of Reno based on the current plan's hazard risk assessment results. The City of Reno assigned extreme weather a risk factor value of 3, reflecting high probability, medium duration, and high frequency impacts. This risk factor value falls in the range of 2.5 to 4, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 26: Calculated Priority Risk Index for Extreme Weather in the City of Reno

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Extreme Weather	4	2	1	3	4	3.0	High

Criminal Acts and Terrorism

LOCATION

Acts of violence can impact any populated area. 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.

Figure 24 illustrates the crime rate for the City of Reno rating of average indicated by the color orange for 500 incidents. The legend indicates that green represents a very low rate of incidents (up to 50); yellow represents a low rate of incidents (50–200); orange represents an average rate (200–500 incidents); red represents a high rate of incidents (500–1000); and brown represents very high rate of incidents (more than 1,000).

EXTENT

It is difficult to estimate the extent or probability of criminal activity or a terrorist incident. Nonetheless, it can be deduced that these threats could affect all populated areas in Washoe County; government facilities and schools may be most likely targeted.

City-Data.com compiles crime indexes across the United States and compares crime rates of U.S. cities to provide a framework for analyzing the extent of crimes and the types of crime occurring in each city. Figure 25 shows that, for the City of Reno in 2022, the City-Data crime index rate was 324, which is 1.3 times greater than the national average or 90% crime index (red on crime index meter), and is greater than the City of Sparks, Truckee, and South Lake Tahoe (the bar graph).

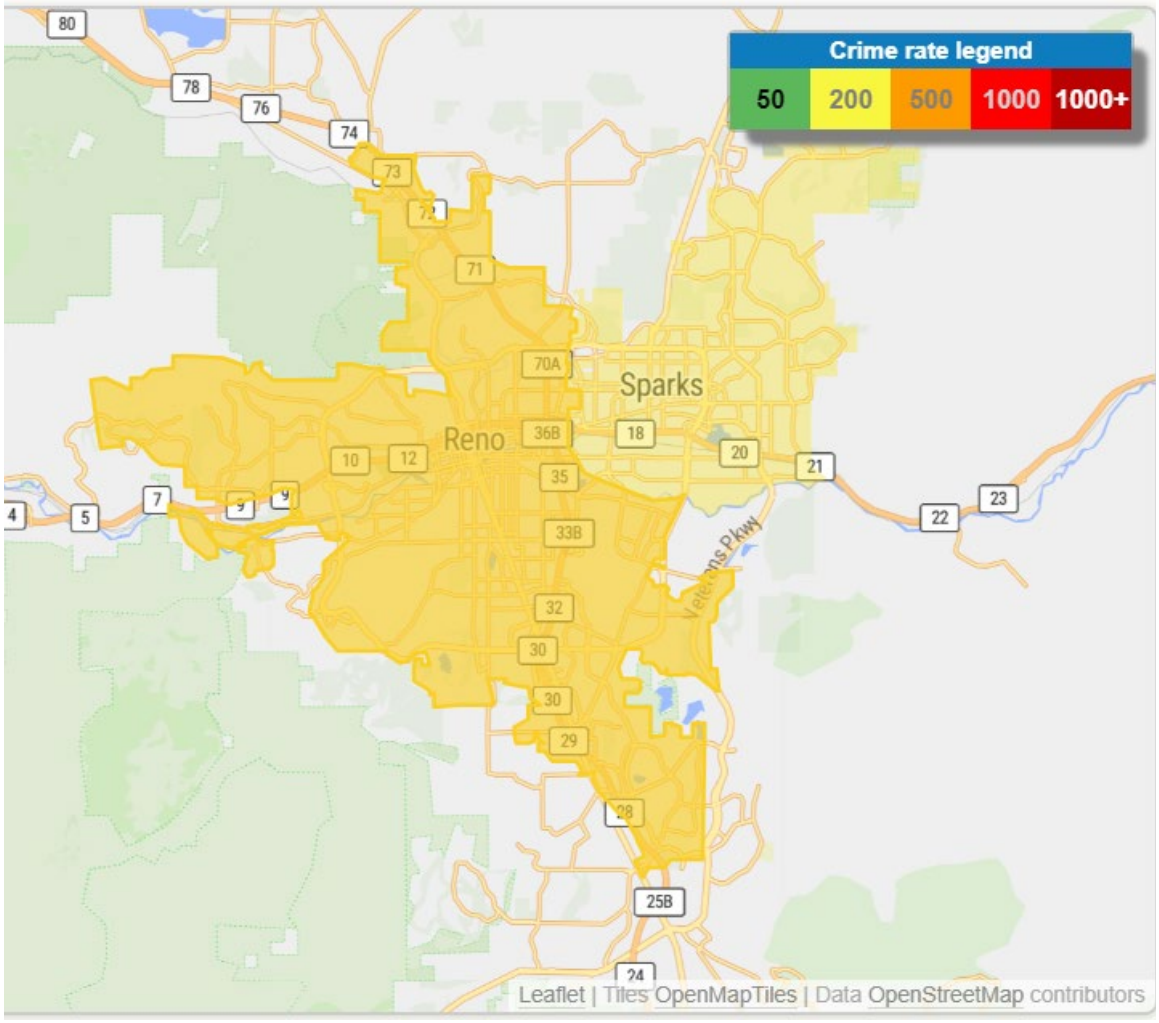


Figure 24: Map of Reno and Sparks with Crime Rate Legend[61]

[61] City-Data.com, 2024, City-Data.com, 2024, "Map of Reno and Sparks with Crime Rate Legend." https://www.city-data.com/crime/crime-Reno-Nevada.html

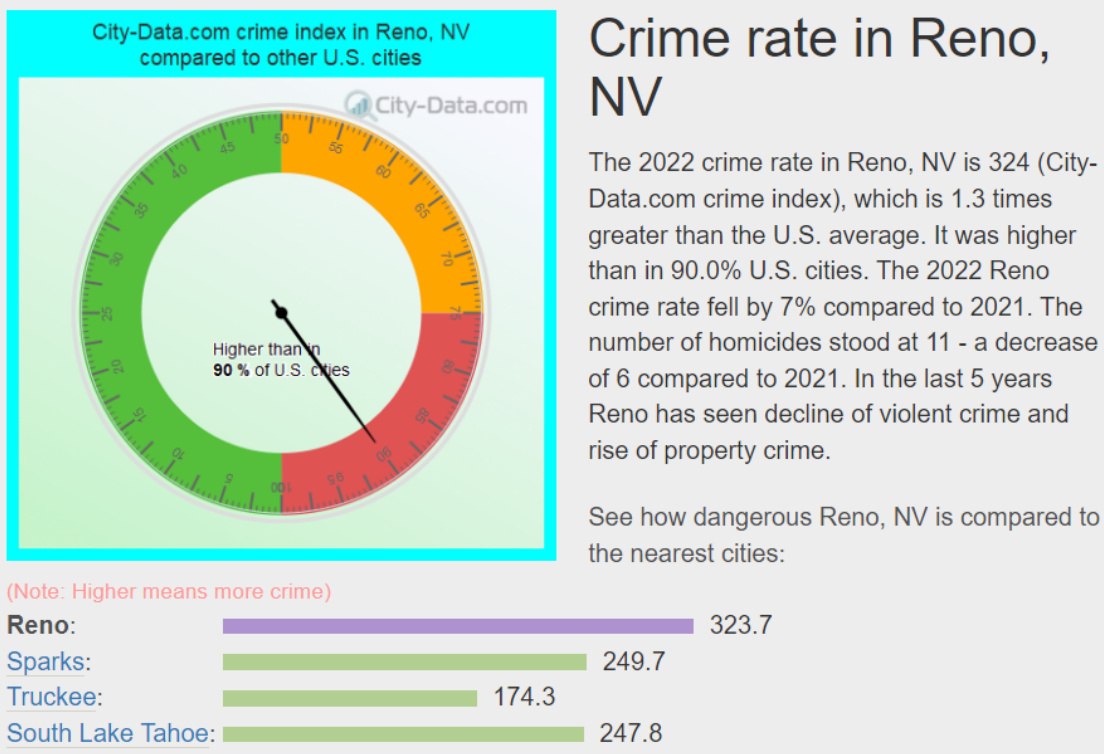


Figure 25: Crime Rate Meter for Reno Nevada Compared with Other US Cities[62]

Figure 26 illustrates crime statistics compiled by City-Data.com in percentages of different types of crime committed in the City of Reno for 2022. From the pie chart, the percentage of thefts in 2022 was 55.7% and would represent the greatest number of criminal acts committed, with burglaries, auto thefts, and assaults following.

[62] City-Data.com, 2024, "Crime in Reno, Nevada (NV): Murders, Rapes, Robberies, Assaults, Burglaries, Thefts, Auto Thefts, Arson, Law Enforcement Employees, Police Officers, Crime Map." https://www.city-data.com/crime/crime-Reno-Nevada.html

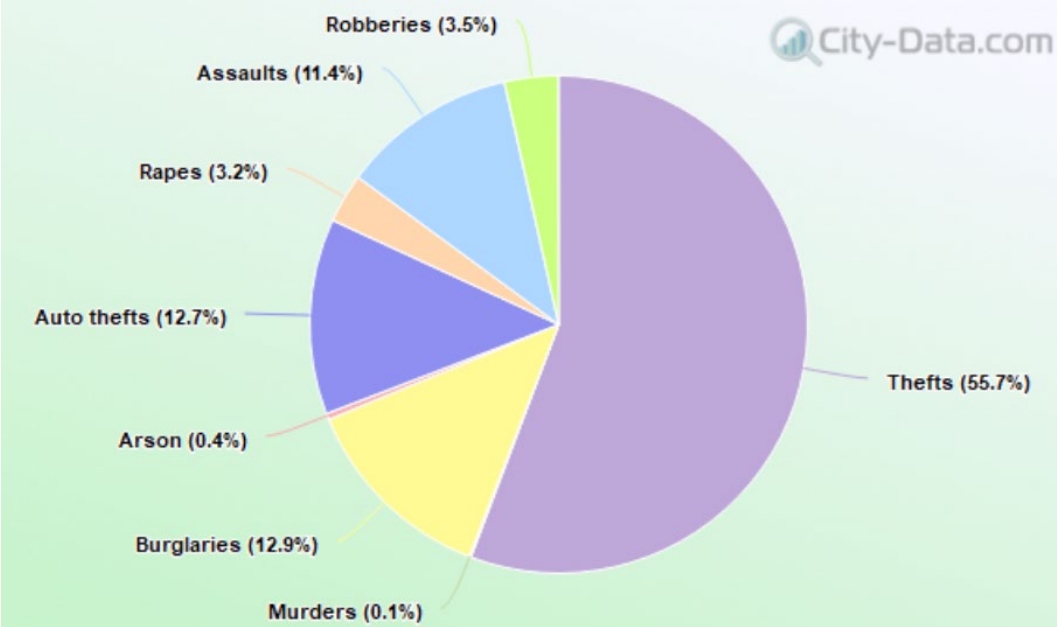


Figure 26: Crimes by Type for the City of Reno, 2022[63]

PREVIOUS OCCURRENCE/HISTORY

- **May 30, 2020:** A gathering of 1,000 protesters in downtown Reno became violent, and civil unrest ensued. This forced the need for barricades, street closures (Virginia Street/First Street), and law enforcement. The protestors broke windows at City Hall and even started a fire inside City Hall. There was vandalism to downtown businesses and the Central Police Station.
- **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.

[63] City-Data.com, 2024, "City-Data Crimes by Type Statistics for City of Reno 2022." https://www.city-data.com/crime/crime-Reno-Nevada.html

Future weather conditions have no direct connection to acts of violence and terrorism. However, increased development and urbanization can increase the probability of active threats. UN Secretary General Antonio Guterres asserts, climate impacts can, however, compound conflicts and exacerbate fragility. When the loss of livelihoods leaves populations in despair, the promises of protection, income, and justice—behind which terrorists sometimes hide their true designs—become more attractive.[64]

Figure 27 illustrates crime rates in the City of Reno by year from 2009 to 2022, the types of crimes committed (per 100,000 population) and the trends of increasing/decreasing crime acts identified in comparison to state averages.

Crime rates in Reno by year

Type	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Murders (per 100,000)	↓9 (4.1)	↓9 (4.0)	↑14 (6.2)	↓7 (3.0)	↑14 (6.0)	↑15 (6.4)	↑15 (6.3)	↓9 (3.7)	↑19 (7.6)	↓6 (2.4)	↕12 (4.7)	↕17 (6.6)	↕17 (6.5)	↓11 (4.0)
Rapes (per 100,000)	↑84 (38.0)	↓46 (20.4)	↓27 (11.9)	↓33 (14.3)	↑68 (29.2)	↑↑128 (54.5)	↑↑136 (56.7)	↑↑139 (56.8)	↑142 (57.1)	↑↑174 (69.0)	↑↑180 (70.8)	↑↑269 (103.8)	↑↑230 (87.5)	↑↑277 (101.2)
Robberies (per 100,000)	↑409 (185.1)	↑385 (170.9)	↑383 (168.6)	↑327 (141.9)	↑305 (131.1)	↑263 (111.9)	↑345 (143.9)	↑↑393 (160.7)	↑↑382 (153.7)	↑303 (120.1)	↑312 (122.7)	↑↑295 (113.8)	↑↑301 (114.5)	↑↑300 (109.6)
Assaults (per 100,000)	↑↑971 (439.3)	↑728 (323.2)	↑684 (301.2)	↑825 (357.9)	↑767 (329.8)	↑741 (315.2)	↑↑923 (385.0)	↑↑ 1,176 (480.9)	↑↑ 1,131 (455.1)	↑↑ 1,153 (456.9)	↑927 (364.5)	↑997 (384.7)	↑ 1,000 (380.3)	↑977 (357.0)
Burglaries (per 100,000)	↑ 1,848 (836.2)	↕ 1,638 (727.3)	↕ 1,618 (712.4)	↕ 1,633 (708.5)	↕ 1,411 (606.7)	↕ 1,312 (558.2)	↑ 1,440 (600.7)	↕ 1,208 (494.0)	↑ 1,347 (542.0)	↑ 1,073 (425.2)	↕902 (354.6)	↑↑ 1,353 (522.1)	↑↑ 1,271 (483.4)	↑↑ 1,113 (406.7)
Thefts (per 100,000)	↑ 6,209 (2,809)	↑ 5,101 (2,265)	↕ 4,311 (1,898)	↕ 4,909 (2,130)	↑ 4,901 (2,107)	↑ 4,711 (2,004)	↑ 5,070 (2,115)	↑ 5,381 (2,200)	↑ 4,890 (1,968)	↕ 3,930 (1,557)	↕ 3,684 (1,448)	↑ 4,470 (1,725)	↑ 5,147 (1,958)	↑ 4,790 (1,750)
Auto thefts (per 100,000)	↑753 (340.7)	↑729 (323.7)	↑621 (273.4)	↑↑881 (382.2)	↑↑868 (373.2)	↑↑775 (329.7)	↑↑ 1,021 (425.9)	↑↑ 1,344 (549.6)	↑↑ 1,432 (576.2)	↑↑ 1,050 (416.1)	↑↑ 1,184 (465.5)	↑↑989 (381.6)	↑↑ 1,377 (523.7)	↑ 1,091 (398.7)
Arson (per 100,000)	↓33 (14.9)	↓29 (12.9)	↓26 (11.4)	↓29 (12.6)	↓18 (7.7)	↓15 (6.4)	↓26 (10.8)	↓10 (4.1)	↓18 (7.2)	↓16 (6.3)	↓15 (5.9)	↓27 (10.4)	↓21 (8.0)	↑36 (13.2)
City-Data.com crime index	380.1	307.7	280.3	297.0	297.4	298.6	338.8	363.8	360.9	312.7	295.7	343.3	347.4	323.7

↓ - means the value is smaller than the state average.
↕ - means the value is about the same as the state average.
↑ - means the value is bigger than the state average.
↑↑ - means the value is much bigger than the state average.

Figure 27: Crime Rates in Reno by Year, 2009–2022, Indicating Types of Crime and Trends[65]

Figure 28 illustrates the five-year trend of violent crime statistics compiled by the City of Reno Police Department between 2019 and 2023 by the number of violent crimes committed each

[64] United Nations, UN News Global Perspectives Human Stories, 2021 https://news.un.org/en/story/2021/12/1107592

[65] City-Data.com, 2024, , "Crime Rates in Reno by Year, 2009-2022, Indicating Types of Crime and Trends." https://www.city-data.com/crime/crime-Reno-Nevada.html

year, indicating a steady increase in violent crimes. Violent Crime is composed of four offenses: Murder and Nonnegligent Manslaughter, Rape, Robbery, and Aggravated Assault.

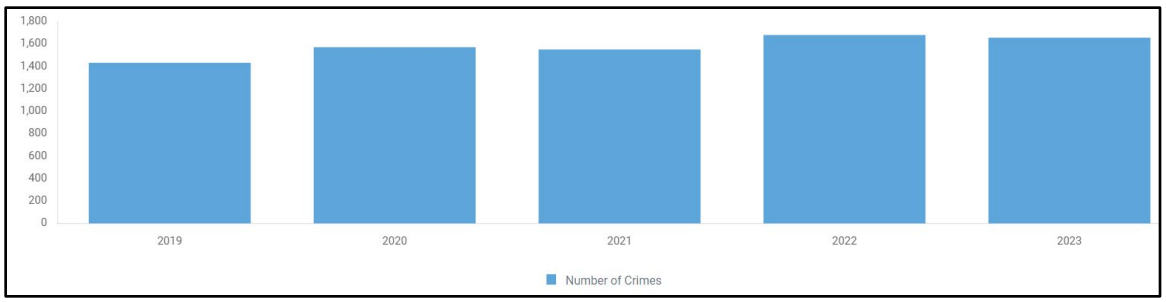


Figure 28: Nevada Crime Statistics, Violent Crime, Reno Police Department, 2019–2023[66]

Figure 29 illustrates a five-year trend of property crime statistics compiled by the City of Reno Police Department between 2019 and 2023 by the number of property crimes committed each year, indicating a decrease in property crime between 2021 and 2023.

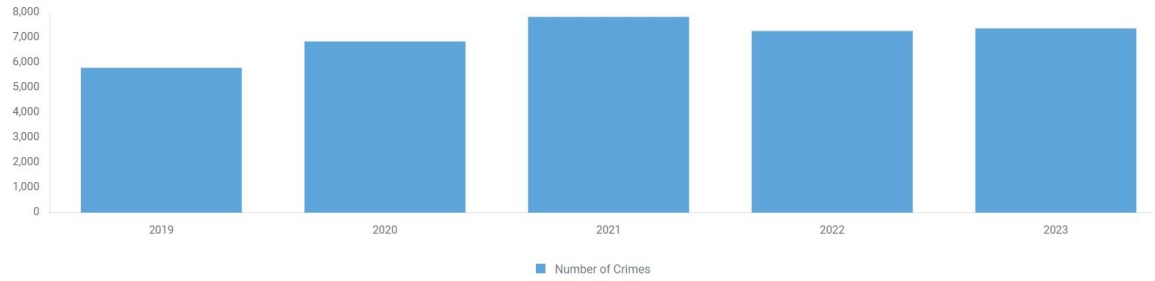


Figure 29: Nevada Crime Statistics, Property Crime, Reno Police Department, 2019–2023[67]

Figure 30 illustrates monthly violent crime statistics compiled by the City of Reno Police Department for 2023, indicating the number of actual offenses committed per month and the total number of offenses cleared by the police department.

[66] Nevada Government, City of Reno Police Department, 2023, "Nevada Crime Statistics, Violent Crime, Reno Police Department, 2019-2023." Violent Crime 2023 (nv.gov)
[67] Nevada Government, City of Reno Police Department, 2023, "Nevada Crime Statistics, Property Crime, Reno Police Department, 2019-2023." Violent Crime 2023 (nv.gov)

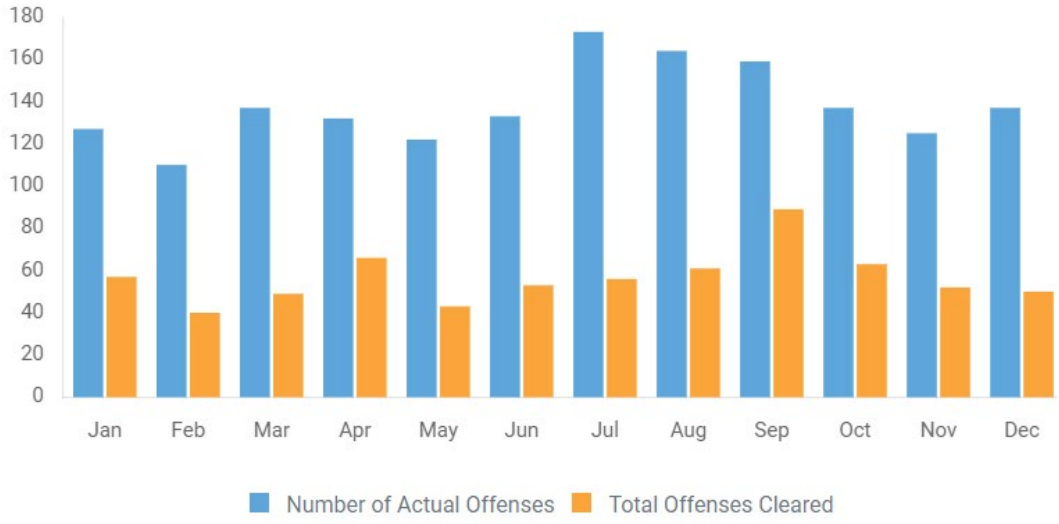


Figure 30: City of Reno Police Department Violent Crimes Statistics by Month, 2023, Actual Offenses and Offenses Cleared[68]

PROBABILITY OF FUTURE EVENTS

The probability of future criminal activity in Reno, Nevada, can generally be considered as "likely," given various factors such as population density, socioeconomic conditions, and historical crime data. However, it is important to note that the nature and frequency of such events can vary based on numerous circumstances.

As for terrorism events, the likelihood is typically categorized as "unlikely" due to the extensive security measures in place and the specific targeting that usually characterizes such incidents. Overall, while criminal activity remains a concern, terrorism is considered less probable in that region.

VULNERABILITY

County, schools, government buildings, or other public gathering places or public events would likely be the 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.

[68] Nevada Government, City of Reno Police Department, 2023, "City of Reno Police Department Violent Crimes Statistics by Month 2023, Actual Offenses and Offenses Cleared." https://nevadacrimestats.nv.gov/tops/report/violent-crimes/reno-police-department/2023

Figure 31 illustrates the number of full-time law enforcement employees/police officers for the State of Nevada and for the City of Reno from 2003 to 2021. The line graph indicates the number of full-time police officers employed with the City of Reno has decreased significantly, from 1.5 police officers per 1,000 residents in 2003 to maintain a steady decline of 1.2 police officer per 1,000 residents in 2021, compared with 2.6 per 1,000 residents State of Nevada full-time law enforcement officers.

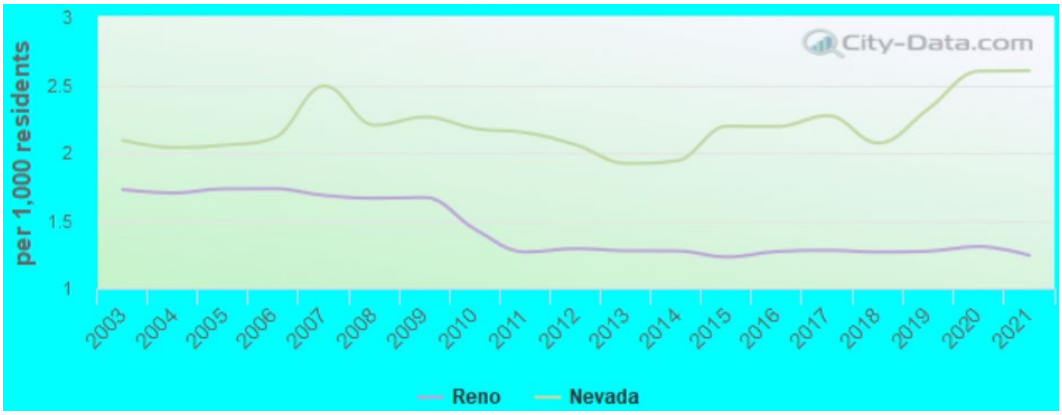


Figure 31: City of Reno Police Department Full-Time Law Enforcement Employees – Police Officers per 1,000 Residents, 2003–2021[69]

Figure 32 illustrates statistics compiled by the City of Reno Police Department for the number of murders committed for 2023 and the victim's age.

[69] City-Data.com, 2024, "City of Reno Police Department Full Time Law Enforcement Employees-Police Officers Per 1,000 Residents, 2003-2021." https://www.city-data.com/crime/crime-Reno-Nevada.html

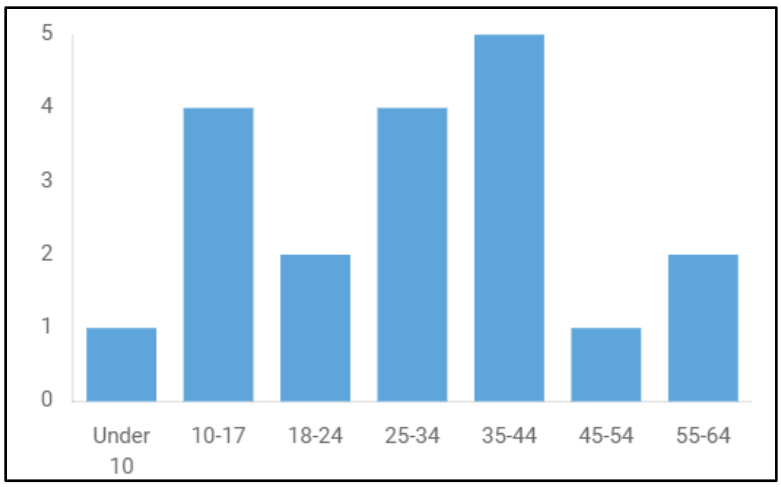


Figure 32: City of Reno Murders by Victim Age, 2023[70]

Figure 33 illustrates statistics compiled by the City of Reno Police Department for the number of murders committed for 2023 and the victim's gender.

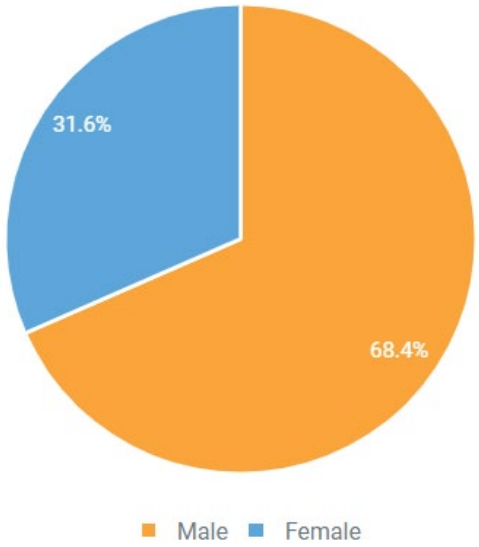


Figure 33: City of Reno Murders by Victim Gender, 2023[71]

Figure 34 illustrates statistics compiled by the City of Reno Police Department for the number of murders committed for 2023 and the victim's race.

[70] Nevada Government, City of Reno Police Department, 2023, "City of Reno Number of Murders by Victim Age (Murder) 2023." https://nevadacrimestats.nv.gov/tops/report/violent-crimes/reno-police-department/2023

[71] Nevada Government, City of Reno Police Department, 2023, "City of Reno Number of Murders by Victim Gender (Murder) 2023." https://nevadacrimestats.nv.gov/tops/report/violent-crimes/reno-police-department/2023

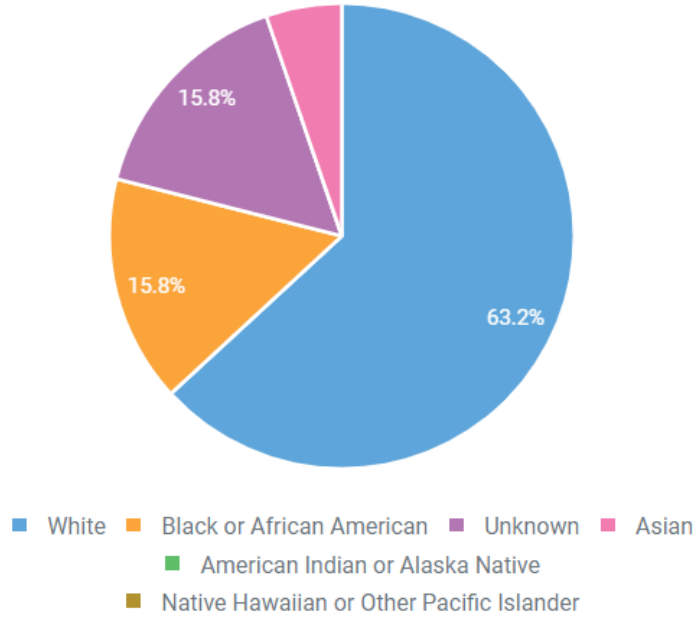


Figure 34: City of Reno Murders by Victim Race, 2023[72]

VULNERABLE POPULATIONS

In Reno, several populations may be considered vulnerable to criminal acts and terrorism due to various factors. One of the most at-risk groups includes low-income individuals and families. Economic hardship can make these populations more susceptible to crime, as they may have fewer resources for security and community support. Additionally, those living in transient or unstable housing conditions often face heightened vulnerabilities due to their lack of social networks and increased isolation.

Another demographic that is vulnerable includes the elderly and individuals with disabilities. These groups may have physical limitations that can hinder their ability to protect themselves or seek help in dangerous situations. Furthermore, they may be targeted by scams or exploitation, making awareness and prevention efforts essential for their safety.

Cultural and ethnic minorities can also be at risk, particularly if they face discrimination or language barriers. Such challenges can limit their access to resources, making them more exposed to criminal elements. In some cases, these populations may avoid reporting crimes due to fear of retribution or distrust of law enforcement, which further exacerbates their vulnerability.

[72] Nevada Government, City of Reno Police Department, 2023, "City of Reno Number of Murders by Victim Race (Murder) 2023." https://nevadacrimestats.nv.gov/tops/report/violent-crimes/reno-police-department/2023

Additionally, youth and young adults, especially those involved in gangs or high-risk activities, may find themselves at higher risk for both violent crime and recruitment into extremist groups. This demographic often requires targeted intervention programs to address underlying issues and prevent future victimization.

DEVELOPMENT TRENDS

- **Economic:** Tourism is the major industry in the Reno area. The hotel and casino industry attracts more than five million visitors annually and adds over $4 billion to the local economy each year. The business climate also has a strong presence in manufacturing and logistics in industries, such as computers, electronics, financial services, and communications. This diversity supports the thriving local economy and includes a wide range of restaurants and retail options (Increased Vulnerability).

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 27 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 27: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 28 provides the Calculated Priority Risk Index (CPRI) for criminal acts and terrorism impacts in City of Reno based on the current plan's hazard risk assessment results. The City of Reno assigned criminal acts and terrorism a risk factor value of 2.7, reflecting medium probability, quick onset, and medium frequency impacts. This risk factor value falls in the range of 2.5 to 4, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 28: Calculated Priority Risk Index for Criminal Acts and Terrorism in the City of Reno

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Criminal Acts and Terrorism	3	2	4	2	3	2.7	High

Avalanche and Landslide

An avalanche is a natural disaster caused when a mass of snow, ice, or rock suddenly slides down a mountainside or slope. Different snow avalanches include slab avalanches, loose snow avalanches, gliding avalanches, powder avalanches, and wet snow avalanches.[73]

Landslides, also known as mass movements, are complex phenomena that occur due to a combination of geological, climatological, and human factors. They are defined as the downward movement of a mass of rock, debris, or earth along a slope or cliff. Heavy rainfall, snowmelt, earthquakes, volcanic activity, and human activities, such as mining or construction, can trigger landslides. The type of slope, the nature of the soil and rock, and the presence of vegetation all play a role in determining the likelihood of landslide occurrence. There are five modes of slope movement: falls, topples, slides, spreads, and flows, and these are further categorized based on the type of geological material and type of movement: bedrock, debris, or earth. Movements include rotational, translational, block, rockfall, topple, debris flow, debris avalanche, earthflow, and creep. Landslides may be small or very large, and they can move at slow to very high speeds. They can be initiated by storms, earthquakes, fires, volcanic eruptions, and human modifications of the land that lead to slope instability.

LOCATION

Avalanche risk is highest in the steep, mountainous areas of the Carson Range of the Sierra Nevada in southwestern Washoe County. Incline Village and Crystal Bay are under avalanche advisories several times each winter.

PREVIOUS OCCURRENCE/HISTORY

No previous occurrences of avalanches or landslides.

[73] WSL Institute for Snow and Avalanche Research, "Avalanche Types." https://www.slf.ch/en/avalanches/avalanche-science-and-prevention/avalanche-types/#:~:text=Slab%20avalanches%20are%20the%20most,and%20caught%20in%20the%20avalanche.

PROBABILITY OF FUTURE EVENTS

The probability of future avalanche events in Reno can vary based on several factors, including weather conditions, snowpack stability, and geographical features, but it is unlikely. While Reno itself is not typically a high-risk area for avalanches due to its lower elevations and urban environment, surrounding mountainous regions, such as those in the Sierra Nevada, are prone to avalanches during the winter months.

VULNERABILITY ANALYSIS

Mountain communities in the Lake Tahoe Basin, including Incline Village and Crystal Bay, are vulnerable to the effects of avalanches. When avalanche conditions are present, risks are highest for recreational users and others in backcountry areas who may trigger avalanches or be injured or killed by an avalanche. Besides injuries and deaths, avalanches can damage or destroy property and utilities and cover roadways in snow. Transportation disruptions caused by avalanches or area closures because avalanche risks can have economic impacts on ski resorts and other businesses in the Lake Tahoe Basin over a period of days to a week or more.

ESTIMATED IMPACT AND POTENTIAL LOSSES

Avalanches and landslides can have significant impacts and potential losses on Reno despite their low risk. Infrastructure damage is a primary concern, as both events can severely affect roads, bridges, and buildings, leading to costly repairs and disrupting transportation and emergency services.

Economically, these natural disasters can result in lost business revenue during closures and a decline in tourism, particularly for winter sports, which would negatively impact the local economy and job market.

Safety is another critical factor; avalanches and landslides pose immediate risks to residents and visitors, leading to injuries or fatalities. This can strain healthcare resources and create legal liabilities for the city.

Environmental impacts include ecosystem disruptions and the potential loss of vegetation and wildlife habitats, leading to costly restoration efforts. Additionally, insurance premiums may rise as risks increase, placing financial burdens on homeowners and businesses.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 29 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than

2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 29: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 30 provides the Calculated Priority Risk Index (CPRI) for avalanche and landslide impacts in City of Reno based on the current plan's hazard risk assessment results. The City of Reno assigned avalanche and landslide a risk factor value of 1.1, reflecting high probability, medium duration, and high frequency impacts. This risk factor value falls in the range of 0 to 1.9, which is considered a low-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 30: Calculated Priority Risk Index for Avalanche and Landslide in the City of Reno

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Avalanche and Landslide	1	1	1	2	1	1.1	Low

VULNERABLE POPULATIONS

In Reno, several populations may be particularly vulnerable to avalanches and landslides due to a combination of geographical, social, and economic factors.

Firstly, residents living in mountainous areas or near steep slopes are at heightened risk. This includes neighborhoods located at higher elevations or those close to natural drainages that can become overwhelmed during heavy rains or snowmelt. Many homes in these regions may not be sufficiently engineered to withstand the forces of an avalanche or landslide.

Another group at risk includes lower-income households and communities experiencing housing insecurity. These populations may reside in less stable housing conditions, often in areas that are less monitored for geological hazards. Limited access to transportation and resources can exacerbate their vulnerability, making evacuation and access to emergency services more challenging during a disaster.

Additionally, elderly individuals and those with disabilities are particularly susceptible due to mobility challenges that can impede their ability to escape quickly in the event of an avalanche or landslide. Lack of awareness or access to information about local hazards can further increase their risk.

Finally, tourists and seasonal visitors who may not be familiar with the local terrain and its risks can unwittingly place themselves in harm's way.

Drought

Nevada is the driest state in the nation, and the planning area has experienced multiple droughts. Drought cycles consisting of successive years of low precipitation are a normal, recurrent phenomenon across the Great Basin. Drought differs from most other natural hazard events due to its slow onset, gradual impact, and duration. With no defined starting period and limited long-range predictability, drought is a "creeping hazard" that may be recognized only after it is well underway. The onset of drought involves many factors, but in Washoe County, it is generally caused by successive years of inadequate winter precipitation, resulting in insufficient natural supplies to meet local demand. It is critical to note that the region depends almost exclusively on winter snowpack and rainfall for its water supply. Rains from summer thunderstorms do little to recharge reservoirs and raise groundwater tables.

LOCATION

Drought affects broad regions and can include any portion of Washoe County. Historically, the southern section of the County has had less frequent droughts than the central and northern sections because of extensive stored water in reservoirs in the Truckee River basin. However, low snowpack in the Truckee River basin can cause droughts of a greater magnitude in the southern section of the County, as was experienced between 2012 and 2017. With the implementation of the Truckee River Operating Agreement, the Truckee Meadow Water Authority can store credit water in the Boca Reservoir. The reservoir is currently operated for wintertime flood control based on the 1985 US Army Corps of Engineers' (USACE) Water Control Manual (WCM), which requires minimum specific flood space requirements in the reservoir and prohibits the capture of springtime runoff before April. Stakeholders throughout the Truckee River Basin recognize that the system can be better operated for both flood control and water supply.

PREVIOUS OCCURRENCE/HISTORY

2021-2022 Extreme drought in Washoe County

PROBABILITY OF FUTURE EVENTS

The probability of future drought events in Reno can be considered likely. The region has experienced variations in precipitation and increasing temperatures, which can contribute to drought conditions.

VULNERABLE POPULATIONS

In Reno, Nevada, several populations are particularly vulnerable to drought conditions. These include low-income families, who may struggle to afford increased water prices or adopt conservation measures. Drought can exacerbate existing financial strains, making it difficult for these households to secure reliable access to water.

Additionally, elderly residents and those with health issues are at heightened risk. They often rely on consistent access to water for hydration and medical needs, and may face challenges in adapting their routines or finding resources during water shortages. Furthermore, individuals living in rural or underserved areas may lack infrastructure for efficient water delivery and storage, leaving them more exposed to the impacts of drought.

The hospitality and agricultural sectors also face vulnerability, as they depend heavily on water for operations. Farmers may suffer crop losses due to water scarcity, while businesses reliant on tourism may see a decline in visitors during periods of extreme drought.

Lastly, Native American communities in the region may experience unique challenges related to land rights and water access, further complicating their vulnerability during drought periods.

VULNERABILITY ANALYSIS

Drought can impact surface water and groundwater availability and have direct, disastrous effects on human populations. The indirect consequences of drought are not often fully known. They include unemployment, reduced tax revenues, increased food prices, reduced outdoor recreation opportunities, higher energy costs as water levels in reservoirs decrease and consumption increases, and water rationing. This complex web of impacts can affect people and economies well beyond the area physically experiencing the drought.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 31 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a

framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 31: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 32 provides the Calculated Priority Risk Index (CPRI) for drought impacts in City of Reno based on the current plan's hazard risk assessment results. The City of Reno assigned drought a risk factor value of 2.4, reflecting medium probability and high duration impacts. This risk factor value falls in the range of 2.0 to 2.4, which is considered a medium-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 32: Calculated Priority Risk Index for Drought in the City of Reno

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Drought	3	2	1	4	2	2.4	Medium

Hazardous Materials Incident

A hazardous material is any item or agent (biological, chemical, or physical) that can cause harm to humans, animals, or the environment, either by itself or through interaction with other factors. Hazardous materials can be present in the form of gas, solid, or liquid. Environmental or atmospheric conditions can influence hazardous materials if they are uncontained.

LOCATION

The potential for contact with hazardous materials is present in all areas of Washoe County. Notably, hazardous materials are transported through the I-80 corridor, the North 395/South 580, and the Union Pacific Railroad on a daily basis and can have major impacts due to transportation accidents.

PREVIOUS OCCURRENCE/HISTORY

No significant hazardous materials incidents in the City of Reno have occurred over the past 5 years. City of Reno Utility Services – Environmental Control Section and the Reno Fire

Department occasionally encounter and mitigate minor incidents with hazardous materials, including biohazardous material cleanups.

PROBABILITY OF FUTURE EVENTS

The probability of future hazardous materials events in Reno can be classified as likely. Factors such as industrial activities, transportation routes, and population density contribute to this likelihood.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 33 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 33: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 34 provides the Calculated Priority Risk Index (CPRI) for hazardous materials incident impacts in City of Reno based on the current plan's hazard risk assessment results. The City of Reno assigned hazardous materials incidents a risk factor value of 2.1, reflecting quick onset and medium frequency impacts. This risk factor value falls in the range of 2.0 to 2.4, which is considered a medium-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 34: Calculated Priority Risk Index for Hazardous Materials Incident in the City of Reno

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Hazardous Materials Incident	2	1	4	2	3	2.1	Medium

VULNERABLE POPULATIONS

In Reno, certain populations are more vulnerable to hazardous materials incidents due to a variety of factors, including socioeconomic status, health conditions, and geographical location.

One of the most susceptible groups includes low-income communities, which may lack the resources to prepare for or respond to emergencies effectively. These neighborhoods often have limited access to transportation, making it difficult for residents to evacuate quickly in case of a hazardous incident. Additionally, those living in poverty may not have the financial means to stockpile essential supplies or take preventative measures.

Children and the elderly are other vulnerable populations. Children are at greater risk due to their developing bodies, which can be more sensitive to environmental toxins, and they may not understand the dangers associated with hazardous materials. The elderly may have pre-existing health conditions that can be exacerbated by exposure to harmful substances, and they might face mobility challenges that hinder their ability to evacuate if needed.

Individuals with chronic illnesses or disabilities are also at higher risk. Conditions such as asthma, respiratory diseases, or other health issues can be aggravated by exposure to hazardous materials. Moreover, those with disabilities might require additional assistance during emergencies, making them more vulnerable in hazardous situations.

Additionally, communities located near industrial areas or transport routes for hazardous materials are at increased risk. Proximity to chemical plants, warehouses, or busy highways can heighten the likelihood of exposure in the event of an accident.

Lastly, racial and ethnic minorities can face unique challenges during hazardous materials incidents, often due to systemic inequalities that limit their access to resources, information, and support during emergencies.

Infectious Disease

While chronic disease has placed a lasting strain on the nation's healthcare system, acute infectious disease poses a greater immediate and severe threat to its capacity. These diseases, caused by pathogenic bacteria, viruses, fungi, or parasites, are often marked by debilitating symptoms, such as fever, diarrhea, fatigue, muscle aches, coughing, respiratory issues, and rashes.[74] An outbreak of infectious diseases can bring socioeconomic activity and critical government functions to a standstill.

[74] Mayo Clinic, "Infectious Diseases." https://www.mayoclinic.org/diseases-conditions/infectious-diseases/symptoms-causes/syc-20351173

LOCATION

Infectious diseases spread by humans, and vector-borne infectious diseases can occur in both urban and non-urban areas throughout the County. Areas in the county that are more susceptible to infectious diseases are typically those with higher population density, such as Reno and Sparks, and areas with poor sanitation and limited access to healthcare services. On the other hand, areas more susceptible to vector-borne diseases are often those with standing water or extensive vegetation, providing suitable habitats for disease-carrying vectors, such as mosquitoes and ticks. These are more prevalent in non-urban areas.

PREVIOUS OCCURRENCE/HISTORY

- **03/13/20 Covid 19** – City of Reno emergency declaration, global pandemic, community shutdown. Complete community shutdown. Economic, tourism, mental health, physical illness, hospitalization, death.
- **2019 –** Other diseases, such as West Nile Virus, are present. In addition, the resurgence of diseases previously considered largely eradicated has been identified in vulnerable (unhoused) populations.

PROBABILITY OF FUTURE EVENTS

The probability of future infectious disease events in Reno can be considered "likely." Factors such as population density, movement of people, and environmental conditions contribute to the potential for outbreaks. Monitoring and preventive measures can help mitigate risks, but the likelihood of infectious disease events remains a concern in urban areas.

VULNERABILITY ANALYSIS

Infectious diseases are known to spread quickly through communities. Many spread through close contact, meaning that highly populated areas like Reno and Sparks are more prone to widespread outbreaks. Public gathering places where people may be together in close quarters, such as schools and childcare facilities, offices, and transportation terminals, provide more opportunities for diseases to pass from one person to another.

Land use changes can have a major impact on infectious disease numbers. This is done by changing the rate of contact between individuals and disease hosts, whether animal, insect, or fungal. Along with this change in contact rate, land use changes can alter the composition of local species, potentially allowing vector species to become the dominant species.

Outbreaks of infectious diseases most often affect vulnerable populations. However, a worst-case scenario could overwhelm local hospitals and medical facilities and require a surge response.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 35 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 35: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 36 provides the Calculated Priority Risk Index (CPRI) for infectious disease impacts in City of Reno based on the current plan's hazard risk assessment results. The City of Reno assigned infectious disease a risk factor value of 2.1, reflecting long duration but slow onset. This risk factor value falls in the range of 2.0 to 2.4, which is considered a medium-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 36: Calculated Priority Risk Index for Infectious Disease Incident in the City of Reno

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Infectious Disease	2	2	1	4	2	2.1	Medium

Radiological Waste Transport

The transportation of radiological waste and other types of radiological materials is a common practice in Washoe County. Washoe County roadways, railways, and airways ship different forms of radiological materials daily. The transportation of radioactive materials through Nevada must follow the hazardous materials regulations of the U.S. Department of Transportation. Most shipments do not require prior notification and do not follow restricted routes. If the type or quantity of radiation exceeds a "Quantity of Concern," the shipper must

notify the state of the planned time and route. Shipments of Radioactive Material in Quantities of Concern are not restricted and are not required to wait for approval. A more restricted category is Highway Route Controlled Quantity (HRCQ), which requires prior notification, and pursuant to a Governor's directive, the shipment and transportation vehicle are inspected and then escorted by the Nevada Highway Patrol. These shipments occur about once every three years through Washoe County.

LOCATION

Radiological waste could be transported along rail systems, major airports, and highway corridors in Washoe County. The zones of potential impact extend beyond these transportation facilities. The sizes and shapes of those zones are affected by the material released and atmospheric and environmental effects, such as wind speed and water flow.

PREVIOUS OCCURRENCE/HISTORY

No previous occurrences of Radiological Waste Transport.

PROBABILITY OF FUTURE EVENTS

The probability of future radiological waste transport events in Reno, Nevada, is generally considered unlikely. However, it can depend on factors such as regional policies regarding waste management, proximity to facilities that handle radioactive materials, and transportation routes utilized for such purposes.

VULNERABILITY ANALYSIS

The MPT determined that hazards from transporting radiological waste have a low probability of occurring. However, the vulnerability of the public, continuity of operations, and infrastructure to radiological waste transport are assessed below. A radiological incident on a transportation corridor could cause a fire or explosion, dispersing radiological particles that contaminate people and property. Depending on several factors, communities in the immediate vicinity of the event would be the most vulnerable. Moreover, if the radioactive materials are not effectively contained, they can spread through the air, soil, and/or water. In the immediate aftermath of a radiological incident on a roadway, the materials pose a substantial risk to first responders and other emergency personnel. Due to the infrequent occurrence of these accidents, emergency personnel may not be sufficiently trained in appropriate response protocols.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 37 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with

a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 37: Overall CPRI Risk Score

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 38 provides the Calculated Priority Risk Index (CPRI) for radiological waste transport impacts in City of Reno based on the current plan's hazard risk assessment results. The City of Reno assigned radiological waste transport a risk factor value of 1.7, reflecting quick onset and medium magnitude and duration impacts. This risk factor value falls in the range of 0 to 1.9, which is considered a low-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 38: Calculated Priority Risk Index for Radiological Waste Transport in the City of Reno

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Radiological Waste Transport	1	2	4	2	1	1.7	Low

VULNERABLE POPULATIONS

In Reno, several populations may be considered vulnerable to radiological waste transport incidents. These groups include low-income communities, elderly individuals, children, and those with existing health issues.

Low-income populations often reside in areas near major transportation routes, thereby increasing their risk of exposure to hazardous materials. Limited resources may diminish their capacity to evacuate or respond effectively during an emergency. Similarly, elderly individuals may face mobility challenges, making it harder for them to evacuate in a timely manner.

Children are particularly vulnerable due to their developing bodies and higher respiration rates, which increase their exposure risk. Additionally, individuals with pre-existing health conditions

may be more susceptible to the adverse effects of radiological exposure, requiring targeted attention in emergency planning.

Transportation Incident (Aircraft Crash)

An aircraft crash may occur for many reasons, including mechanical failure, poor weather conditions, or criminal activity. Aircraft of varying sizes are subject to this hazard, from small single-engine aircraft and gliders to helicopters and commercial airliners. The damage from an aircraft crash depends on the location of the accident (densely versus sparsely populated area) and the potential for releasing hazardous materials.

LOCATION

Washoe County has four publicly operated airports: the Reno–Tahoe International Airport (RNO). Several privately operated airports in the County serve commercial, non-commercial, private commuter, and recreational aircraft. The greatest volume of commercial aircraft service passes through Reno–Tahoe International Airport. Federal agencies, such as the Bureau of Land Management, also operate and lease airports in Nevada.

PREVIOUS OCCURRENCE/HISTORY

- **September 17, 2023** – Two pilots were killed when their planes collided in midair during an air race in Reno, Nevada. The aircrafts—a North American T-6G and a North American AT-6B—crashed during the final day of competition at the National Championship Air Races. Only the pilots were on board at the time of the collision, according to the Federal Aviation Administration. The tragic incident occurred on the last day of the famed air races, which were being held for the last time ever that year in Reno. The competition took place at the Reno-Stead Airport for 59 years, but the airport will no longer host the event, "citing the region's significant growth amongst other concerns," according to the Reno Air Racing Association Board of Directors. The deadliest crash was in 2011, when anhttps://www.cnn.com/2012/09/16/us/nevada-air-race-crash/index.html and plunged into the ground near a seating area, killing one pilot and 10 spectators. Dozens of others were injured.[75]

VULNERABILITY ANALYSIS

Public airports that have accepted federal assistance, including the Reno–Tahoe International Airport, must designate runway protection zones (RPZs) at each end of their runways to protect people and property on the ground if an aircraft lands or crashes beyond the runway. Reno–

[75] Juliana Kim, NPR.com, September 18, 2023, "Two Pilots Were Killed in a Midair Collision on the Last Day of Nevada Air Races." https://www.npr.org/2023/09/18/1200092542/reno-air-show-crash

Tahoe International Airport owns most of the land in its RPZs in Reno.[76] Aircraft crashes are more likely to occur in mixed commercial, residential, and commercial–industrial development in the RPZs.

Reno Stead Airport has designated airport-critical areas at the ends of its runways. These trapezoidal areas help ensure that land use is compatible with airport operations to reduce risks to people and property on the ground. The airport-critical areas at either the end of Runway 8/26 or the south end of Runway 14/32 extend beyond airport property. Residential areas in the County and industrial and recreational areas in Reno near the airport are critical areas where aircraft crashes are more likely to occur.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 39 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 39: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 40 provides the Calculated Priority Risk Index (CPRI) for transportation incident impacts in City of Reno based on the current plan's hazard risk assessment results. The City of Reno assigned transportation incidents a risk factor value of 1.7, reflecting quick onset and medium probability and duration impacts. This risk factor value falls in the range of 0 to 1.9, which is considered a low-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

[76] Reno-Tahoe Regional Airport, "RNO.C3_Facility Requirements_Final.docx." https://www.renoairport.com/wp-content/uploads/2022/08/RNO-MP-2018_Facility-Requirements.pdf

Table 40: Calculated Priority Risk Index for Transportation Incident in the City of Reno

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Transportation Incident	2	1	4	2	1	1.7	Low

VULNERABLE POPULATIONS

In Reno, certain populations are particularly vulnerable to transportation incidents, including aircraft-related incidents. Low-income families often find themselves at greater risk due to reliance on public transportation or living in proximity to airports. This demographic may have limited access to resources or emergency information that could help them navigate dangerous situations effectively.

Children also represent a vulnerable group, especially those attending schools located near airports. Their limited understanding of safety protocols can put them at risk during emergencies. Additionally, the noise and air pollution from air traffic can have adverse effects on their health and well-being.

Elderly residents face unique challenges as well. Many older adults may have mobility issues that complicate their ability to evacuate quickly in the event of an incident. This demographic is often more susceptible to health complications that can arise from transportation-related disturbances.

Individuals with disabilities are another group that may experience heightened vulnerability. Whether due to physical or cognitive impairments, these individuals can encounter difficulties in navigating their environment safely, especially in chaotic situations like transportation incidents.

Moreover, low-income communities tend to lack the same level of access to resources and support systems that enhance safety. Economic disadvantages can limit options for effective emergency responses, putting these populations at an elevated risk during transportation incidents.

Finally, tourists and visitors in Reno may not be familiar with the local area or safety measures, making them particularly vulnerable during incidents. Their lack of awareness regarding potential risks at the airport or surrounding areas can increase the likelihood of encountering dangerous situations.

Volcano

A volcano is an opening or rupture of the earth's surface that allows ash, gases, and/or molten rock under tremendous pressure to emerge from the surface. Volcanic activity over long periods can either form mountains, as molten rock is gradually extruded, or rapidly obliterate mountains during explosive eruptions.

LOCATION

No active volcanoes are in Washoe County.

PREVIOUS OCCURRENCE/HISTORY

No previous occurrence of Volcanos.

PROBABILITY OF FUTURE EVENTS

The probability of future volcanic events in Reno, Nevada is considered unlikely. The region is not known for volcanic activity, as it is situated away from major volcanic centers. While there may be some geological features in the broader area, the risk of a volcanic eruption directly impacting Reno is minimal.

ESTIMATED IMPACT AND POTENTIAL LOSSES

The potential impacts of a volcanic eruption on the city of Reno, while unlikely, could still be significant. Air quality issues would be a major concern, as eruptions can release ash and gases that degrade air quality, leading to respiratory problems and increased healthcare costs for residents.

Infrastructure damage is another critical issue, as volcanic ash can accumulate on buildings, roads, and power lines, causing structural failures and resulting in expensive repairs. Additionally, essential services such as water supply and electricity could be disrupted, leading to economic repercussions.

Evacuations may be necessary if an eruption threatens the area, creating challenges related to temporary housing and relocations. The tourism industry could also face serious impacts, as visitors may be deterred, affecting local hotels, restaurants, and attractions.

Overall, while the chances of a volcanic event affecting Reno are low, the potential consequences for the city's economy and residents' well-being could be significant.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 41 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 41: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 42 provides the Calculated Priority Risk Index (CPRI) for volcano impacts in City of Reno based on the current plan's hazard risk assessment results. The City of Reno assigned volcano incidents a risk factor value of 1.2, reflecting quick onset and long duration impacts. This risk factor value falls in the range of 0 to 1.9, which is considered a low-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 42: Calculated Priority Risk Index for Volcano Incident in the City of Reno

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Volcano Incident	1	1	1	3	1	1.2	Low

VULNERABLE POPULATIONS

In Reno, certain populations are especially vulnerable to the impacts of volcanic activity, despite the region not being known for active volcanoes. One of the primary groups at risk is the low-income community. These individuals often lack the resources necessary for effective disaster preparedness and recovery. Limited access to transportation, emergency supplies, and critical information can leave them particularly exposed to the hazards associated with volcanic eruptions, such as ash fallout and the need for evacuation.

Another vulnerable demographic is the elderly population. Seniors may face significant challenges during a volcanic event due to mobility issues and chronic health conditions that could impede their ability to evacuate quickly. They are likely to require additional support, not only in the evacuation process but also in accessing medical services and ensuring they have their essential medications and supplies on hand.

Children and families also represent a group that may struggle during such emergencies. Young children might not fully grasp the dangers posed by a volcanic eruption, relying heavily on adults for guidance and protection. Families may face logistical difficulties when evacuating, especially if they have multiple children, pets, or special needs to consider, thereby complicating their efforts for a safe exit.

People with disabilities constitute another vulnerable population under volcanic threat. Individuals with physical or cognitive limitations may require specialized assistance during an evacuation, making their safety more complicated to secure. Emergency response plans must incorporate their specific needs to ensure they receive the necessary support during a volcanic crisis.

Furthermore, those experiencing homelessness are particularly at risk. They often lack access to information about potential volcanic hazards and may find themselves without a plan or means of shelter during an eruption. Their absence of a stable living situation can lead to significant danger during such emergencies, emphasizing the need for targeted outreach and support.

Visitors and temporary residents, such as tourists or seasonal workers, are another group that is often overlooked. They may not be familiar with local emergency protocols, or the geological risks associated with the area, leaving them unprepared in the event of volcanic activity.

Vulnerability Assessment

JURISDICTION-SPECIFIC VULNERABILITIES

Table 43: Vulnerable Assets in the City of Reno

Vulnerable Assets	What makes this group/asset vulnerable during hazards? Have there ever been issues with recovery after an event?
People (residents, workers, visiting populations, and socially vulnerable populations like seniors, individuals with disabilities, lower-income individuals, etc.)	
Fires	
IES will provide mapping/HAZUS	
Unsheltered along river/streams (flooding) and rail (trains)	Unsheltered individuals residing along the river and train tracks face significant health and safety risks due to rising waters and constant railroad traffic.

Vulnerable Assets	What makes this group/asset vulnerable during hazards? Have there ever been issues with recovery after an event?
Unsheltered during extreme heat/cold or fires (smoke)	During extreme heat/cold weather conditions, unsheltered individuals are directly exposed to the elements, which increases the risks of hypothermia, frostbite, heat exhaustion, and heatstroke. In addition, hazards related to air quality events and failure to seek adequate refuge can cause immediate danger for those with pre-existing health conditions and may result in an increased risk of cancer.
Structures (residential, commercial, industrial, government-owned, planned capital improvement, etc.)	
Walgreens bridge with communications line	Earthquake impacts on bridge structure could affect major communications lines located on the bridge.
Unreinforced structures	Subject to damage/destruction from earthquake
Unhoused trespassing at Truckee Meadows Water Reclamation Facility (TMWRF)	Unhoused trespassing at TMWRF could pose safety for individuals and/or staff at the plant.
Economic Assets (major employers, primary economic sectors, key infrastructure like telecommunications networks, etc.)	
Natural, Historic, and Cultural Resources (areas of conservation, beaches, parks, critical habitats, community centers, historic places, etc.)	
Pyramid Lake Paiute Tribe downstream partner affected by Truckee River water quality.	Disaster occurrence, major power outage, earthquake or flood could impact water quality discharge to the Truckee River.
Critical Facilities and Infrastructure (hospitals, law enforcement, water, power, transportation systems, etc.)	
TMWRF power supply redundancy.	TMWRF does not have backup generators, only small scale battery backup for IT controls. Need increased battery backups for the server room. TMWRF currently working on a redundant power assessment.
TMWRF flooding	No employee access during major flood event
TMWRF seismic assessment	Destruction of critical wastewater infrastructure leading to wastewater entering the Truckee River
TMWRF cybersecurity assessment, on-site badging	
RSWRF cybersecurity assessment	

Vulnerable Assets	What makes this group/asset vulnerable during hazards? Have there ever been issues with recovery after an event?
Community Activities (major local events, such as festivals, or economic events, like farming or fishing)	
Air Races now Air Show	
Multiple annual downtown festivals	
Regional festivals – i.e., Hot August Nights, Street Vibrations, Wing Fest, BBQ, Brews, & Blues	

ASSET INVENTORY

Local assets that may be affected by hazards include residents, properties, utilities, and infrastructure. GIS data from federal, state, and local databases were used to inform the vulnerability assessment and identify critical infrastructure. The Vulnerability Assessment Section of the Base Plan discusses the sources and types of data used in the RHMP. 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 were 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 in the next plan update.

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).

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 with California draw new residents to the region. The City of Reno's development has expanded outward to areas in foothill regions with greater vulnerability to wildland fires.

The vulnerability subsection of each hazard profile in Section 3.3 outlines recent development trends to illustrate the 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 44 provides a snapshot of how vulnerability has changed since the development of the 2012 HMP.

Table 44: Recent Development Trends in the City of Reno

Type of Hazard Event	Changes in Land Use	Changes in Population	Changes in Conditions (e.g., climate change)	Overall Vulnerability
Avalanche and Landslide	No changes	No changes	No changes	No changes
Criminal Acts and Terrorism	No changes	No changes	No changes	No changes
Drought	No changes	No changes	Climate change	Increased frequency and intensity
Earthquake	No changes	No changes	No changes	No changes
Energy Emergency	No changes	No changes	No changes	No changes
Flood	No changes	No changes	Climate change	Increased frequency and intensity
Infectious Disease	No changes	No changes	No changes	Vulnerability decreased in response to COVID-19 pandemic. New protocols and processes are in place for remote meetings, work, etc.

Type of Hazard Event	Changes in Land Use	Changes in Population	Changes in Conditions (e.g., climate change)	Overall Vulnerability
Radiological Waste Transport	No changes	No changes	No changes	No changes
Extreme Weather (Winter Storm, Windstorms, Extreme Heat)	No changes	No changes	Climate change	Increased frequency and intensity
Transportation Incident	No changes	No changes	No changes	No changes
Volcano	No changes	No changes	No changes	No changes
Wildland Fire	Valley View and The Canyons developments in S Meadows on the mountain above DRHS. Approx 150 homes in WUI area. Stonegate development on the W side of White Lake. 4000–5000 homes in WUI area. Meridian development Garson Road in Verdi. 120 homes in WUI area.	Valley View and The Canyons homes will be built on the slope fronting prevailing SW winds. Stonegate and Daybreak will create large population increases and will impact emergency services capabilities. High winds and above-ground power lines	During years of drought, the frequency and severity of wildfires are more likely to increase.	Increased

Type of Hazard Event	Changes in Land Use	Changes in Population	Changes in Conditions (e.g., climate change)	Overall Vulnerability
	Daybreak development in S. Meadows. Approx 4000 homes in WUI areas. New above-ground power line from Somersett to Cold Springs in WUI area.	are at increased risk in WUI.		

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))

Capability Assessment

Planning and Regulatory

Planning and regulatory capabilities are the plans, policies, codes, and ordinances that prevent and reduce the impacts of hazards. Based on the City of Reno's self-assessment, the city has the following planning and regulatory capabilities.

Table 45: Planning Capabilities of the City of Reno

Plan	Do you have this? (Y/N)	Does the plan address hazards? (Y/N)	How can the plan be used to implement mitigation actions?	When was it last updated? When will it be updated next?
General Plan	City of Reno Master Plan – ReImagine Reno	Yes	It reflects the City's goals and the Council's priorities	Last update effective November 2021.

Plan	Do you have this? (Y/N)	Does the plan address hazards? (Y/N)	How can the plan be used to implement mitigation actions?	When was it last updated? When will it be updated next?
				Begin update in winter 2025
Capital Improvement Plan	Yes	Yes	It can help us plan for and fund the identified mitigation projects	Updated with the FY25 budget. Updated annually as part of the budget process.
Climate Change Adaptation Plan	No	n/a	n/a	n/a
Community Wildfire Protection Plan	No. In the grant selection process for plan development funding	n/a	n/a	n/a
Economic Development Plan	City of Reno – No Economic Development Authority of Western Nevada (EDAWN) – Yes, which is approved by the Reno City Council	No	--	EDAWN plan last updated July 2019. Next update, 2025.
Land Use Plan	City of Reno Master Plan – ReImagine Reno	Yes	It reflects the City's goals and the Council's priorities	Last update effective November 2021.

Plan	Do you have this? (Y/N)	Does the plan address hazards? (Y/N)	How can the plan be used to implement mitigation actions?	When was it last updated? When will it be updated next?
				Begin update in winter 2025
Local Emergency Operations Plan	Yes Regional Emergency Operations Plan	Yes	Outlines plans and operations during emergencies/hazards. AARs	July 2020 Fall 2024
Stormwater Management Plan	Yes	Some	Identifies needed improvements.	Multiple previous stormwater and flood control reports have to be updated. Currently working on Phase 1 of a 3-Phase Storm Drain Master Plan.
Transportation Plan	Yes – through the RTC* and adopted by the Reno City Council		Address emergency evacuation routes, secondary routes during shutdowns, accidents, storms	Updated 2021 Next update 2025
Substantial Damage Plan	No	n/a	n/a	n/a
Other	Washoe County has a Damage Assessment Plan that serves the same intent and covers all jurisdictions.			

Plan	Do you have this? (Y/N)	Does the plan address hazards? (Y/N)	How can the plan be used to implement mitigation actions?	When was it last updated? When will it be updated next?
Other? (Describe)	Re-Leaf Reno Strategy to build parks and athletic fields in flood zones/plains	Yes – extreme heat Yes	Yes	n/a
Regional Hazardous Material Response Agreement	Yes	Yes	Yes	2024

Table 46: Regulations and Ordinances of the City of Reno

Plan	Does this regulation/ordinance effectively reduce hazard impacts?	Is it adequately administered and enforced?	When was it last updated? When will it be updated next?
Building Code	Yes. 2018 International Building Code, 2018 International Residential Code, 2018 International Existing Building Code, 2018 International Energy Conservation Code, 2018 International Fuel Gas Code, 2018 Uniform Plumbing Code, 2018 Uniform Mechanical Code, 2017 National Electrical Code,	Yes	2018 Building Codes were mandatory July 1, 2019. Northern Nevada Amendments adopted 2018. Anticipate the adoption of 2024 Building Codes in 2025. Nevada Blue Book, which summarizes NRS, NAC, building codes, city and county ordinances, board policies, and

Plan	Does this regulation/ordinance effectively reduce hazard impacts?	Is it adequately administered and enforced?	When was it last updated? When will it be updated next?
	The Nevada Blue Book		recommended minimum practices and standards, was adopted in 2020.
Flood Insurance Rate Maps	Yes	Yes	Varies, major Truckee River floodplain/floodway revision underway through the Truckee River Flood Management Authority (TRFMA). Swan and Silver Lake floodplain revisions are currently underway. South Reno tributaries to the Truckee River floodplain revisions underway though FEMA Risk Map study.
Floodplain Ordinance	Yes, Title 18	Yes	Updated effective October 2022. Currently being updated, should be adopted in 2025.
Subdivision Ordinance	Yes, annexation and land development code (title 18)	Yes	Updated effective October 2022. Currently being updated, should be adopted in 2025.

Plan	Does this regulation/ordinance effectively reduce hazard impacts?	Is it adequately administered and enforced?	When was it last updated? When will it be updated next?
Zoning Ordinance	Yes, Title 18.	Yes.	Updated effective October 2022. Currently being updated, should be adopted in 2025.
Natural Hazard Specific Ordinance (Stormwater, Steep Slope, Wildfire)	Yes, Title 18 regarding, flood hazard areas, source water protection, wildland interface/fire safety, wetland and stream environment protection, erosion prevention, hillside development and slopes. No – stormwater ordinance.	Yes	Updated effective October 2022. Currently being updated, should be adopted in 2025.
Acquisition of Land for Open Space and Public Recreation Use	City has a strategy of developing parks or athletic fields in flood zones/plains		
Prohibition of Building in At-Risk Areas	Yes, Title 18	Yes	Updated effective October 2022. Currently being updated, should be adopted in 2025.
Other? (Describe)			

Administrative and Technical Capabilities

Table 47: Administrative Capabilities of the City of Reno

Administrative Capability	Do you have this? (Y/N)	Is staffing adequate?	Is staff trained on hazards and mitigation?	Is coordination between agencies and staff effective?
Chief Building Official	Yes	Yes, additional staff would be helpful in planning for hazard mitigation.	Yes, ongoing and updated training is required.	Yes
Civil Engineer	Yes	Yes, additional staff would be helpful in planning for hazard mitigation.	Yes, ongoing and updated training is required.	Yes
Community Planner	Yes	Yes, additional staff would be helpful in planning for hazard mitigation.	Yes, ongoing and updated training is required.	Yes
Emergency Manager	Yes	No	Yes	Yes
Floodplain Administrator	Yes	No	Yes	Yes
Geographic Information System (GIS) Coordinator	Yes	No	Thorough research revealed a lack of sufficient information to	Thorough research revealed a lack of sufficient information to

Administrative Capability	Do you have this? (Y/N)	Is staffing adequate?	Is staff trained on hazards and mitigation?	Is coordination between agencies and staff effective?
			evaluate or categorize this, indicating a need for further investigation.	evaluate or categorize this, indicating a need for further investigation.
Planning Commission	Yes	Yes	No	Yes
Fire Safe Council	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.
CERT (Community Emergency Response Team)	Reno – no Washoe County – yes	n/a	n/a	n/a
Active VOAD (Voluntary Agencies Active in Disasters)	Yes	Defer to Red Cross	Defer to Red Cross	Yes
Other? (Please describe.)	Sustainability Manager	Yes	No	Yes

Table 48: Technical Capabilities of the City of Reno

Technical Capability	Do you have this? (Y/N)	How has the capability been used to assess/mitigate risk in the past? (Answer or N/A)	How can the capability be used to assess/mitigate risk in the future?
Mitigation Grant Writing	Yes	Application for Community Project Funding to address Hazard Mitigation Projects	Continue to seek out and apply for Hazard Mitigation Grants through FEMA or other agencies
Hazard Data and Information	Yes – maintained by each department, such as Utility Services, Public Works, Maintenance and Operations	Planning for severe winter storms for street closures, bridge removals, sandbag locations.	Continue to work together to coordinate efforts, review hazards after they occur to evaluate response and update plans for future response.
GIS	Yes	Yes – used during development review	Geospatial review of potential hazards in relation to development
Mutual Aid Agreements	Yes	Assist when local resources are exhausted. Assist when Mutual Aid resources are geographically closer to the risk	Refine Mutual Aid Plans as the region experiences unprecedented growth and zoning changes while resource growth lags behind.
Other? (Please describe.)			

Financial Resources

Financial capabilities are the resources to fund mitigation actions. Talking about funding and financial capabilities is important to determine what kinds of projects are feasible given their cost. Mitigation actions like outreach programs are lower cost and often use staff time and existing budgets. Other actions, such as earthquake retrofits, could require substantial funding from local, state, and federal partners. Partnerships, including partners willing to donate land, supplies, or an in-kind match and cash, can be included.

Table 49: Financial Capabilities of the City of Reno

Funding Resource	Do you have this?	Has this funding resource been used in the past and for what types of activities?	Could this resource be used to fund future mitigation actions?	Can this be used as the local cost match for a federal grant?
Capital Improvement Project Funding	Yes	Designing/Building capital improvement projects, maintaining capital assets	Yes	Yes
General Fund	Yes	Yes, this is the most flexible funding source that the City has. It has been used for the Seismic Retrofit of City Hall as the matching funds for a Hazard Mitigation Grant.	Yes	Yes
Hazard Mitigation Grant Program (HMGP/404)	Yes	Yes, City Hall Seismic Retrofit.	Yes – plan to apply for upcoming hazard mitigation grants	No
Building Resilient Infrastructure &	Yes	Yes, Was awarded for microgrid planning and	Yes	No

Funding Resource	Do you have this?	Has this funding resource been used in the past and for what types of activities?	Could this resource be used to fund future mitigation actions?	Can this be used as the local cost match for a federal grant?
Communities (BRIC)		through the RTC, the region received an award for Lemmon Drive Phase II Roadway Reconstruction.		
Flood Mitigation Assistance (FMA)	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Yes	No
Public Assistance Mitigation (PA Mitigation/406)	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Yes	No
Community Development Block Grant (CDBG)	Yes	Yes, limited funding for ADA Accessibility improvements like curb ramps and audible traffic signal	Thorough research revealed a lack of sufficient information to	No

Funding Resource	Do you have this?	Has this funding resource been used in the past and for what types of activities?	Could this resource be used to fund future mitigation actions?	Can this be used as the local cost match for a federal grant?
		crosswalk indicators. Has been used to fund housing and neighborhood development programs.	evaluate or categorize this, indicating a need for further investigation.	
Natural Resources Conservation Services (NRCS) Programs	Yes	Yes, design and construction or mitigation of High Hazard Dams. West Wash Dam is currently under review for design.	Yes	No
U.S. Army Corps (USACE) Programs	Yes – Water Resources Development Act (WRDA)	Yes, received money for conservation projects on the lower Truckee River	Yes	No
Property, Sales, Income, or Special Purpose Taxes	Yes – Property, Sales No – Income	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.

Funding Resource	Do you have this?	Has this funding resource been used in the past and for what types of activities?	Could this resource be used to fund future mitigation actions?	Can this be used as the local cost match for a federal grant?
Stormwater Utility Fee	No	No	Yes	Yes
Fees for Water, Sewer, Gas, or Electric Services	Yes	Sewer – city; gas and electric come from franchise fees	Yes – though they are currently allocated to fund other programs	
Impact Fees from New Development and Redevelopment	Yes	For funding capacity and growth projects	Yes	Yes
General Obligation or Special Purpose Bonds	Yes		Yes	Yes
Federal-funded Programs (Please describe)	Yes	It has been used for creek and dam	Yes	Yes
Other State-funded Programs (Please describe)	Truckee Meadows Stormwater Management Program	Flood preparedness, stormwater mitigation	Yes	Yes

Funding Resource	Do you have this?	Has this funding resource been used in the past and for what types of activities?	Could this resource be used to fund future mitigation actions?	Can this be used as the local cost match for a federal grant?
Private Sector or Nonprofit Programs	N/A			
Other?	HMGP from FMAG, CWDG, WUI Grant, FP&S for CWPP	Wildland Fire restoration and mitigation	Yes	No

*Note: FMAG = Fire Management Assistance Grant Program, RTC = Regional Transportation Commission

Education and Outreach

Education and outreach capabilities are programs and methods that could communicate about and encourage risk reduction. These programs may be run by a participant or a community-based partner. Partners, especially those who work with underserved and multilingual communities, can help identify additional education and outreach capabilities.

Table 50: Education and Outreach Capabilities of the City of Reno

Education and Outreach Capability	Do you have this? (Y/N)	Does this resource currently incorporate hazard mitigation?	Notes
Community Newsletter(s)	Yes – Quarterly Development Services Newsletter, public safety e-newsletters as needed	No.	City has extensive email list with 30,000 subscribers we can push newsletters out to. Content is also available in Spanish.
Hazard Awareness Campaigns (such as	Yes – Firewise, Ready Set Go, Fire	Yes	none

Education and Outreach Capability	Do you have this? (Y/N)	Does this resource currently incorporate hazard mitigation?	Notes
Firewise, Storm Ready, Severe Weather Awareness Week, School Programs)	Adaptive NV, Living with Fire, Dumpster program, Defensible Space programs, Flood awareness programs, Great Nevada Shakeout		
Public Meetings/Events (Please Describe)	Yes – Neighborhood Advisory Boards and HOAs, which address Ward-specific concerns and issues that occur, City Council Meetings	Yes, the Council considers funding for projects to address hazards and emergencies. NABs and HOAs may bring hazard situations to the attention of city staff and the city council.	none
Emergency Management Listserv	City has a list serve of 30,000 subscribers that it can push emergency management information out to	No	none
Local News	Yes – 2 News, News 4/Fox 11, KOLO 8 News/Telemundo, Univision, Reno Gazette Journal, KOH Radio, KUNR Public Radio, and The Nevada Independent	Local media partners help amplify city's messaging regarding upcoming hazards or emergencies.	Local news include Spanish media including television and radio.

Education and Outreach Capability	Do you have this? (Y/N)	Does this resource currently incorporate hazard mitigation?	Notes
Distributing Hard Copies of Notices (e.g., public libraries, door-to-door outreach)	No	n/a	n/a
Insurance Disclosures/Outreach	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.
Organizations that Represent, Advocate for, or Interact with Underserved and Vulnerable Communities (Please Describe)	Yes – Clean and Safe coordinates with contractors to interact with the unsheltered population to educate them on concerns and issues that occur	Clean and Safe Staff have standard operation procedures to mitigate life and safety concerns during inclement weather and/or hazards.	
Social Media (Please Describe)	Yes – Facebook, Twitter, Instagram, YouTube, Nextdoor, Blog – "Around the Arch"	Yes	Provides notification of storm preparedness tips, street closures, emergency evacuations, available resources
Other? (Please Describe)	Neighborhood Advisory Board Meetings	No.	

National Flood Insurance Program Participation

The National Flood Insurance Program (NFIP) is a Federal Emergency Management Agency (FEMA) program that provides flood insurance to millions of policyholders across the country. The plan must describe participation in the NFIP for each participant, as applicable, in accordance with NFIP regulatory requirements.

Table 51: Floodplain Management, Mapping, and Insurance for the City of Reno

Question	Response
Who is the floodplain manager? Is this their primary or secondary role?	Joe Coudriet, secondary role
Does the floodplain manager have adequate training and capacity for their role? If not, what else is needed?	Yes. However, additional staff and staff training are needed for crossover.
How does the community enforce its floodplain rules? Does enforcement include monitoring compliance and acting to correct violations?	Through implementation and enforcement of the Reno Municipal Code via the Development Services Department, ensuring that all permit related activities comply with Reno Municipal Code. Yes
When was the community's most recent Community Assistance Visit (CAV)?	November 8, 2019
Were any violations noted on the community's most recent CAV?	No
Is there an upcoming CAV? If not, is one needed?	The five-year CAV is expected November 2024.
When was the most recent floodplain management ordinance adopted?	November 2007
Does your community participate in the Community Rating System (CRS)? If so, describe the steps the community has taken to achieve the CRS goals.	No
Does the community's floodplain management ordinance include any higher standards? If so, please list.	Yes Section 18.12.605 – Requires compensatory flood storage in Critical Flood Zone 1, as identified by the Truckee River Flood Project. 1.3:1 Section 18.12.1703(a)(3)d3 – The City regulates development in Shaded Zone X and requires elevation of the bottom

Question	Response
	of the lowest floor beam to one foot above the highest adjacent grade. Section 18.12.1703(d)(1)a – The City requires the development of Base Flood Elevation data for ALL subdivision proposals irrespective of the 5 acre-50 lot NFIP requirement. Section 18.12.1703(a)(3) – The City has a Freeboard Requirement and requires elevation of the bottom of the lowest floor beam to one foot above Base Flood Elevation or Base Flood Depth. Section 18.12.1703(a)(3)e – The City requires that ALL manufactured homes, regardless of location in a new or an existing manufactured home park or subdivision, meet the same elevation requirements as all other new development or substantial improvement. Section 18.12.1703(b)(6) – The City prohibits manufactured homes on alluvial fans, except in existing manufactured home parks or subdivision. Section 18.04.102(a)(8) – The City requires compensatory flood storage for Closed Intermittent Lakes. Onsite detention/retention basins that are adequately sized to mitigate the increase of stormwater runoff as the result of the development to a minimum mitigation ratio of 1:1.3 during the 100-year, 10-day storm. No Rise in Floodplain?
Who is responsible for permitting?	Development Services Department, Utility Services, Floodplain Manager, and Director of Utility Services
How does the community issue development permits in the special flood hazard area?	Verify Zoning is consistent with proposed use (Planning) and that activities comply with the Reno

Question	Response
	Municipal Code and Federal Emergency Management Agency (FEMA) regulations. Staff utilizes a checklist to implement the process and follow up documentation and other requirements are met.
Does the community maintain elevation certificates?	Yes
Does the community track the number of buildings in the special flood hazard area? If yes, are there any trends?	No
How many repetitive loss (RL) structures does the community have? (List number and type of structure)	2 – Single Family Structure 1-two-four family 6- Non-residential 3- Non-residential business
How many severe repetitive loss (SRL) structures does the community have? (List number and type of structure)	1 – Business – Non-Residential
Have any RL/SRL properties been mitigated since the last plan update?	No
Who is responsible for making substantial damage/substantial improvement determinations?	Development Services Department
How does the substantial damage/substantial improvement process work in your community?	Development Services determines whether an improvement to a structure is a "substantial improvement." If the application pertains to a property located in a floodplain, the flood zones recorded on the permit which is stored electronically. The City then requires an elevation certificate for the new construction or a cost verification if it is a substantial improvement. The cost verification certificate is given to the applicant to complete for valuation of the project and market value of the structure. When this ratio reaches 40%, the City does a complete verification of the certificate. This same system is used for substantial

Question	Response
	damage. Once the applicant has complied with the City's codes and regulations, a permit is issued. The applicant submits another elevation certificate upon completion of construction. After an inspector approves the final construction, a certificate of occupancy is issued.
Is there sufficient staff and training to make substantial damage/substantial improvement determinations?	Yes
How are substantial damage/substantial improvement requirements messaged to the public before and after an event?	We haven't had any substantial damage/substantial improvement permits since the last plan update.
Have any substantially damaged/substantially improved structures been mitigated since the last plan update?	Not applicable – We have not had any SD/SI permits come through since the last plan update.
How will the community remain in compliance with the NFIP moving forward? (simply stating "the community will continue to comply with the NFIP" will not meet FEMA's planning requirements)	We will continue to apply and enforce the Reno Municipal Code as it pertains to development within flood hazard areas. Additionally, we hire and retain staff to engage in all aspects of planning, design, maintenance, and operations related to internal and external development projects and related matters. Furthermore, this program relies on staff from multiple departments, thereby ensuring continuity and continued compliance.
How does the community support map change requests? This could be requests during the Risk MAP process or through Letters of Map Amendment or Revision.	The City is currently working through a FEMA Risk Map effort to revise floodplains in the South Reno area for tributaries to the Truckee River.
When did the latest FIRM become effective?	Majority of FIRM panels DATE. Numerous LOMRs, LOMAs, etc. have updated these FIRM panels.
When was the latest Flood Insurance Rate Map (FIRM) adopted?	FIRM dated : 03.16.2009 FIS dated: 07.09.2021

Question	Response
Is the FIRM and FIS report in an accessible location? How would the public get access to their flood map information?	Through the FEMA website.
Does the community use any Risk MAP products? If so, describe.	The City is currently working through a FEMA Risk Map effort to revise floodplains in the South Reno area for tributaries to the Truckee River.
Does the community collect updated floodplain data or modeling? Is this shared with partners and with FEMA?	Yes, except for the Truckee River mainstem and portions of Steamboat Creek, where the TRFMA maintains the latest models.
How does the community educate the public on floodplain management and the availability of flood insurance, in and out of the floodplain?	Through citizen inquiry response and development review submittals.
How familiar is the public with their flood insurance options?	The City does not engage with insurance agents.
How many properties have flood insurance in the community?	822
Are there any areas where flood insurance is lacking?	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation. Mitigation action added.
Other comments?	

Opportunities to Expand and/or Improve Capabilities

Table 52: The City of Reno's Opportunities to Develop Capabilities

Capability Type	Opportunity to Expand and/or Improve
Planning and Regulations	Sustainability plan to address climate hazards, such as heat islands in the City; Stormwater Utility
Administrative and Technical	Utility Services Staffing must accomplish CIP and programmatic work.
Financial	The city of Reno has not provided information regarding opportunities to expand and/or improve financial capabilities for stakeholders interested in

Capability Type	Opportunity to Expand and/or Improve
	developing initiatives that could benefit the community.
Education and Outreach	The city of Reno has not provided information regarding opportunities to expand and/or improve education and outreach capabilities for stakeholders interested in developing initiatives that could benefit the community.

Plan Integration



C6. Does the Plan describe a process by which it will incorporate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate?

An updated plan must explain how the plan participants incorporated the previous mitigation plan, when appropriate, into other planning mechanisms over the last 5 years. This demonstrates progress in local mitigation efforts. Planning mechanisms refer to the governance structures used to manage local land use development and community decision making, such as budgets, comprehensive plans, capital improvement plans, or other long-range plans, codes, and ordinances. Table 53 lists the previous plans that have been integrated into this one.

Table 53: Integration of Previous Plans by the City of Reno

Plan Name	Description
Washoe County Hazard Mitigation Plan	Adopted by Reno City Council and Washoe County Board of Commissioners in 2020
Reimagine Reno Master Plan	Citywide policies, specifically in Guiding Principle 6, discuss and address the integration of hazard mitigation considerations in the development review process. In addition, Policy 6.2B specifically addresses the Washoe County Regional Hazard Mitigation Plan.
Title 18 – Annexation and Land Development Code	Title 18 does not address the Hazard Mitigation Plan directly but contains many policies relating to natural hazard considerations for development review including flood hazards, wildland interface/fire safety, water protection, and slope protection.

The plan must also identify the local planning mechanisms where the updated hazard mitigation information/actions may be integrated and how. Listing specifics, such as who will be

responsible, the timeframe for the update, and ongoing work, such as hiring a contractor or gathering data, can help meet this requirement. Table 54 lists opportunities for future plan integration.

Table 54: Opportunities for Future Plan Integration for the City of Reno

Plan Name	Description
Zoning Code	Applied for Fire Prevention and Safety Grant for funds to develop and facilitate the Community Wildfire Protection Plan (CWPP). The Reno Fire Prevention Bureau will be responsible for the Plan
Reimagine Reno Master Plan	Updates to Master Plan to incorporate additional policies and implementation measures related to hazard mitigation

Mitigation Strategy

FEMA	**C4.** Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure?

Review of 2020 Hazard Mitigation Actions

As part of the mitigation strategy update, all mitigation actions identified in the 2020 plan were evaluated to determine the status of the action and whether any ongoing or incomplete actions should be included as actions in the 2020 plan update.

Table 55: Status of Previous Mitigation Actions by the City of Reno

ID	Mitigation Action	Lead Department	Status For Plan Update	Should this action be retained in the plan update? (Yes/No)
MH-4	Increase staffing level in 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).	Reno Fire Department	Complete – All Stations staffed with 4 person Engine Companies, 2 full time Rescues with a 3rd Rescue situationally staffed. 2 Truck companies with a potential 3rd if the Safer Grant is awarded to RFD.	No
MH-9	Implement and/or use Community Emergency Response Teams and the Citizens Homeland Security Council, to shift burden from sworn officers, where appropriate (All Partners).	All Jurisdictions: • Emergency Managers • Police Departments	CERT is available and has been active since last plan update	No
WF-1	Develop surge capabilities in the region to handle burn patients (All Partners).	Renown Health		No
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 homeowners' associations. (City of Reno)	Reno Fire Department	In progress – Working with HOAs in WUI areas to assist in developing CWPPs and Wildfire education through fuel mitigation grant programs and public outreach activities.	Yes
WF-3	Provide free or low-cost resources to private property owners as an incentive to maintain defensible	Reno Fire Department	Complete (but ongoing) Implemented annual free dumpster program for green waste in high-risk areas and	No

ID	Mitigation Action	Lead Department	Status For Plan Update	Should this action be retained in the plan update? (Yes/No)
	space on their properties (e.g., free weekend use of dump trailers or free dump day drops (City of Reno).		provided free fuels mitigation with hand crews. Educate on Defensible Space measures.	
WF-4	Enforce State adopted Wildland–Urban Interface (WUI) code on new developments in the WUI and monitor and enforce required vegetation management plans (City of Reno).	Reno Fire Department	Review PUD handbooks in WUI areas for defensible space compliance and vegetation management plans.	Yes
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)	Reno Fire Department	Complete (ongoing) – Implemented fuel mitigation with grant funding in high-risk areas. Completed the Rosewood Canyon project and multiple mitigation efforts in the Peavine area. 400 inspections for Defensible Space in Rosewood Canyon area through WUI grant.	No
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).	Reno Fire Department	Complete (ongoing) – Provide free services with dumpster program and hand crew fuel mitigation to encourage participation.	No
WF-7	Adopt the 2024 International Fire Code with amendment based on requirements in the Nevada Revised	Reno Fire Department	In the process of being adopted through the Northern Nevada Code Adoption Committee.	Yes

ID	Mitigation Action	Lead Department	Status For Plan Update	Should this action be retained in the plan update? (Yes/No)
	Statutes and regional challenges. (City of Reno)			
WF-13	Adopt 2018 wildland fire code County-wide (All Partners).	Regional Fire Protection Districts	In process – Will be adopting the 2024 WUI Code	Yes
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).	Regional Fire Protection Districts	Complete – Perimeter and Code Red Regional Full Scale Exercise Incline	No
FL-2	Update FEMA Flood Insurance Rate Maps to incorporate recent Letter of Map Revision, Conditional Letter of Map Revision, and changes in topography and impervious surfaces using regional LiDAR data (Washoe County, City of Reno, City of Sparks).	Washoe County Community Services Department Truckee River Flood Management Authority (TRFMA) Reno Utility Services Department	In progress – Current map revisions underway; North Valleys Swan and Silver Lake (WC), Truckee River PMR (TRFMA, Sparks, Reno), South Reno Channels (Reno, WC)	No
FL-3	Implement scour countermeasures, including channel stabilization at bridge piers and abutments for 14 bridges identified as scour critical	Reno Utility Services Department	In progress – Various repairs have taken place post flooding on 3 of the 14 bridges. Items must remain on the list.	Yes

ID	Mitigation Action	Lead Department	Status For Plan Update	Should this action be retained in the plan update? (Yes/No)
	bridges. Work would include countermeasure design, permitting, diversions, excavation, and riprap placement (City of Reno).			
FL-4	To address localized flooding on Ranger Road, connect adjacent development to the storm drain system (City of Reno).	Reno Public Works and Utility Services Departments	City of Reno Maintenance and Operations continue to address during flooding events – Should remain in the plan	Yes
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).	Reno Development Services Departments	Not complete – Ranger Road area flooding events have continued.	Yes
FL-10	Complete Rosewood Wash culvert and channel upgrades. (City of Reno)	Reno Utility Services Department	Portion from Plumas to Virginia Lake has been upgraded. Upstream improvements still needed.	Yes
FL-11	Complete Cemetery Drain water quality, erosion control, drainage and sewer improvements (City of Reno).	Reno Utility Services Department	Not complete.	Yes
FL-12	Complete Warren Estates Evaluation and Drainage Improvement Project (City of Reno).	Reno Utility Services Department	Project no longer needed.	No
FL-13	Complete Autumn Hills Flood Control Project (City of Reno)	Reno Utility Services Department	Not complete.	Yes

ID	Mitigation Action	Lead Department	Status For Plan Update	Should this action be retained in the plan update? (Yes/No)
FL-14	Complete improvements to address undersized drainage ditches and systems County-wide (Washoe County, City of Reno, City of Sparks, RSIC, PLPT)	All Jurisdictions: Reno Utility Services Department Public Works Engineering	In progress – City of Reno Maintenance and Operations continue to address during flooding events – Should remain in the plan	Yes
FL-21	Booth Street Bridge: Remove Booth Street Bridge, which constricts flows and increases flood water elevations (TRFMA, City of Reno)	TRFMA, CTWCD, Reno Public Works and Utility Services Departments	Might be deleted as new modeling shows no major benefit to bridge removal	No
FL-22	Jones Street Signal Improvements: Construct signal at Jones and Keystone Avenue (TRFMA, City of Reno)	Public Works	Project no longer a priority.	No
FL-24	Pumping Station: Construct pumping station along Riverside Drive (TRFMA, City of Reno)	TRFMA	Review with TRFMA – may be old infrastructure associated with a 100-year event levee along riverside	No
FL-25	Pedestrian Closure Gate Structures: Pedestrian gates are needed along the length of the floodwall to maintain the current pedestrian access points. A product, such as FloodBreak or approved equivalent (TRFMA, City of Reno)	TRFMA	This mitigation action is not specifically mentioned in TRFMA's 2023 Map Book and may no longer be necessary. City of Reno would likely be the lead agency for this action. Note: Construction of Downtown & West Reno Flood Project elements will be prioritized based on	No

ID	Mitigation Action	Lead Department	Status For Plan Update	Should this action be retained in the plan update? (Yes/No)
			future opportunities to partner with other entities and leverage funding.	
FL-29	Replace Floodwalls: Replace old, inadequate floodwalls from Arlington St. to Lake St.	TRFMA	Arlington Ave Area: TRFMA's 2023 Map Book identifies existing floodwalls from Arlington Ave to Lake St, and states that TRFMA may provide technical or possibly financial assistance to the project lead agency in the future. Note: Construction of Downtown & West Reno Flood Project elements will be prioritized based on future opportunities to partner with other entities and leverage funding.	No
FL-30	Sierra Street Bridge: Replace Sierra Street Bridge, which constricts flows and increases flood water elevations, with a new bridge that is hydraulically efficient and capable of passing the 100-year flood (TRFMA, City of Reno)	TRFMA, RTC, Reno Public Works and Utility Services Departments	In progress – Currently under design with the RTC and anticipate construction 2027 after the completion of Arlington Bridge(s) replacement	Yes
FL-31	Center Street Bridge: Replace Center Street Bridge, which constricts flows and increases flood water elevations, with a new bridge that is hydraulically efficient and capable of	TRFMA	Center St Bridge Replacement: This mitigation item is included in TRFMA's 2023 Map Book. However, TRFMA's role is to provide technical support to the project lead (i.e., provide hydraulic models and data to aid in the design	No

ID	Mitigation Action	Lead Department	Status For Plan Update	Should this action be retained in the plan update? (Yes/No)
	passing the 100-year flood (TRFMA, City of Reno)		process). Note: Construction of Downtown & West Reno Flood Project elements will be prioritized based on future opportunities to partner with other entities and leverage funding.	
FL-32	Lake Street Bridge: Replace Lake Street Bridge, which constricts flows and increases flood water elevations, with a new bridge that is hydraulically efficient and capable of passing the 100-year flood (TRFMA, City of Reno)	TRFMA	Lake St Bridge Replacement: This mitigation item is included in TRFMA's 2023 Map Book. Note: Construction of Downtown & West Reno Flood Project elements will be prioritized based on future opportunities to partner with other entities and leverage funding.	No
FL-33	Remove existing pedestrian bridge at Wells Ave. Install new pedestrian bridge upstream of Wells Ave. (TRFMA, City of Reno)	TRFMA	Lake St Bridge to I-580 Reach: This mitigation action now includes the removal of the existing Wells Ave Bridge (as well as any required bank stabilization and/or protection for the Wells Ave overpass), but not installation of a new pedestrian bridge. Previous plans included installation of a pedestrian bridge to replace the Wells Ave Bridge; however, the property on the north bank of the river has changed ownership and because the Kuenzli St Bridge is only a few hundred feet	No

ID	Mitigation Action	Lead Department	Status For Plan Update	Should this action be retained in the plan update? (Yes/No)
			upstream, TRFMA has determined that replacing the Wells Ave Bridge is not necessary.	
FL-34	Bank stabilization and bridge protection around Wells Avenue at Wells Ave. Bridge (TRFMA, City of Reno)	TRFMA	Same as FL-33	No
FL-35	Grand Sierra Floodwall: On the south (right) bank of the Truckee River a 3,000-foot-long, 6-foot-high floodwall would be built from Glendale to Greg Street (Costs included in Element 19 Sparks Levees and Floodwalls: Glendale to Greg.) (TRFMA, City of Reno)	TRFMA	Grand Sierra Resort Berm & Levee (Glendale Ave Bridge to Greg St Bridge): Construct an earthen berm and levee along the south bank of the Truckee River at the Resort location (Glendale Ave Bridge to Greg St Bridge). The proposed upstream berm would consist of approximately 45,000 cubic yards of compacted material; estimated cost is $1.35 million in 2021 dollars. The proposed downstream berm would consist of approximately 52,000 cubic yards of compacted material; estimated cost is $1.56 million in 2021 dollars. The berms would be connected by a levee section approximately 350 feet long (estimated cost $700,000 in 2021 dollars). This design concept is a shift from previous plans, which included a floodwall. The berms would be designed	No

ID	Mitigation Action	Lead Department	Status For Plan Update	Should this action be retained in the plan update? (Yes/No)
			with gentle slopes that would allow better connection between the GSR and the river. This would also allow more options for use of the berm area (such as parking) during non-flooding conditions. Planned construction: 2026-2027 or 2027-2028.	
FL-41	Terracing Rock to McCarran: Reduced terracing to reduce the amount of excavation and avoid the existing Pioneer Ditch. The terracing and associated levees are moved northward toward the Truckee River and levee ties into the Rock Blvd. bridge. The land between Mill Street and the relocated levee can be used as a fill disposal site and reserved for future recreational use (TRFMA, City of Reno)	TRFMA	Mill/McCarran Levees & Terracing (Rock Blvd Bridge to McCarran Blvd Bridge): Currently in 60% design phase (June 2024). Planned construction: 2027-2028. Between the Rock Blvd Bridge and the McCarran Blvd Bridge, relocate the Truckee River channel and increase its sinuosity, excavate floodplain terraces, and construct levees to reduce flood risk, restore the ecosystem, and enhance recreational opportunities. The updated conceptual design omits floodwalls and includes higher levees on both the north and south banks of the Truckee River, as well as a lower "intermediate" levee on the south side. The intermediate levee would be designed to contain a 50-year flood event. Ecosystem restoration is proposed to improve instream and	No

ID	Mitigation Action	Lead Department	Status For Plan Update	Should this action be retained in the plan update? (Yes/No)
			riparian habitat for fish and wildlife species. Recreational enhancements may include nature-based activities along the river corridor and improved river access, as well as sports fields and park facilities on the south side in between the intermediate levee and the outer, high levee. The estimated cost to construct the levees (north, south, south intermediate) is $20.4 million. Excavation of the floodplain terraces and ecosystem restoration is estimated to cost $20 million. TRFMA has already invested more than $48 million to acquire 110 acres of land in this area (more than 1.2 miles of river frontage on the south bank of the river). Implementation of this flood project element will significantly reduce flood risk for the north and south industrial areas and the airport.	
FL-54	Autumn Hills, Offenhauser, Longley & McCarran storm drain improvements and detention solutions	Reno Development Services and Utility Services Departments	Not complete. Should be carried forward.	Yes

ID	Mitigation Action	Lead Department	Status For Plan Update	Should this action be retained in the plan update? (Yes/No)
FL-55	Sagittarius storm drain improvements	Utility Services Department	In progress – City of Reno Maintenance and Operations continue to repair after flooding events; Should remain in the plan.	Yes
FL-56	Miscellaneous Various Storm Drain: Greenridge to Moore, various "island 18," Edison Wy, Sage St yard area, California Ave, Isbell Rd, Avenida de Landa, Wedekind, Scottsdale/Clear Acre	Reno Public Works	Greenridge in progress, to be completed Fall, 2024 – All other areas to remain in the plan	Yes
FL-57	Double Diamond Levee Upgrades: Construct levee improvements at Double R Blvd and Double Diamond Blvd to provide FEMA certified flooding protection.	Reno Development Services and Utility Services Departments	Incomplete, should be carried over to the next plan.	Yes
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.	Reno Building, Planning, and Engineering Division	Not complete – should remain in the plan.	Yes
FL-59	In and Out Basins – 12th and Brookfield, 12th and Washington, Plumas & Hillcrest: Remove in and out basins and tie to storm drain.	Reno Public Works	Not complete – Public Works addressed Plumas & Hillcrest. All other locations need to remain.	Yes

ID	Mitigation Action	Lead Department	Status For Plan Update	Should this action be retained in the plan update? (Yes/No)
FL-60	Miscellaneous Grading-Regrading – Len Cir, Orange and Apple St, Hatch, Brentwood, Walker, Skyline: Grading/regrading curb and gutters to address ponding issues.	Reno Public Works	Public Works addressed Walker and Skyline locations. All other locations need to remain.	Yes
FL-61	Sadleir Southworth (Wells Ave) Area Storm Drain Improvements: Upgrade/enlarge or provide surcharge relief system for storm drain system.	Reno Public Works and Utility Services	Partially complete – Storm Drain improvement work completed summer of 2024 with RTC Oddie Wells project that addresses downstream flow along Oddie from Sadleir to 9th Street. Location needs to remain on list as storm drain improvement needed along Sadleir and downstream on 9th Street.	Yes
FL-62	Irrigation Ditch Tributary Crossing Improvements: Improve the ditch crossings at three irrigation ditches to reduce ditch failures and overtoppings.	Washoe County and City of Reno Utility Services Department	Conceptual report complete. Should remain in plan update.	Yes
FL-63	Stead Storm Drain and Channel Improvements	Reno Utility Services Department	Not complete. Should remain on the list and be pursued.	Yes
FL-64	Aquila Ave/Krupp Cir Drainage Improvements: Enlarge and reinforce roadside ditches, upsize/install new storm drain.	Reno Utility Services Department Reno Public Works	In progress – City of Reno Maintenance and Operations continue to repair after flooding events. Should remain in the plan.	Yes

ID	Mitigation Action	Lead Department	Status For Plan Update	Should this action be retained in the plan update? (Yes/No)
FL-65	Thomas Creek at South Virginia St between approximately Patriot & Gavian storm drain improvements: Improve storm drainage across roadways.	Reno Utility Services and Public Works Department	Not complete. Should remain on the list and be pursued.	Yes
EQ-3	Retrofit dialysis centers to maintain potable water service following a disaster (Washoe County, City of Reno, City of Sparks)	Dialysis Centers (Fresenius, DaVita)	No update.	No. This is not a City of Reno item. It is at the discretion of the individual dialysis centers.
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)	Reno Building, Planning and Engineering Division	Not complete – This has not been addressed but should remain on the list and be pursued.	Yes
EQ-5	Retrofit Reno's City Hall with seismic upgrades (ex. seismic dampers and improved column splices) to ensure that the building remains functional after an earthquake (City of Reno)	Reno Public Works	Project Complete in 2024.	No
EQ-6	Relocate Reno's City Hall offices to address seismic risks (City of Reno)	Reno Public Works	Remove Project	No
EQ-10	Assess, repair, and/ or replace infrastructure that may fail during earthquakes (e.g., Keystone Ave.	All Jurisdictions – Public Works Engineering	Not complete – Keystone bridge currently under preliminary feasibility	Yes

ID	Mitigation Action	Lead Department	Status For Plan Update	Should this action be retained in the plan update? (Yes/No)
	Bridge) (Washoe County, City of Reno, City of Sparks, RSIC, PLPT)		analysis. Construction to be determined, as project will need funding.	
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)	NV Energy	Ongoing	Yes – this should continue on the new plan as it is included in NV Energy's system resiliency efforts through their pole inspection and pole replacement program
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)	NV Energy	Ongoing	Yes – this should be included in the next plan as it is part of NV Energy's system resiliency efforts through the removal of copper wire, removing tree attachments, and their covered conductor program
EE-5	Install back-up generators for critical infrastructure and facilities along with other measures to improve	All Jurisdictions: • Emergency Management	In progress, power redundancy assessment for Truckee Meadows	Yes

ID	Mitigation Action	Lead Department	Status For Plan Update	Should this action be retained in the plan update? (Yes/No)
	reliability (e.g., alarms, meters, remote controls, and switchgear upgrades) (All Partners)		Water Reclamation Facility being conducted	
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)	Law Enforcement Agencies Facility Managers	In the last year, RPD has completed Active Assailant Training for the Department, participated in Rescue Task-Force Training with regional partners, and received Tactical Combat Casualty Care training.	No
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)	Reno Fire Department	Complete – 70 sets of bullet proof vests, helmets and other necessary equipment to support Rescue Task Forces have been procured and distributed to RFD crews.	No
HM-1	Purchase additional equipment, such as booms or collapsible spill containment berms or walls to ensure that responding fire crews have the capability to perform immediate containment of hazardous material spills (City of Reno)	Reno Fire Department	In progress – Booms for spill containment have been acquired to ensure that the Triad has the capability to perform containment of Hazmat spills. Collapsible berms or walls have not been acquired.	Yes

ID	Mitigation Action	Lead Department	Status For Plan Update	Should this action be retained in the plan update? (Yes/No)
DT-2	Implement current TMWA Conservation Plan including encouraging transition to less water-intensive landscaping on both public and private properties (City of Reno, City of Sparks, RSIC, PLPT)	City of Reno, City of Sparks, RSIC, PLPT: • Water utilities • Planning Departments	The Reimagine Reno Master Plan contains Policy 2.5C Drought Tolerant Landscaping, which requires the use of "landscaping which utilizes drought tolerant plant materials, efficient irrigation, incorporates soil amendments to support plant health and resiliency, and other low water usage practices." In addition, Title 18, Section 18.04.806, Water Conservation, addresses landscaping plan requirements that aim to reduce water consumption by limiting the amount of lawn/turf, requiring water-conserving irrigation systems, low water consumption plants, and preventing overspray, among other items.	No
ID-1	Implement a range of emission reduction strategies (e.g., policies geared toward renewable energy measures and projects, reduction in vehicle miles traveled, and increased use of transit and multimodal transportation) to reduce levels of particulate matter, ozone, and other criteria pollutants (All Partners)	Washoe County Health District Air Quality Management Division	WC, City of Reno, and RTC all applied for a grant under the Climate Pollution Reduction Grants – award pending. Most likely will not know the status by 05/2024. The City updated its fee model for installing solar to reduce the cost for permitting.	No

ID	Mitigation Action	Lead Department	Status For Plan Update	Should this action be retained in the plan update? (Yes/No)
TI-1	Purchase properties in the runway protection zones at Reno-Tahoe International Airport and airport critical areas at Reno-Stead Airport (Washoe County, City of Reno)	Reno-Tahoe Airport Authority	Ongoing	Yes

*Note: RTC = Regional Transportation Commission

2025–2029 Mitigation Implementation Plan

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 cause ongoing capability or structural projects to reduce vulnerability to hazards.

Considered Mitigation Actions

The City of Reno considered a broad range of actions, including actions that benefit vulnerable populations and current and new development, as a part of this plan update. There are four main types of mitigation actions, listed below. The results are presented in Table 56.

- Local plans and regulations
- Structure and infrastructure projects
- Natural systems protection
- Education and awareness programs

Table 56: Considered Mitigation Actions

Mitigation Action	Type of Action	Selected? (Y/N)	If not selected, why not?
Lemmon Drive Reconstruction to elevate above 100-year WSEL* for emergency access	Structure and Infrastructure Projects:	Y	In design
Silver Lake Floodplain Update	Educational and Awareness Washoe County Updated Silver Lake Base Flood Elevations	Y	
Development of N. Valley Maintenance Facility	Structure and Infrastructure Projects	Y (but not funded)	Planned in phases for affordability
Vulnerable populations	Targeted outreach to the unsheltered population before and/or during natural disasters, such as extreme temperatures, flooding, wildfire, etc.	Y	

*Note: WSEL = Water Surface Elevation Level

Updated Mitigation Action Plan

Table 57 presents the mitigation action plan for the next five years. In that table, Community Lifelines are defined at Lifelines Toolkit v2.0 (fema.gov) and include the new Water Systems lifeline. Timeframes are defined as follows:

- Short term: Less than 1 year
- Medium term: 1–3 years
- Long term: 3–5 years

THIS PAGE INTENTIONALLY LEFT BLANK

Table 57: 2025–2029 Mitigation Implementation Plan

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Community Lifeline	Priority
1	TMWRF* Power redundancy assessment	Energy Emergency	Critical infrastructure, protect a Native American water body down-stream	City of Reno Utility Services	City of Sparks	Power redundancy assessment	Sewer Enterprise Fund	$30,000	Protect critical infrastructure Maintain biology health during outages.	30 years	1-3 years	All	High
Description: Look for alternatives and power redundancy options including alarms, meters, remote controls, and switchgear upgrades for Truckee Meadows Water Reclamation Facility after experiencing 3 power outages within 12 months.													
2	Implement scour countermeasures at 11 bridges identified as scour critical bridges.	Flooding, Extreme Weather	The population that utilizes bridges	City of Reno Utility Services	NDOT, RTC, TRFMA	RHMP, partner plans and protocols.	Sewer Enterprise Fund	$300,000	Bridge stability	20 years	1–3 years	Transportation	High
Description: Implement scour countermeasures, including channel stabilization at bridge piers and abutments. Work would include countermeasure design, permitting, diversions, excavation, and riprap placement.													
3	Ranger Road Storm drain improvements	Flooding	People and property	City of Reno Utility Services and Public Works Departments	NDOT	RHMP, partner plans and protocols.	Sewer Enterprise Fund	$100,000	Protect people and property	20 Years	1–3 years	Water systems	Medium
Description: Investigate and implement drainage improvements on Ranger Road for the storm drain**.**													

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Community Lifeline	Priority
4	Complete Autumn Hills Flood Control Project (City of Reno)	Flooding	People and property	City of Reno Utility Services	None	RHMP	Sewer Enterprise Fund	$100,000	Protection of people and property from flood waters	20 Years	1–3 years	Water systems	High
Description: Investigate and implement the flood control issue and correct for the Autumn Hills Flood Control Project in Reno.													
5	Complete improvements to address undersized drainage ditches and systems County-wide.	Flooding, Extreme Weather	People and property, and protect transportation routes	City of Reno Public Works, Utility Services, and Maintenance and Operations	Washoe County CSD, City of Reno, City of Sparks, RSIC, PLPT	RHMP, partner plans and protocols.	Sewer Enterprise Fund	$100,000	Protection of people and property from flood waters	20 Years	1–3 years	Transportation	Medium
Description: upgrade and expand these infrastructures.													
6	Sierra Street Bridge	Flooding, Extreme Weather	Transportation	City of Reno Utility Services and Public Works	TRFMA, RTC	Regional Transportation Plan	Street fund	$300,000	Protection of people and property from flood waters	50 years	1–3 Years	Transportation	High
Description: Replace Sierra Street Bridge, which constricts flows and increases flood water elevations, with a new bridge that is hydraulically efficient and capable of passing the 100-year flood.													
7	Sagittarius storm drain improvements	Flooding, Extreme Weather	Pooling of water, protection of infrastructure,	City of Reno Utility Services	WC CSD	RHMP, partner plans and protocols.	Sewer Enterprise	$100,000	Protection of people and	20 Years	1–3 years	Safety and security	Medium

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Community Lifeline	Priority
			reduction in stagnant water				Fund, Street Fund		property from flood waters				
Description: Implement a routine maintenance schedule for storm drains that includes regular cleaning and inspection. This will help remove debris, optimize water flow, and identify potential issues early on. Additionally, consider installing green infrastructure solutions such as bioswales or permeable pavement to enhance drainage capacity and reduce runoff.													
8	Storm Drain Improvements	Flooding, Extreme Weather	Pooling of water, protection of infrastructure, reduction in stagnant water	City of Reno Utility Services and Public Works	None	RHMP	Sewer Enterprise Fund, Street Fund	$100,000	Protection of people and property from flood waters	20 years	1–3 years	Safety and security	Medium
Description: Island 18," Edison Wy, Sage St yard area, California Ave, Isbell Rd, Avenida de Landa, Wedekind, Scottsdale/Clear Acre													
9	Miscellaneous Grading	Flooding, Extreme Weather	Prevent erosion, waterlogging, and related safety hazards, thereby enhancing the resilience of urban and residential areas against heavy rainfall and storm events.	City of Reno Utility Services and Public Works	None	RHMP	Sewer Enterprise Fund, Street Fund	$50,000	Flood damage protection, erosion control, infrastructure longevity, public safety, reduced maintenance costs	20 Years	1–3 years	Safety and security	Medium
Description: Regrading Len Cir, Orange and Apple St, Hatch, Brentwood, Grading/regrading curb and gutters to address ponding issues.													

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Community Lifeline	Priority
10	9th Street and Sadleir Southworth (Wells Ave) Area Storm Drain Improvements	Flooding, Extreme Weather	Pooling of water, protection of infrastructure, reduction in stagnant water	City of Reno Utility Services	None	RHMP	Sewer Enterprise Fund	$100,000	Protection of people and property from flood waters	20 Years	1-3 years	Safety and security	Medium
Description: Upgrade/enlarge or provide surcharge relief system for storm drain system.													
11	Aquila Ave/Krupp Cir Drainage Improvements	Flooding	Pooling of water, protection of infrastructure, reduction in stagnant water	City of Reno Utility Services, Public Works	none	RHMP	Sewer Enterprise Fund	$100,000	Protection of people and property from flood waters	20 Years	1-3 years	Safety and security	Medium
Description: Enlarge and reinforce roadside ditches, upsize/install new storm drain.													
12	Develop a process to provide financial and professional assistance for seismic retrofits to make unreinforced masonry buildings identified by the Nevada Earthquake Council safer.	Earthquake	The risk to safety and structural integrity is posed by seismic events.	City of Reno Development Services, Public Works, Maintenance and Operations	Washoe County CSD, City of Sparks, RTC	RHMP, partner plans and protocols.	General funds	$50,000	Property damage reduction, injury and loss of life protection, economic disruption mitigation, insurance cost savings, community	50 years	1-3 years	Shelter	Low

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Community Lifeline	Priority
									resilience enhancement.				
Description: Develop a process to provide financial and professional assistance for seismic retrofits to make unreinforced masonry buildings identified by the Nevada Earthquake Council safer.													
13	Assess, repair, and/ or replace infrastructure that may fail during earthquakes (e.g., Keystone Ave. Bridge).	Earthquake	People, and transportation,	City of Reno Department of Public Works	Washoe County CSD, City of Sparks, RTC	RHMP, partner plans and protocols.	General funds and State available funds	$300,000	Economic losses, loss of life and injury, disruption of services, insurance cost reductions,	50 years	1-3 years	All	Low
Description: Assess, repair, and/ or replace infrastructure that may fail during earthquakes (e.g., Keystone Ave. Bridge).													
14	Purchase additional equipment, such as collapsible spill containment berms or walls to ensure that responding fire crews have the capability to perform immediate containment of hazardous material spills.	Hazardous Materials	Containment, personal protection, neutralization, decontamination, storage, response time, environmental impacts	City of Reno Fire Department	none	RHMP	General funds and State available funds	$200,000	Health risks, environmental damage, property damage, regulatory fines, operation downtime, liability issues	30 Years	1–3 years	Food, water, shelter, safety and security, health and medical, communications, energy	Medium
Description: Purchase additional equipment, such as collapsible spill containment berms or walls.													

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Community Lifeline	Priority
15	North Valleys Maintenance Facility	Extreme Weather, Flooding, Emergency response to critical infra-structure	Critical infrastructure	City of Reno Maintenance and Operations Department	None	Capital Improvement Program	Sewer Enterprise Fund, Street Fund	$10M	Protection of critical infrastructure in the immediate region.	40 years	1-3 years	Emergency services able to reach the North Valleys during severe winter storms	High
Description: During extreme weather, the traffic out to the North Valleys has the tendency to back up and be at a standstill. Staff can either not get to downtown to get the necessary equipment to address the road conditions, or they cannot get out to North Valleys with all the traffic to address the road conditions. A northern facility would allow for access and decreased response time to address road conditions and emergency infrastructure repair during extreme weather.													
16	Swan Lake Flood Prevention measures	Extreme Weather, Flooding	Damage due to environmental factors and human activities	City of Reno Emergency Management and Washoe County CSD	None	RHMP, partner plans and protocols.	FEMA Hazard Mitigation Grant, Sewer Enterprise Fund	$12M	$4M mitigation	50 years	1–3 years	Water systems	Medium
Description: Underground the temporary overland pipeline from Swan Lake to American Flat for flood mitigation of Swan Lake.													
17	In and Out Basins	Flooding/ Extreme Weather	Flood reduction, improved water quality, ecosystem health, infrastructure reliability, maintenance efficiency, urban	City of Reno Public Works, Utility Services	None	RHMP	Sewer Enterprise Fund, Street Fund	$1 million	Flood damage, erosion control, water quality improvement, emergency response costs reduced, insurance	20 years	1–3 years	Water systems, health	Medium

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Community Lifeline	Priority
			heat island mitigation						costs reduced, reduction in public health risks				
Description: 12th and Brookfield, 12th and Washington, Remove in and out basins and tie to storm drain.													
18	PFAS Treatment at Swan Lake	Hazardous Materials Incident	Emerging contaminant with developing standards for stormwater and other exposure pathways (TBD)	City of Reno Utility Services, Public Works, Washoe County CSD	EPA, NDEP, WRWC, NNWPC, UNR	WRWC has begun work with consultant (Jacobs) for a preliminary study and potential next steps.	WRWC, Reno Sewer Fund, Washoe County CSD, state, federal	$1 M	Public health risks, ecosystem health, recreational opportunities, property value, liability and legal costs, restoration of natural resources	10 years	1-3 years for action steps 3-5 years for funding and next steps	Safety and security, health and medical, food and hydration	Medium
Description: Implement a targeted groundwater monitoring program to assess the extent of contamination, long-term remediation strategies, include soil excavation or bioremediation													
19	Stead area storm drain and channel improvements	Flooding/ Extreme Weather	Pooling of water, protection of infrastructure, reduction in stagnant water	City of Reno Utility Services & Public Works	none	RHMP	Sewer Enterprise Fund	$200,000	Protection of people and property from flood waters	20 years	1–3 years	Safety and security	Low

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Community Lifeline	Priority
Description: Implement regular maintenance schedules to clear debris and sediment, ensuring efficient water flow. Additionally, consider installing permeable pavement in surrounding areas to enhance drainage capacity and reduce runoff													
20	Improve storm drainage across roadways.	Flooding, Extreme Weather	Pooling of water, protection of infrastructure, reduction in stagnant water	City of Reno Utility Services and Public Works	none	RHMP	Sewer Enterprise Fund, Street Fund	$200,000	Protection of people and property from flood waters	20 years	1–3 years	Safety and security	Medium
Description: Thomas Creek at South Virginia St between approximately Patriot & Gavian storm drain improvements.													
21	Complete Rosewood Wash culvert and channel upgrades	Flooding/ Extreme Weather	Pooling of water, protection of infrastructure, reduction in stagnant water	City of Reno Utility Services & Public Works	none	RHMP	Sewer Enterprise Fund	$1M	Protection of people and property from flood waters	30 years	1–3 years	Transportation	High
Description: Complete Rosewood Wash culvert and channel upgrades													
22	Enforce State adopted WUI code	Wildfire	Damage to people and property	Reno Fire Dept	None	RHMP, Fire Dept regulations	HMA funds	$50,000	Protection of people, property and ecosystem	30 years	1-3 years	Safety and Security	High
Description: Enforce state adopted Wildland–Urban Interface (WUI) code on new developments in the WUI and monitor and enforce required vegetation management plans (City of Reno)													
23	Underground the temporary overland pipeline	Flooding	Pooling of water, protection of infrastructure,	City of Reno Utility Services	Washoe County CSD	RHMP, partner plans and protocols.	FEMA Hazard Mitigation Grant, Sewer	$4M	$12M	50 years	1-2 years	Water systems	High

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Community Lifeline	Priority
	from Swan Lake to American Flat to mitigate Swan Lake flooding		reduction in stagnant water, flooding				Enterprise Fund						
Description: Underground overland pipes													
24	TMWRF seismic assessment and retrofitting	Earthquake	Critical Infrastructure	City of Reno Utility Services	City of Sparks – Seismic Assessment Consultant	RHMP, partner plans and protocols.	Sewer Enterprise Fund & Hazard Mitigation Grants	$50,000	Infrastructure protection	50 years	1-3 years	shelter	High
Description: TMWRF seismic assessment and retrofitting or rebuilding of at-risk buildings/infrastructure													
25	Stormwater Utility CIP	Flooding	Critical Infrastructure, Property, Life	City of Reno Utility Services	N/A	Feasibility study completed; rate analysis completed	Sewer Enterprise Fund	$600M	Protection of people and property	30-75 years	3-5 years	all	Medium
Description: Implement green infrastructure solutions, such as rain gardens and permeable pavement													
26	Storm drain Master Plan CIP	Flooding	Critical Infrastructure, Property	City of Reno Utility Services	N/A	Phase 1 master plan completed, Phases 2-4 as funding allows	Sewer Enterprise Fund	$500M	Improved storm performance in 25-year rain events	50-75 years	3-5 years	All	Medium

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Community Lifeline	Priority
Description: Complete Phases 2-4													
27	Cemetery Improvements	Flooding	Property and Infrastructure	City of Reno Utility Services	N/A	Preliminary scope of work	Sewer Enterprise Fund or Stormwater Utility	$25,000	Area flooding	20 years	3-5 years	All	Medium
Description: Complete Cemetery Drain water quality, erosion control, drainage and sewer improvements													
28	Irrigation Ditch Tributary Crossing Improvements	Flooding	People and infrastructure	City of Reno Utility Services	Washoe County CSD, Associated Ditch Companies	Preliminary scope of work	Sewer Enterprise Fund or Stormwater Utility	$50,000	Area flooding	50 years	3-5 years	All	Medium
Description: Irrigation Ditch Tributary Crossing Improvements: Improve the ditch crossings at three irrigation ditches to reduce ditch failures and overtoppings													
29	Belford Drainage Overpass at Lake Ditch	Flooding	People and infrastructure	City of Reno Utility Services	Needs further investigation	Preliminary scope of work	Sewer Enterprise Fund or Stormwater Utility	$50,000	Area flooding	50 years	3-5 years	All	Low
Description: Provide overpass/bypass such that the Belford Drainage flows will continue down the drainage way and not be intercepted by the Lake Ditch													

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Community Lifeline	Priority
30	EV Ready Code Change	Transportation Incident	Children, older adults, those with heart/lung disease, low-income and underserved communities	NNPH – AQMD	City of Reno City of Sparks Washoe County CSD	Building code amendment recommendation to be adopted by municipalities	General funds	Unsure	Better air quality	Beneficial continuously until updated	In the next 5 years	Safety and security	Low
Description: Amend the building code to include the EV Ready code change to protect air quality.													
31	Evacuation Routes in the area – study	All Hazards requiring persons to leave the area	Residents and visitors; LE, Fire, etc.	WCEM, City of Reno Emergency Operations	LE, Fire, first responders	RHMP, partner plans and protocols.	General funds, FHA, PROTECT	$135K – cost of completed study in Nevada County tor a starting point	Loss of life, property, time spent by responders guiding persons out of area	Immediate and continuous. There are always additional persons due to tourism and general residents. Also, there is never not a time when evacuation might be necessary.	Medium. Hire a contractor to complete the study, then decide based on findings	Safety and security	Medium
Description: Perform a study to map and consider the best evacuation routes during an emergency.													

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Community Lifeline	Priority
32	Flood insurance study	Flooding	People and infrastructure	City of Reno Flood and Drainage, Washoe County CSD	City of Reno	RHMP, partner plans and protocols.	General Fund, USACE	$50,000	Studying areas lacking flood insurance can pinpoint vulnerable regions and guide policy decisions, enhancing community preparedness and economic resilience. It raises awareness about the need for adequate coverage and supports stronger disaster mitigation efforts.	5-10 years	1-2 Years	Safety & security, food, water and shelter, health and medical, communications	Medium

Description: This study aims to identify gaps in flood insurance coverage in the county by assessing accessibility, awareness, and mitigation efforts. Through data analysis and community engagement, it highlights areas lacking insurance and offers recommendations to improve community resilience against flooding.

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Community Lifeline	Priority
33	Tree Maintenance and Management	Wind	Residents and visitors	City of Reno Arborist	The cities of Reno and Sparks, Keep Truckee Meadows Beautiful, and Living with Fire	RHMP, partner plans and protocols.	Operating budget	$500.00 + staff time	Decreased property damage	Life of plan	1-2 years	Energy	Medium
Description: Regularly prune trees and remove dead or weakened branches to reduce the risk of falling debris during severe wind events. Consider replacing high-risk trees with more wind-resistant species, and ensure trees are planted at appropriate distances from structures.													
34	Themed Months/ Days per Hazard (Including Proclamations)	Extreme Heat	Residents and visitors	City of Reno Emergency Operations	Subject matter experts/ agencies for specific hazards (USGS, fire agencies, LE, NWS/NOAA, etc.)	RHMP	Emergency Operations General fund, EMPG, SERC funds	$500.00 + staff time	Increased community awareness and resilience	Life of the plan	1-2 years	Water, hydration, shelter, water systems, health and medical, energy	High
Description: Public awareness campaign													
35	Preparedness Education	Drought	Residents and visitors	City of Reno Emergency Operations, Washoe County CSD	Subject Matter Experts, Water districts, fire districts, and emergency agencies in the planning area.	RHMP, Applicable Agency Plans and protocols	City of Reno, EMPG, SERC funding	$500.00 + staff time	Increase in public safety	Lifetime	1-3 years	Safety and security	High

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Community Lifeline	Priority
Description: Adopt ordinances to prioritize and control water use, especially during emergencies like firefighting.													
36	Volcano Education and Awareness Program	Volcano	Residents and visitors	City of Reno Emergency Operations, WCEM	USGS Menlo Park	RHMP itself	General funds, EMPG, SERC funds	Possibly USGS or local. Need better understanding from SME about cost and whether there are studies that could be used for reference. $500.00 + staff time	Increased awareness and understanding of potential impact, clean-up time, etc.	Beneficial until the update is available or needed based on volcanic activity/ occurrence	Short term	Safety and security	Medium
Description: Public awareness campaigns													
37	Preparedness Education	Avalanche	Residents and visitors	City of Reno Emergency Operations	Washoe County CSD, WCEM	Budgeting & funding, partnerships with local agencies	County communication budget allocations, state and federal grants such as the Department of Agriculture or the Department of	$500.00 + staff time	Loss of life and injuries, financial losses, property damage, emergency response costs, impact on reputation	Life of filled position	1-3 years	Safety and security, transportation	High

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Community Lifeline	Priority
							Interior, EMPG, SERC funds						
Description: Avalanche prediction risk, public education, improving safety protocols, data collection & research, real-time monitoring & alerts.													
38	Themed Months/Days per Hazard (Including proclamations)	Winter storms	Residents and visitors	City of Reno Emergency Operations	Subject matter experts/ agencies for specific hazards (USGS, fire agencies, LE, NWS/NOAA, etc.)	RHMP	General fund, EMPG, SERC funds	$500.00 + staff time.	Increased community awareness and resilience	Life of the plan	1-2 years	Safety and security	High
Description: Public awareness campaigns													
39	Roadway Impacts	Landslides	Erosion & land stability, infrastructure protection	City of Reno Public Works	U.S. Forest Service, NDOT, Washoe County CSD,	Master Plan and Land Use Policies, Public Works & Engineering standards, Emergency Management Plans, Stormwater Management Plans, Building	Federal grants (FEMA), Department of Transportation Grants, Local government funding, HMA/HMGP/ CDBG	$4.7M cost estimate for the county as a starting point.	Avalanche protection, enhanced safety, infrastructure protection, long-term cost efficiency, habitat preservation, controlled water drainage	30 Years	5+	Safety and security, transportation	Medium

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Community Lifeline	Priority
						codes and regulations							
Description: Create landslide roadway impacts study													
40	Preparedness Education	Criminal Acts and Terrorism	People and Property	City of Reno Emergency Operations	Law Enforcement Agencies	Law Enforcement plans and protocols	City of Reno, Homeland Security Grants, EMPG, SERC funds	$500.00 + staff time	Loss of life, loss of property, loss of agriculture integrity	Lifetime	1-3 years	Safety and Security,	High
Description: Education to the public and various agencies to increase awareness of criminal acts and terrorism.													
41	Preparedness Education	Infectious Disease	Residents, Visitors	City of Reno Emergency Operations	Health, Subject Matter Experts	RHMP and Partner plans and protocols	City of Reno, EMPG, SERC funds	$500.00 + staff time	Fatalities, injuries, contagion	Lifetime	1-3 years	Safety and Security, Health	High
Description: Education to the public and various agencies to increase awareness of infectious diseases to help prevent the spread during an incident.													
42	Preparedness Education	Radiological Waste Transport	Residents, Visitors	City of Reno Emergency Operations	NDOT, NDEP	RHMP, Partner plans and protocols	City of Reno, EMPG, SERC funds	$500.00 + staff time	Fatalities, injuries, contagion	Lifetime	1-3 years	Safety and security, Transportation	High
Description: Education to the public and various agencies to increase awareness of the dangers of radiological waste spills.													

*Note: CDBG = Community Development Block Grant, CIP = Capital Improvement Plan, CSD = Community Services District, EMPG = Emergency Management Preparedness Grant, EPA = Environmental Protection Agency, FEMA = Federal Emergency Management Agency, FHA = Federal Highway Administration, HMA = Hazard Mitigation Assistance, HMGP = Hazard Mitigation Grant Program, LE = Law Enforcement NDEP = Nevada Division of Environmental Protection, NDOT = Nevada Department of Transportation, NNPH-AQMD = Northern Nevada Public Health - Air Quality Management Division, NNWPC = Northern Nevada Water Planning Commission, NOAA = National Oceanic and

Atmospheric Administration, NWS = National Weather Service, PFAS = Per- and Polyfluoroalkyl Substances, PLPT = Pyramid Lake Paiute Tribe, PROTECT = Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation Program, RSIC = Reno-Sparks Indian Colony, RHMP = Reno Hazard Mitigation Program, RTC = Regional Transportation Commission, SERC = State Emergency Response Commission; TMWRF = Truckee Meadows Water Reclamation Facility,, TRFMA = Truckee River Flood Management Authority, UNR = University of Nevada, Reno, USACE = United States Army Corps of Engineers, USGS = United States Geological Survey, WCEM = Washoe County Emergency Management, WRWC = Western Regional Water Commission, WUI = Wildland–Urban Interface

THIS PAGE INTENTIONALLY LEFT BLANK

Prioritizing Mitigation Actions

The identified mitigation actions were then prioritized, based on the following terms:

- **S – Social:** The public must support the overall mitigation implementation strategy and specific mitigation actions. Consider, will the action disrupt housing or cause the relocation of people? Will the proposed action adversely affect one segment of the population? Is the action compatible with present and future community/agency values?
- **T – Technical:** It is important to determine if the proposed action is technically feasible, will help reduce losses in the long term, and has minimal secondary impacts. How effective is the action in avoiding or reducing future losses? Does the action solve the problem or only a symptom? Will the action create more problems than it solves? Consider the root cause of the issue at hand to determine whether the action is a whole or partial solution, or not a solution at all.
- **A – Administrative:** This category examines the expected staffing, funding, time, and maintenance requirements for the mitigation action to determine if the jurisdiction/special district has the personnel and administrative capabilities to implement the action or whether outside help will be necessary. Consider, a) Staffing (enough staff and training): does the jurisdiction/special district have the capability (staff, technical experts) to implement the action? b) Funding allocated: does the jurisdiction/special district have the funding to implement the action or can it readily be obtained? c) Time: can it be accomplished in a timely manner? d) Maintenance/Operations: can the jurisdiction/special district provide the necessary maintenance? It is important to remember that most federal grants will not provide funding for maintenance.
- **P – Political:** This considers the level of political support for the mitigation action. Is there political support to implement and maintain this action? Have political leaders participated in the planning process so far? Is there a local champion willing to help see the action to completion? Is there enough public support to ensure that the success of the action? Have all stakeholders been offered an opportunity to participate in the planning process?
- **L – Legal:** The jurisdiction/special district must have the legal authority to implement the action or consider what new laws or regulations would be needed to carry out the mitigation action. Evaluate, are the proper laws, ordinances, and resolutions in place to implement the action? Are there any potential legal consequences? Is the action likely to be challenged by stakeholders who may be negatively affected?
- **E – Economic**: Economic considerations must include evaluation of the present economic base and projected growth. Cost-effective mitigation actions that can be funded in current or upcoming budget cycles are more likely to be implemented than actions requiring general obligation bonds or other instruments that would incur long-term debt in a jurisdiction/special district. Consider benefits and costs at a planning level. A detailed benefit-cost analysis will be performed as project-specific funding becomes available. What

financial benefits will the action provide? Does the cost seem reasonable for the size of the problem and the likely benefits? What burden will be placed on the tax base or local economy to implement this action? Does the action contribute to community economic goals, such as capital improvements or economic development? Are there currently sources of funding that can be used to implement the action?

- **E – Environmental:** The impact on the environment is an important consideration because of public desire for sustainable and environmentally healthy communities. Also, statutory considerations, such as the National Environmental Policy Act (NEPA), have to be kept in mind when using federal funds. How will this action impact land/water? Impact on endangered species: how will this action impact endangered species? How will this action impact hazardous materials and waste sites? Is this action consistent with community environmental goals? Is the action consistent with federal laws, such as the National Environmental Policy Act (NEPA)?

The actions were also assigned a prioritization category of low, medium, or high, based on the following definitions:

- **Low:** Based on one to two STAPLEE criteria, the action is feasible and important, with multiple potential challenges. The action should be implemented as funding becomes available.
- **Medium**: Based on three to four STAPLEE criteria, the action is feasible and important, with some potential challenges. Its implementation is not as urgent as a high priority action item and can be implemented over time.
- **High**: Based on five or more STAPLEE criteria, the action is feasible and important, with minimal to no concerns. It is very important to the jurisdiction to implement and may be prioritized in the short term.

The results are in Table 58.

Table 58: Priorities Assigned to the Mitigation Actions of the City of Reno

Action #	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Priority
1	4	4	4	3	4	2	4	High
2	3	4	3	3	3	3	3	High
3	3	2	2	2	3	2	3	Medium

Action #	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Priority
4	3	3	2	3	3	2	3	High
5	3	2	2	2	3	2	3	Medium
6	3	3	3	3	3	3	3	High
7	3	3	2	2	3	2	3	Medium
8	3	3	2	2	3	2	3	Medium
9	3	3	2	2	3	2	3	Medium
10	3	3	2	2	3	2	3	Medium
11	3	2	2	2	3	2	3	Medium
12	2	2	1	2	2	1	2	Low
13	3	2	1	2	2	1	2	Low
14	3	4	2	3	2	2	3	Medium
15	4	3	3	3	3	2	3	High
16	3	3	2	3	2	2	2	Medium
17	3	3	2	2	3	2	3	Medium
18	3	2	2	3	2	1	3	Medium
19	2	2	2	2	3	2	3	Low
20	3	2	2	2	3	2	3	Medium
21	3	3	3	3	3	2	3	High

Action #	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Priority
22	4	4	2	3	2	3	3	High
23	4	4	2	3	2	3	3	High
24	3	3	2	2	4	3	4	High
25	2	2	2	2	2	1	3	Medium
26	2	2	2	2	2	1	3	Medium
27	2	3	2	2	2	2	3	Medium
28	1	2	2	1	1	2	2	Low
29	2	3	2	2	3	2	3	Medium
30	1	3	2	1	1	2	2	Low

MITIGATION SUCCESS STORIES

- **City Hall Seismic Retrofit:** Placement of dampeners and strengthening welds in upper stories of City Hall to mitigate "whip" from seismic event.
- **Vista Narrows Project:** The Vista Narrows Project is a key element of TRFMA's Truckee River Flood Management Project (Flood Project), which was designed and permitted as a standalone project. The overall $400 million Flood Project is a joint effort between TRFMA, the Cities of Reno and Sparks, Washoe County, and numerous stakeholders. The Flood Project will reduce flood damage from 100-year flows in the Truckee Meadows region. Some elements have already been completed, such as the realignment of the North Truckee Drain; replacement of the Virginia Street Bridge; and river restoration projects at Lockwood, 102 Ranch, Tracy, and Mustang Ranch. The full extent of the Flood Project is from Reno to the town of Wadsworth.

References

BTS (U.S. Bureau of Transportation Statistics). 2017c. Hazardous Materials Serious Incidents 1991–2001 (monthly data, not seasonally adjusted). Updated May 2017. https://www.bts.gov/archive/publications/transportation_indicators/october_2001/Safety/Hazardous_Materials_Incidents. Accessed May 7, 2019.

City of Sparks. 2016. Ignite Sparks Comprehensive Plan: The Plan Guiding the City of Sparks to the Year 2030. https://cityofsparks.us/departments/planning-and-zoning/. Accessed June 13, 2019.

Earth Observatory. No date. Great Basin Geology. https://earthobservatory.nasa.gov/images/8497/great-basin-geology. Accessed July 29, 2019.

FEMA (Federal Emergency Management Agency). 2019. OpenFEMA – Declaration Data Set as of: 3/15/19. https://www.fema.gov/media-library/assets/documents/28318. Accessed September 19, 2019.

National Park Service. 2015. Cultural Resources. https://www.nps.gov/acad/learn/management/rm_culturalresources.htm. Accessed July 29, 2019

NV Energy. 2019. Public Safety Outage Management. https://www.nvenergy.com/safety/psom. Accessed September 23, 2019.

Regional Water Planning Commission. 2003. RWPC Regional Floodplain Management Strategy. 2nd Draft, June 2003. http://documents.wrwc.us/files/2368-00036.pdf Accessed August 15, 2019.

U.S. Census Bureau. 2017a. American Community Survey 1-year estimates. Retrieved from Census Reporter Profile page for Sparks, NV: http://censusreporter.org/profiles/16000US3268400-sparks-nv/. Accessed July 25, 2019.

U.S. Census Bureau. 2017b. American Community Survey 1-year estimates. Retrieved from Census Reporter Profile page for Nevada: https://www.census.gov/programs-surveys/acs/technical-documentation/table-and-geography-changes/2017/1-year.html July 25, 2019.

U.S. Census Bureau. 2017c. Age by Disability Status by Health Insurance Coverage Status American Community Survey 1-year estimates. https://censusreporter.org/data/table/?table=B18135&geo_ids=16000US3268400&primary_geo_id=16000US3268400. July 25, 2019.

U.S. Census Bureau. 2017d. Presence of a Computer and Type of Internet Subscription in Household American Community Survey 1-year estimates. Retrieved from

https://censusreporter.org/ data/table/?table=B28003&geo_ids=16000US3268400 &primary_geo_id=16000US3268400

U.S. Census Bureau. No date(a). DP-1 Profile of General Population and Housing Characteristics: 2010. 2010 Demographic Profile Data. https://factfinder.census.gov/faces/nav /jsf/pages/index.xhtml. Accessed July June 13, 2019.

U.S. Census Bureau. No date(a). S2301 Employment Status, 2017 American Community Survey 1-Year Estimates. Available online: https://factfinder.census.gov/faces /nav/jsf/pages/search-results.xhtml?refresh=t#.

Washoe County. 2008. Regional Open Space & Natural Resource Management Plan. https://www.washoecounty.us/csd/planning_and_development/master-plan-zoning/files/os_plan_081908.pdf. Accessed July 29, 2019.

Acronyms

BRIC	Building Resilient Infrastructure & Communities
CAV	Community Assistance Visit
CIP	Capital Improvement Plan
CWPP	Community Wildfire Protection Plan
EPA	Environmental Protection Agency
FMAG	Fire Management Assistance Grant Program
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
I-80	Interstate 80
MMI	Modified Mercalli Intensity
MPT	Mitigation Planning Team
NCEI	National Center for Environmental Information
NDEP	Nevada Division of Environmental Protection
NDOT	Nevada Department of Transportation
NNWPC	Northern Nevada Water Planning Commission
NRI	National Risk Index
PFAS	Per- and Polyfluoroalkyl Substances
PG&E	Pacific Gas and Electric Company
PLPT	Pyramid Lake Paiute Tribe
RHMP	Regional Hazard Mitigation Plan
RSIC	Reno-Sparks Indian Colony
RTC	Regional Transportation Commission
Southern Pacific	Southern Pacific Railway Company

TMWRF	Truckee Meadows Water Reclamation Facility
TRFMA	Truckee River Flood Management Authority
UNR	University of Nevada, Reno
WRWC	Western Regional Water Commission
WSEL	Water Surface Elevation Level
WUI	wildland–urban interface

City of Sparks Hazard Mitigation Program

The City of Sparks has a fully integrated approach to hazard mitigation planning and program implementation. Throughout the 2020 update process, the following Regional Hazard Mitigation Plan (RHMP) participation roles were recorded:

Name	Position	Department
Mark Andersen	Public Works Director	City of Sparks Public Works
Robert R. Bidart	Utilities Director	City of Sparks Planning and Zoning
Brian Cason	Capital Projects Manager	City of Sparks Engineering Services
Chris Crawforth	Police Chief	City of Sparks Police Department
Michael Drinkwater	Treatment Plant Manager	City of Sparks Community Services
Jon Ericson	City Engineer	City of Sparks Engineering Services
Scott Means	Division Chief, City of Sparks Emergency Manager	City of Sparks Division of Emergency Management
Casey Mentzer	Plant Manager	Truckee Meadows Water Reclamation Facility
Walt White	Fire Chief	City of Sparks Fire Department

What's New in the 2025 Update?

With the 2025 RHMP update, Washoe County and its regional partners have recognized changes in planning priorities by placing an added emphasis on incorporating actionable strategies into the mitigation implementation plan and moving away from including ongoing coordination activities. Recent disasters and emerging hazards have also influenced planning priorities and the development of mitigation actions for the 2025 RHMP update.

In the years since the release of the 2020 HMP, the city has undergone nearly constant change—with a growing population, some vulnerabilities have increased, while others have been effectively mitigated to an acceptable level. New development in the city has primarily occurred in the Spanish Springs Valley, which is more prone to wildland fire hazards. Mitigation actions have been added to the 2025 RHMP update to reflect the increase in priority of actions to address wildland fire hazards.

The 2025 update of the RHMP includes the following major revisions to the 2020 plan:

- Incorporation of additional hazards and more comprehensive risk assessments;
- Expanded capability assessment;

- Integration of hazard mitigation planning into existing mechanisms; and
- Comprehensive and focused mitigation strategy with prioritized mitigation actions.

See Appendix C in the Base Plan for the completed Federal Emergency Management Agency (FEMA) Local Plan Mitigation Review Tool for the Washoe County RHMP.

Plan Adoption

44 CFR §201.6(c)(5) requires that an HMP be formally adopted by elected officials from each participating jurisdiction. City Council formally adopted the 2025 update of the Washoe County RHMP on January 12, 2026.

This HMP was approved by FEMA Region 9 on September 24, 2025. Once the plan is approved and signed, a copy of the City of Sparks' adoption resolution will be placed in Appendix E of the Base Plan.

Community Profile

Governance

The City of Sparks was established as a planned community by the Southern Pacific Railway Company (Southern Pacific) and incorporated in 1905. The City of Sparks government operates using a council/ manager form of government, under which the Mayor and City Council make policy decisions that are implemented by the City Manager and staff. The mayor and the five members of the City Council are elected for staggered four-year terms.

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

- Building Permits
- Business License Department
- City Attorney's Office
- City Clerk and Records Management
- City Manager's Office
- Code Enforcement
- Community Services
- Customer Service
- Engineering Services
- Environmental Control Section
- Financial Services
- Fire Department
- Fire Prevention Bureau
- Government Affairs
- Housing Program
- Human Resources
- Maps and Geographic Information System (GIS) Resource Portal
- Parks & Recreation
- Planning and Zoning

- Police Department
- Public Information/Community Relations
- Purchasing
- Public Works
- Sparks Municipal Court

Geography and Climate

The City of Sparks is 4,410 feet above sea level in the semiarid Truckee Meadows basin, situated between the Sierra Nevada and the Great Basin. The city covers approximately 36 square miles east of the City of Reno. Interstate 80 (I-80) crosses the southern part of the city from east to west, and the Truckee River forms most of the City's southern boundary. The city's oldest parts are in the south, between the railroad line and the river. Starting in the 1970s, commercial and residential development began to spread to areas north and east of downtown, and during the 1990s, Sparks expanded its city limits northward into the Spanish Springs Valley. Figure 35 is a map of the city.

The Truckee Meadows region has a semiarid climate, with summer highs averaging in the 80s (Fahrenheit) to low 90s and winter lows in the 20s. The region generally experiences low humidity and precipitation, although severe snowstorms and heavy precipitation can occur.

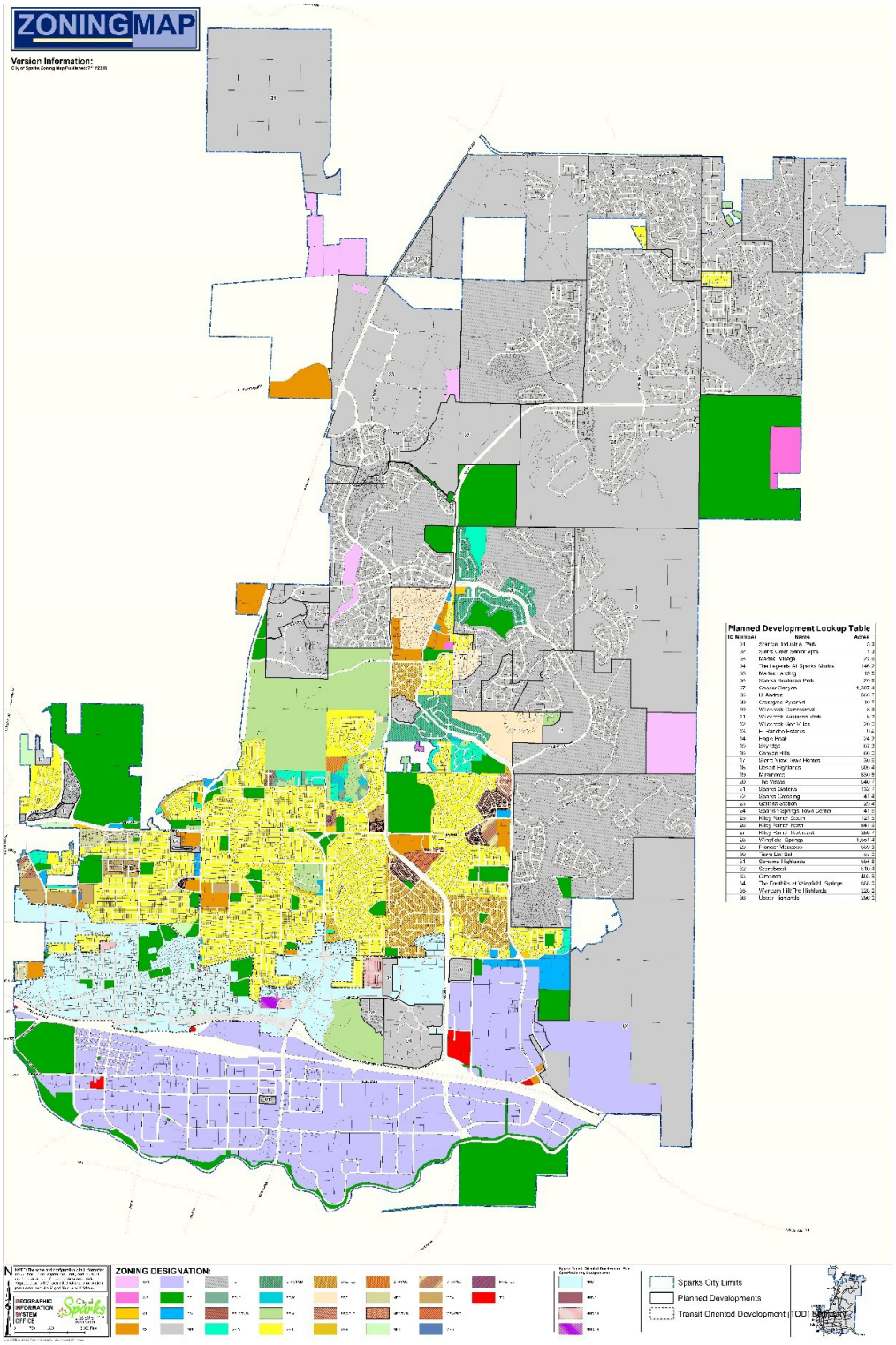


Figure 35: City of Sparks Zoning Map (2018 City GIS Services)

Population and Demographics

The 2020 Census recorded a population of 108,463 people in the City of Sparks.[77] Between 2020 and 2023, the population grew by approximately 1.7%, resulting in an estimated 2023 population of 110,323 people (see Table 59).[78]

Table 59: City of Sparks Demographic Characteristics[79]

Metric	City of Sparks (%)	Nevada (%) (2023)
Population by age, 2023		
Under 5 years old	6.3%	5.5%
Under 18 years old	23.5%	21.7%
65 years and older	15.5%	16.9%
Women, 2023	48.9%	49.5%
Race/Ethnicity, 2023		
White	64.6%	72.1%
Black	2.0%	10.8%
American Indian, Alaskan Native	1.2%	1.7%
Asian, Native Hawaiian, other Pacific Islander	6%	10.3%
Hispanic or Latino, any race	34.2%	30.3%

As of 2023, an estimated 9.0% of Sparks's population under the age of 65 years was disabled, and 11.4% of the City's population under age 65 do not have health insurance.[80] The median household income in 2018–2022 was $82,938, with 8.5% of the City's population living in poverty. In the time range between 2018 and 2022, approximately 27.5% of people over the age of 5 spoke a language other than English at home.

[77] United States Census Bureau, "QuickFacts." https://www.census.gov/quickfacts/fact/table/sparkscitynevada/PST045223
[78] United States Census Bureau, 2023, "QuickFacts, Sparks City, Nevada," U.S. Census Bureau QuickFacts: Sparks city, Nevada
[79] United States Census Bureau, 2023, "QuickFacts, Nevada," U.S. Census Bureau QuickFacts: Nevada
[80] United States Census Bureau, 2023, "QuickFacts, Sparks City, Nevada," U.S. Census Bureau QuickFacts: Sparks city, Nevada

As of 2022, 59.4% of housing units in the City of Sparks are owner-occupied. The median value of owner-occupied homes is $423,500. During this time, 97% of households owned a computer, and 91.7% had a broadband internet subscription.

The 2022 American Community Survey 5-year estimates reported that approximately 63.3% of the population over 16 years old in the City was employed, and 4.4% of the population over 16 years old was unemployed. Per capita income in the City in 2022 was $32,436, and approximately 7.9% of the City's population lived below the poverty line.[81]

Economy

In 2009, *Business Week* named Sparks the number one city in Nevada to start a new business. Nevada has no corporate income or gross receipts taxes, which supports economic development.

By employment, the largest sectors of Sparks's economy are the service sectors of entertainment, hotel, and food services, followed by education. Construction also plays a major role. The City has benefited from the recent development of advanced manufacturing and technology facilities in the Reno-Sparks metropolitan area, which has resulted in a period of job growth. Figure 36 shows images that promote downtown Sparks as a redevelopment district.

In 2022, the most common employment sectors for those who live in Sparks are manufacturing (6,454 people), retail trade (6,329 people), and healthcare and social assistance (5,466 people).

[81] United States Census Bureau, 2022, "Selected Economic Characteristics." https://data.census.gov/table/ACSDP5Y2022.DP03?q=DP03&t=Employment:Employment%20and%20Labor%20Force%20Status&g=060XX00US3203194794



Figure 36: Images Promoting Downtown Sparks as a Redevelopment District

Land Use and Ownership Trends

The following is the most up-to-date information from the City's current Comprehensive Plan or "Master Plan" called Ignite Sparks, a guide to help the City's growth through 2030.

According to its Comprehensive Plan, the City of Sparks experienced 38% growth from 2000 to 2010 and an additional 4% from 2010 to 2015. "People who live in Sparks appreciate its quality of life and small-town feel. Sparks is known as the premiere special events venue for northern Nevada, hence the City Slogan "It's Happening Here." Most properties in the City are privately owned. The City of Sparks owns and operates public facilities, including government administration facilities; City parks and open space; public works facilities and utilities, including the Truckee Meadows Water Reclamation Facility (jointly owned with the City of Reno); libraries; and fire and police stations.

The Comprehensive Plan provides the following information:[82]

As of January 2016, Sparks covers approximately 36 square miles, with an estimated current population of 93,581 (Source: Nevada State Demographer). Situated at 4,410 feet above sea level in a semiarid valley, daily temperatures are temperate, with daily highs and lows varying by as much as 45 degrees Fahrenheit. The sun shines roughly 290 days a year, or eight of every

[82] City of Sparks, "Sparks Comprehensive Plan (Master Plan)." https://cms7files1.revize.com/sparksnv/Document_Center/Department/Planning%20&%20Zoning/Sparks%20Comprehensive%20Plan_Full%20Plan_2021.03.08.pdf

10 days. Annual precipitation averages 8.26 inches per year. Sparks has four seasons, with a relatively short growing season.
Sparks is one of two incorporated cities in Washoe County (County). The other City is Reno. Sparks is connected to the western United States by U.S. 395, Interstate 80, and the Union Pacific Railroad and is served by the Reno–Tahoe International Airport.

Older housing is located near downtown, while most of the newer housing is in the Spanish Springs Valley. Single-family detached houses make up approximately 64% of the housing stock. The City of Sparks uses a strong city manager form of government. The City Manager reports to the mayor and a five-member City Council."

Historically—in the early 1900s—the area was just swampland and ranches. When Southern Pacific altered its railroad lines, it offered incentives for employees to move to lots in what became Sparks in 1905. Sparks remained small until growth in Reno pushed populations outward in the 1950s. "In the 1970s, the area south of the railroad to the Truckee River started to develop with warehouses and industry and in time became the main employment area for Sparks. During the 1970s, Sparks experienced a housing boom in the area north and east of its downtown, which continued into the 1980s." Numerous commercial spaces were developed in the decades that followed, including a high-rise hotel/casino, movie complex, and public plaza. By the 1990s, city limits had expanded northward to Spanish Springs Valley, which continues to grow with 15 approved developments.

In 1997, a 77-acre lake was developed. "From 1999 through 2006, the City of Sparks experienced an upward trend in revenue, number of building permits, jobs, and new businesses. The number of building permits and planning cases peaked in 2006. Starting in 2007, city revenues and the number of building permits and planning cases, all indications of a growing economy, began to contract. The Great Recession, which proved to be more severe and last longer than in many parts of the United States, had come to Sparks.

Consolidated taxes (the primary component of which is sales taxes), a major source of revenue for the City's general fund, dropped for the first time ever in 2007. This was followed by a six-year decline in total general fund revenue. Nationally, the Great Recession is recorded as lasting from December 2007 to June 2009, but not until 2014 did Sparks begin to see an increase in revenues. During those tough years, one-third of city personnel were laid off. The City is still recovering, but it has not significantly increased personnel or city services."

NATURAL RESOURCES

The following major natural systems are present in the Truckee Meadows basin:

- **Geology:** The City of Sparks and Washoe County are located on the western edge of the geological formation known as the Great Basin, which is part of the Basin and Range geological province. The Basin and Range Province are 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 United States. These ridges also create a closed basin, meaning that water that falls in the basin stays there until it evaporates or is removed through human activity.

- **Watersheds:** Sparks lies in 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.[83]
- **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.

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 artifacts that may be found at these sites. The region was part of the territory of the Northern Paiutes, who inhabited and moved between various habitats.

Historic buildings in the City that are older than 50 years and eligible for listing in the National Register of Historic Places are also considered cultural resources and important contributors to the City's character.

Most cultural sites in the city have not been mapped or surveyed, which can lead to the degradation of these sites if they are developed. Private development can degrade archaeological sites because federal and state regulations do not require the protection of cultural resources on private property. Unregulated use of off-road vehicles, mountain bikes, or hiking can also damage archaeological sites.[84]

[83] Truckee Meadows Water Authority, "Truckee River Operating Agreement." https://tmwa.com/your-water/topics-facts/truckee-river-operating-agreement/
[84] City of Sparks, "Sparks Comprehensive Plan (Master Plan)." https://cms7files1.revize.com/sparksnv/Document_Center/Department/Planning%20&%20Zoning/Sparks%20Comprehensive%20Plan_Full%20Plan_2021.03.08.pdf

Hazard Profiles and Vulnerability Assessments

FEMA	**B1.** Does the Plan include a description of the type, location, and extent of all natural hazards that can affect [the City of Sparks]? (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 Sparks]? (Requirement §201.6(c)(2)(i))

This section contains hazard profiles and vulnerability assessments to determine the potential impact of hazards on the people, economy, and built and natural environments of the City of Sparks. They have been streamlined to increase the effectiveness and usability of the RHMP. Additional details are contained in the Vulnerability Assessment Section of the Base Plan.

General

Washoe County has experienced several disaster declarations that may have affected the City of Sparks. In total, the County has received 48 disaster declarations, including 15 since the previous HMP update.

The hazard profiles and vulnerability assessments contained in this annex represent a considerable amount of work performed by the Mitigation Planning Team (MPT). Planning Team members ranked hazards using several key considerations, followed by activities to validate hazard analysis results and identify specific areas of risk. The City of Sparks representatives to the MPT identified the following hazards for further assessment. (Refer to the RHMP Base Plan for regional risk assessments for moderate and low-priority hazard profiles.)

- Avalanche and Landslide
- Criminal Acts and Terrorism
- Drought
- Earthquake
- Energy Emergency
- Flood
- Hazardous Materials Incident
- Infectious Disease
- Radiological Waste Transport
- Extreme Weather (Winter Storm, Windstorms, Extreme Heat)
- Transportation Incident
- Volcano
- Wildland Fire

Hazard Ranking Methodology

CALCULATED PRIORITY RISK INDEX

A risk assessment result for the entire county does not mean that each municipality is at the same amount of risk for each hazard. Each jurisdiction considered how it is uniquely at risk of the hazards profiled. The Calculated Priority Risk Index (Table 60) assessment resulted in hazard rankings for the City of Sparks.

Table 60: Factors for Calculating Risk

Risk Index Factor	Degree of Risk Level		Criteria	Factor Weight for Degree of Risk Level
Probability *What is the likelihood of the hazard occurring?*	1	Unlikely	Less than 1 percent probability of occurrence in the next year or a recurrence interval of greater than every 100 years.	30%
	2	Occasional	1 to 10 percent probability of occurrence in the next year or a recurrence interval of 11 to 100 years.	
	3	Likely	11 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.	
	4	Highly Likely	91 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.	
Magnitude *What will be the overall impact?*	1	Negligible	Less than 5% of the affected area's critical and non-critical facilities and structures are damaged/destroyed. Only	30%

Risk Index Factor	Degree of Risk Level		Criteria	Factor Weight for Degree of Risk Level
			minor property damage and minimal disruption of life. Temporary shutdown of critical facilities.	
	2	Limited	Greater than 5% and less than 25% of property in the affected area is damaged/destroyed. Complete shutdown of critical facilities for more than one day but less than one week.	
	3	Critical	Greater than 25%, but less than 50% of property in the affected area was damaged/destroyed. Complete shutdown of critical facilities for over a week but less than one month.	
	4	Catastrophic	Over 50% of critical and non-critical facilities and infrastructures in the affected area are damaged/destroyed. Complete shutdown of critical facilities for more than one month.	
Onset *How long will be there be between when it is recognized the hazard is approaching and when the hazard*	1	Self-defined	More than 24 hours	10%
	2	Self-defined	12 to 24 hours.	
	3	Self-defined	6 to 12 hours.	
	4	Self-defined	Less than 6 hours.	

Risk Index Factor	Degree of Risk Level		Criteria	Factor Weight for Degree of Risk Level
will begin affect the community?				
Duration *What is the length of time the hazard will remain active, including how long emergency operations will have to continue after the hazard event?*	1	Brief	Up to 6 hours.	10%
	2	Intermediate	Up to one day.	
	3	Extended	Up to one week.	
	4	Prolonged	More than one week.	
Frequency *How often has this kind of hazard resulted in an emergency or disaster?*	1	Every 10+ years	This hazard is not frequent but may still impact the area.	20%
	2	Every 5–10 years	This hazard is not as frequently occurring but it could occur in the next 10 years.	
	3	Every 1–5 years	This hazard is likely to occur relatively often. It may have occurred more or less frequently recently, but on average, it can be expected every 1–5 years.	
	4	Annually	This hazard is a frequent occurrence which the area actively has to respond to on an approximately annual basis.	

The following is the risk factor equation:

Risk Factor Equation

RF Value = [(Probability x .30) + (Magnitude x .30) + (Onset x .10) + (Duration x .10) + (Frequency x .20)]

Table 61 presents the classification system for the CPRI. Risk factor values are grouped into three categories—high, medium, and low—based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 through 4.0 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 61: Overall Risk Scores for the CPRI

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

The Washoe County base plan is comprehensive for regional assessments and effectively addresses the calculated risk indexes. It provides a thorough evaluation that highlights its commitment to risk management and community safety, while the annexes are specific to each jurisdiction. Table 62 displays the CPRI values for the City of Sparks.

Table 62: Calculated Priority Risk Index for the City of Sparks

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Avalanche and Landslide	1	1	4	3	1	1.5	**Low**
Criminal Acts and Terrorism	2	2	4	3	2	2.3	**Medium**

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Drought	3	2	4	4	1	2.5	**High**
Earthquake	4	2	4	4	1	2.8	**High**
Energy Emergency	3	3	2	3	2	2.7	**High**
Flood	4	2	4	4	3	3.2	**High**
Hazardous Materials Incident	2	2	4	3	1	2.1	**Medium**
Infectious Disease	2	3	1	4	1	2.2	**Medium**
Radiological Waste Transport	1	3	4	4	1	2.2	**Medium**
Extreme Weather (Winter Storm, Windstorms, Extreme Heat)	4	1	1	3	3	2.5	**High**
Transportation Incident	2	1	1	3	1	1.5	**Low**

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
(Aircraft Crash)							
Volcano	1	1	1	4	1	1.3	**Low**
Wildland Fire	3	1	1	4	4	2.5	**High**

NATIONAL RISK INDEX

The National Risk Index (NRI) is not included in the local jurisdiction annexes as the dataset is developed at a county and census tract level, and it is not aggregated to individual jurisdictional boundaries. While the NRI provides useful context for understanding countywide hazard overall risk data, it does not offer the resolution needed to support jurisdictional specific assessments.

Hazard-Specific Profiles and Risk Assessments

Avalanche and Landslide

LOCATION

Avalanche risk is highest in the steep, mountainous areas of the Carson Range of the Sierra Nevada in southwestern Washoe County. Incline Village and Crystal Bay are under avalanche advisories several times each winter. The Avalanche Hazard Report prepared by Dick Penniman for the County in 1993 identified three high-hazard avalanche areas (areas where an avalanche could damage standard wood-frame structures and/or automobiles). They are described in the following sections. The hazard zones were identified as high, medium, and low potential. The data were provided to IEM by Washoe County.

Certain areas are more susceptible to landslides than others. Regions with steep slopes, loose soil or rock, and heavy rainfall are particularly prone to landslides. In addition, areas previously disturbed by human activities, such as construction, mining, or deforestation, are at higher risk. Landslides in Nevada are typically confined to specific areas and generally cause less severe economic consequences than hazards that affect larger regions. Landslide hazard areas include foothills and mountain areas with fractured and steep slopes.

These areas in Washoe County include the Sierra Nevada foothills just southwest of Reno, the Virginia Mountains along the western side of Pyramid Lake, the Pah Rah Range just south of Pyramid Lake, and the Carson Range of the Sierra Nevada in southern Washoe County near Lake Tahoe.

There are no avalanche risk areas near the City of Sparks.

EXTENT

In Washoe County, the overall magnitude and severity of the impacts of avalanches are generally classified as Very Low. Secondary impacts, such as blocked roads, can affect larger areas and cause detours. However, places like Incline Village/Crystal Bay and sections along Mount Rose Highway above Galena Park face Moderate avalanche impacts. In response to typical avalanche effects, local resources, including state, county, and local agencies, such as the Incline Village General Improvement District and the North Lake Tahoe Fire Protection District, are deployed. Search and rescue efforts are facilitated by local volunteers organized through the County Sheriff's Office, while road-clearing operations are typically managed by state or county resources.

Landslide hazard areas in Washoe County include foothill and mountain areas where fractured and steep slopes are present. These areas include the Sierra Nevada foothills just southwest of Reno, the Virginia Mountains along the western side of Pyramid Lake, the Pah Rah Range just south of Pyramid Lake, the Lake Range east of Pyramid Lake, mountain ranges to the west of Long Valley in the northwestern part of the County, and the Carson Range of the Sierra Nevada in Southern Washoe County near Lake Tahoe. Small slides and slumping may occur along the steep banks of rivers and creeks. Areas where steep slopes are present are not generally heavily populated, and most are located on federal or state land. The overall magnitude and potential severity of impacts from a landslide is considered Medium.

Less severe landslide events could be handled at the state or county level, disrupt services for 4 to 7 days, and have minor economic impacts on a communitywide scale. Considering a worst-case scenario, a landslide event could require state- or county-level support, impact critical facilities, disrupt services for 8 to 14 days, and have countywide economic impacts.

PREVIOUS OCCURRENCES/HISTORY

The City of Sparks has not reported any previous occurrences of Avalanche and Landslide.

PROBABILITY OF FUTURE EVENTS

The 2023 enhanced SHMP reports that Washoe County is one of the areas in the state that is expected to experience the highest annual losses due to avalanches. Due to the steep mountainous terrain, high elevations, and winter snows common on the eastern slopes of the Sierra Nevada, minor avalanches with negligible impact occur annually or semiannually in

Washoe County. More severe avalanches that cause injuries, damage property, or impact roadways arise less frequently.

The probability of severe avalanche events that impact public safety, property, or infrastructure is considered Medium, with roughly a 14% chance of occurrence each year. This indicates that high-risk avalanches typically occur between once in 10 years and once in 100 years in Washoe County. On a smaller scale, the 2023 Avalanche Analysis Report categorized Third Creek as having a potential for avalanches affecting the lower inhabited draining between every 20–50 years or a 30-year average return period. Avalanche impacts in the Crystal Bay area on the upslope side of Tuscarora Road occur approximately once every 3 years. The Sierra Avalanche Center monitors specific avalanche probability and provides forecast data for the Lake Tahoe-Sierra region on the following website: http://sierraavalanchecenter.org/index.html. Figure 37 shows the Sierra Avalanche Center's forecast area.

VULNERABILITY ANALYSIS

Mountain communities in the Lake Tahoe Basin, including Incline Village and Crystal Bay, are vulnerable to the effects of avalanches. When avalanche conditions are present, risks are highest for recreational users and others in backcountry areas who may trigger avalanches or be injured or killed by an avalanche. Besides injuries and deaths, avalanches can damage or destroy property and utilities and cover roadways in snow. Transportation disruptions caused by avalanches or area closures because avalanche risks can have economic impacts on ski resorts and other businesses in the Lake Tahoe Basin over a period of days to a week or more.

ESTIMATED IMPACT AND POTENTIAL LOSSES

When avalanches intersect with humans, there can be substantial costs associated with impacts on commerce, damage to infrastructure, and loss of human life. In the western United States, avalanches are the most frequently occurring lethal form of mass movement and, on an annual basis, cause more fatalities than earthquakes and all other forms of slope failure combined. They can also impact roads and railways, causing substantial damage and disruption to commerce.



Figure 37: Map of Sierra Avalanche Center's Forecast Area

VULNERABLE POPULATIONS

People caught in avalanches can die from suffocation, trauma, or hypothermia. An average of 28 people die in avalanches every winter in the U.S.[85] Most avalanche-related injuries and fatalities will likely continue to be related to recreationalists drawn to the steep snow-covered slopes prone to avalanches, and most developed ski areas have avalanche control measures and rescue teams on site to deal with avalanche-related emergencies. However, an ever-

[85] FEMA, Preparedness Community, 2024, https://community.fema.gov/ProtectiveActions/s/article/Avalanche-Impact

increasing number of outdoor enthusiasts use snowmobiles in undeveloped areas with no avalanche controls or available emergency personnel. In 2009, twice as many snowmobilers died in avalanches in the U.S. as did participants in any other winter sports activities. As the population increases and as more snowmobilers' venture into the winter backcountry, avalanches may become an increasing threat in Nevada in the future, but currently, they do not account for a large number of deaths or injuries in this state. There were only two snowmobiler fatalities in Nevada between 1951 and 2016.[86]

DEVELOPMENT TRENDS

The County has installed a camera system above Crystal Bay to monitor snow conditions and provide early warning of avalanches. Planned future development in the Incline Village and Crystal Bay communities will occur primarily as an infill. The County reviews development proposals in these communities to identify and mitigate avalanche hazards. Risks in these areas have not changed. Avalanche hazard areas have been mapped near Incline Village and Crystal Bay, and development is directed away from these areas. Backcountry recreational areas and access roads may be more vulnerable to avalanches and landslides. Overall, the risk of these hazards has not changed since the last plan update due to changes in development.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 63 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 63: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 64 provides the Calculated Priority Risk Index (CPRI) for avalanche and landslide impacts in the City of Sparks based on the current plan's hazard risk assessment results. The City of

[86] 2018 State Enhanced HMP, Colorado Avalanche Information Center, "Avalanche Fatalities by Activity in Nevada, from 1951–2016." http://avalanche.state.co.us/?s=avalanche+statistics

Sparks assigned avalanche and landslide a risk factor value of 1.5, reflecting quick onset and medium duration impacts. This risk factor value falls in the range of 0 to 1.9, which is considered a low-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 64: Calculated Priority Risk Index for Avalanche and Landslide in the City of Sparks

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Avalanche and Landslide	1	1	4	3	1	1.5	Low

RECENT MITIGATION CASE STUDY

For all development in unincorporated areas of the County in identified avalanche hazard areas, developers must complete a geotechnical study and comply with the study's final recommendations to reduce vulnerability to avalanches.

Criminal Acts and Terrorism

LOCATION

Crime and violence can impact any population. The map in Figure 38 include shopping centers, business centers, financial districts, clinics/hospitals, schools, and government offices and buildings in the City of Sparks. The University of Nevada, Reno, and Peppermill Resort Spa Casino are examples of highly populated areas where an act of violence may occur.

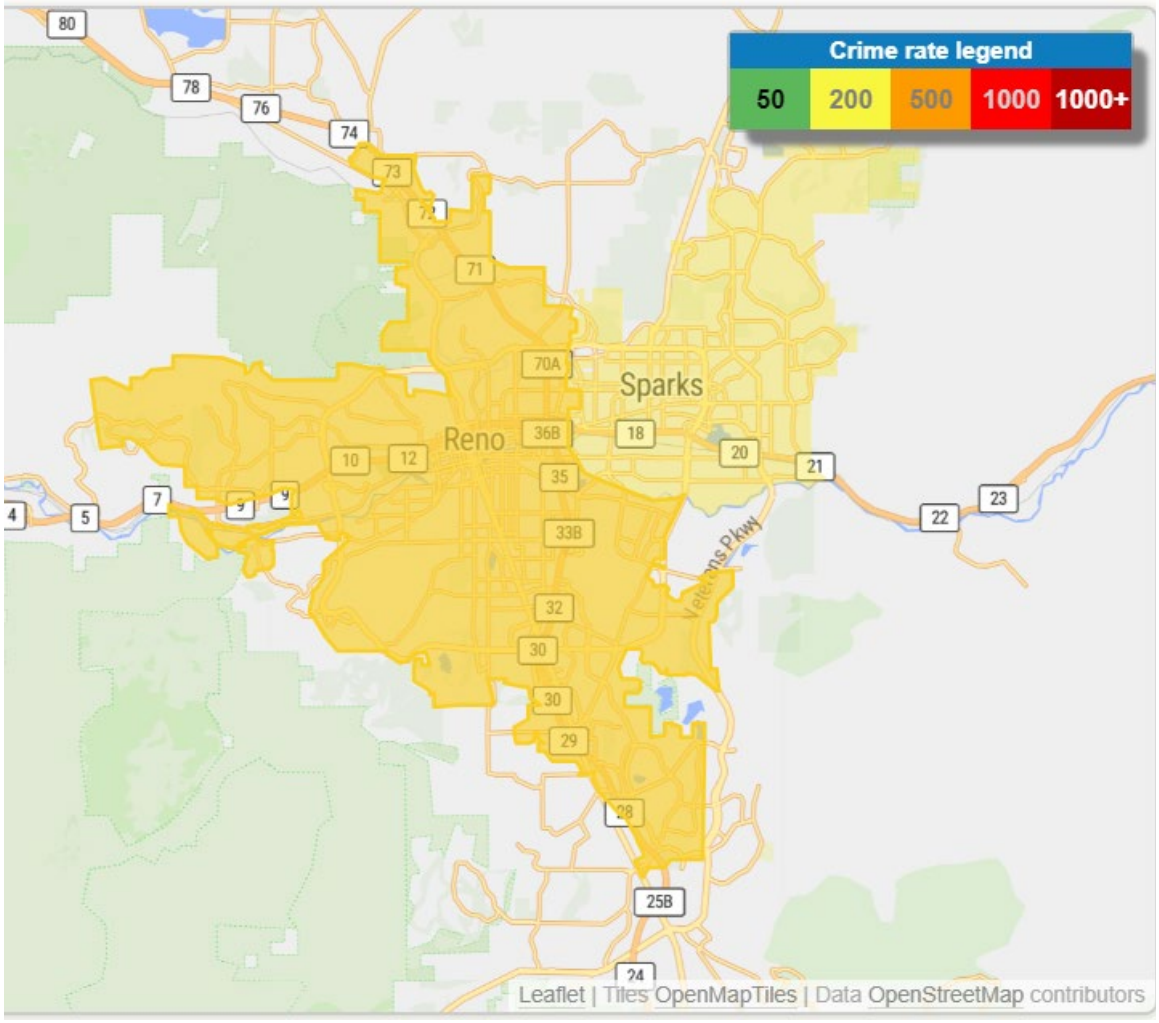


Figure 38: Map of Reno and Sparks with Crime Rate Legend[87]

Figure 39 shows the crime rate for the City of Sparks rating of average indicated by the color orange for 500 incidents. The legend indicates that green represents a very low rate of incidents or 50 or less, yellow represents a low rate of incidents or between 50 and 200 incidents, orange represents an average or between 200 and 500 incidents, red represents a high rate of incidents or between 500 and 1000 incidents, and brown represents a very high rate of incidents or greater than 1,000 incidents.

[87] City-Data.com, 2024, "Crime in Reno, Nevada (NV): Murders, Rapes, Robberies, Assaults, Burglaries, Thefts, Auto Thefts, Arson, Law Enforcement Employees, Police Officers, Crime Map." https://www.city-data.com/crime/crime-Reno-Nevada.html

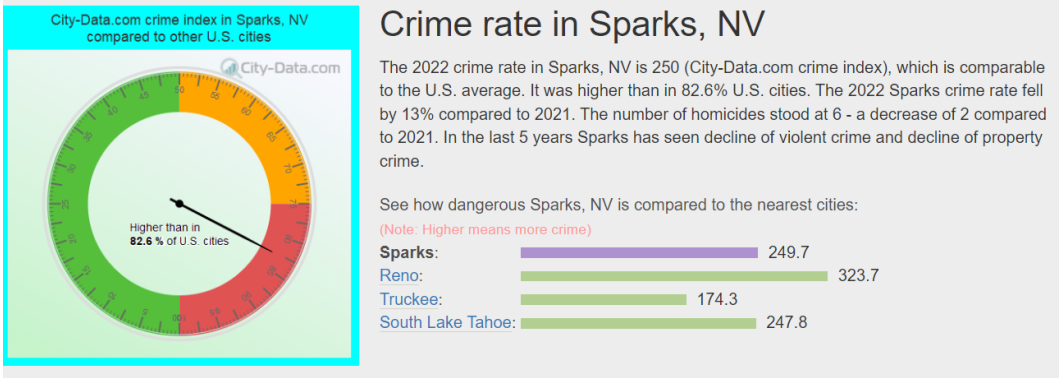


Figure 39: Crime Rate Meter for Sparks Nevada Compared with Other U.S. Cities[88]

EXTENT

It is difficult to estimate the extent or probability of criminal activity or a terrorist incident. However, threats of crime and terrorism could affect all populated areas in Washoe County, and government facilities and schools may be most likely targeted.

City-Data.com compiles a crime index across the United States and provides comparisons of crime rates of U.S. cities to provide a framework for analysis of the extent of crime increases or declines of types of crime occurring for each city. Figure 39 shows that the City of Sparks City-Data crime index rate was 250 in 2022, which was comparable to the national average and higher than 82.6% of American cities. The bar graph in that figure compares the crime rates in Sparks to those of nearby cities.

Figure 40 is a pie chart of crime statistics compiled by City-Data.com in percentages of different types of crime committed in the City of Sparks for 2022. From the pie chart, the percentage of thefts in 2022 was 58.8% and would represent the greatest number of criminal acts committed, with burglaries, auto thefts, and assaults following.

[88] City-Data.com, 2024, "Crime in Reno, Nevada (NV): Murders, Rapes, Robberies, Assaults, Burglaries, Thefts, Auto Thefts, Arson, Law Enforcement Employees, Police Officers, Crime Map." https://www.city-data.com/crime/crime-Reno-Nevada.html

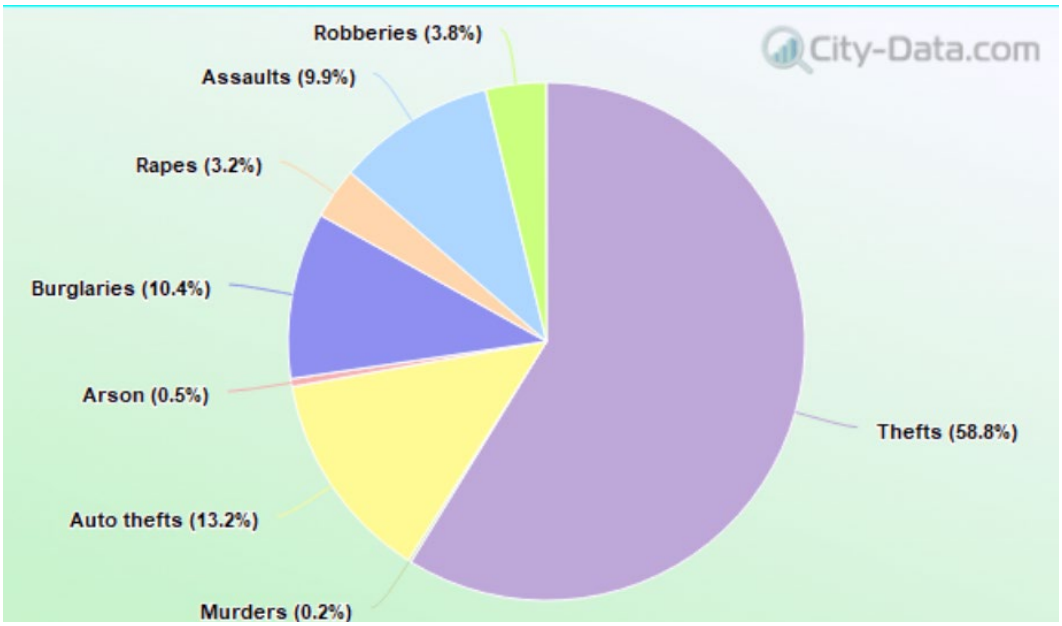


Figure 40: City-Data Crimes by Type Statistics for the City of Sparks, 2022[89]

PREVIOUS OCCURRENCES/HISTORY

- **May 2020:** Law enforcement significantly mobilized in response to the George Floyd riots, and City facilities suffered minor damage.
- **October 21, 2013:** A 12-year-old student opened fire with a semiautomatic handgun at Sparks Middle School, injuring two students and killing a teacher.[90]

Figure 41 is a bar graph of the crime index compiled by City-Data.com for the City of Sparks from 2005 to 2022, comparing the U.S. average index rating to the City's index rating for each year.

[89] City-Data.com, 2024, "Crime in Reno, Nevada (NV): Murders, Rapes, Robberies, Assaults, Burglaries, Thefts, Auto Thefts, Arson, Law Enforcement Employees, Police Officers, Crime Map." https://www.city-data.com/crime/crime-Reno-Nevada.html

[90] Catherine E. Shoichet, Amanda Watts, and Chuck Johnston, CNN, 2013, "Nevada School Shooting, Teacher Killed, Two Students Wounded." https://www.cnn.com/2013/10/21/justice/nevada-middle-school-shooting/index.html

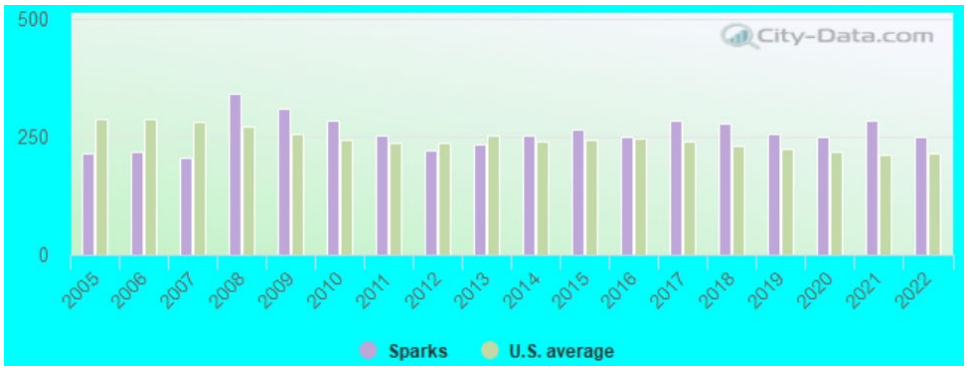


Figure 41: Crime Rates in the City of Sparks and the U.S. Average, 2005–2022[91]

PROBABILITY OF FUTURE EVENTS

Future weather conditions, such as climate change, have no direct connection to acts of violence and terrorism. However, increased development and urbanization can increase the probability of a future active threat. UN Secretary General Antonio Guterres states that climate impacts can increase conflicts and fragile economies when the loss of stable economic conditions leaves large portions of the population with little resources, protection, income, or security and may increase terrorist ideological interests.[92]

Figure 42 illustrates crime rates in the City of Sparks by year from 2009 to 2022, the types of crimes committed (per 100,000 population), and the trends of increasing/decreasing crime acts identified in comparison to state averages.

Figure 43 shows a five-year trend of violent crime statistics compiled by the City of Sparks Police Department between 2019 and 2023 by the number of violent crimes committed each year, indicating a steady decrease in violent crimes, down from 2022 by 7.78%. Violent Crime is composed of four offenses: murder and nonnegligent manslaughter, rape, robbery, and aggravated assault.

[91] City-Data.com, 2024, "Crime in Reno, Nevada (NV): Murders, Rapes, Robberies, Assaults, Burglaries, Thefts, Auto Thefts, Arson, Law Enforcement Employees, Police Officers, Crime Map." https://www.city-data.com/crime/crime-Reno-Nevada.html

[92] United Nations, UN News Global Perspectives Human Stories, 2021, https://news.un.org/en/story/2021/12/1107592

Crime rates in Sparks by year														
Type	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Thefts (per 100,000)	2,007 (2,195)	1,829 (2,026)	1,600 (1,758)	1,710 (1,851)	1,710 (1,843)	1,701 (1,809)	1,731 (1,807)	1,662 (1,709)	1,684 (1,689)	1,536 (1,501)	1,538 (1,451)	1,353 (1,268)	1,763 (1,623)	1,586 (1,436)
Burglaries (per 100,000)	850 (929.8)	699 (774.4)	656 (720.7)	609 (659.2)	559 (602.6)	545 (579.7)	657 (685.7)	448 (460.6)	591 (592.6)	570 (556.9)	513 (483.9)	429 (402.2)	357 (328.7)	281 (254.4)
Auto thefts (per 100,000)	248 (271.3)	233 (258.1)	191 (209.8)	240 (259.8)	253 (272.7)	248 (263.8)	270 (281.8)	340 (349.5)	417 (418.1)	334 (326.3)	376 (354.7)	325 (304.7)	421 (387.6)	355 (321.3)
Assaults (per 100,000)	242 (264.7)	211 (233.8)	157 (172.5)	133 (144.0)	156 (168.2)	181 (192.5)	206 (215.0)	317 (325.9)	313 (313.8)	349 (341.0)	297 (280.2)	284 (266.3)	291 (267.9)	267 (241.7)
Robberies (per 100,000)	112 (122.5)	103 (114.1)	75 (82.4)	68 (73.6)	70 (75.5)	56 (59.6)	97 (101.2)	89 (91.5)	105 (105.3)	87 (85.0)	76 (71.7)	75 (70.3)	74 (68.1)	103 (93.2)
Rapes (per 100,000)	40 (43.8)	35 (38.8)	46 (50.5)	32 (34.6)	43 (46.4)	68 (72.3)	54 (56.4)	26 (26.7)	54 (54.1)	68 (66.4)	76 (71.7)	87 (81.6)	106 (97.6)	85 (76.9)
Arson (per 100,000)	24 (26.3)	17 (18.8)	22 (24.2)	14 (15.2)	13 (14.0)	9 (9.6)	12 (12.5)	12 (12.3)	11 (11.0)	19 (18.6)	4 (3.8)	7 (6.6)	6 (5.5)	14 (12.7)
Murders (per 100,000)	5 (5.5)	8 (8.9)	7 (7.7)	1 (1.1)	2 (2.2)	2 (2.1)	2 (2.1)	3 (3.1)	2 (2.0)	4 (3.9)	1 (0.9)	4 (3.8)	8 (7.4)	6 (5.4)
City-Data.com crime index	310.2	285.6	252.6	221.7	235.4	252.6	265.4	248.7	284.2	279.8	257.1	250.4	285.8	249.7

↓ - means the value is smaller than the state average.
↕ - means the value is about the same as the state average.
↑ - means the value is bigger than the state average.
↑↑ - means the value is much bigger than the state average.

Figure 42: Crime Rates in Sparks by Year, 2009–2022, Indicating Types of Crime and Trends[93]

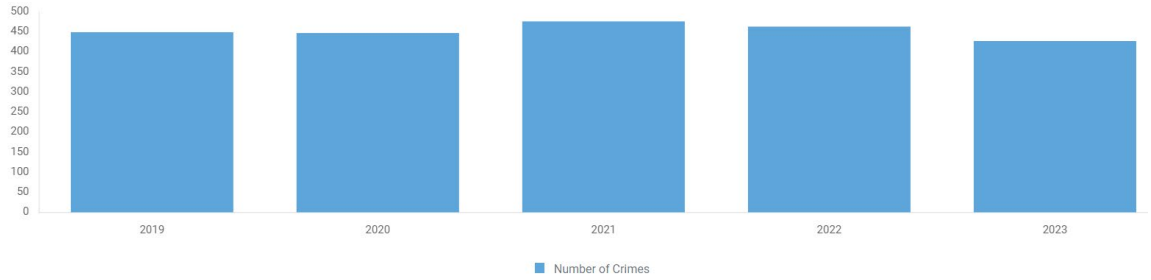


Figure 43: Nevada Crime Statistics, Violent Crime, Sparks Police Department, 2019–2023[94]

[93] City-Data.com, 2024, "Crime in Reno, Nevada (NV): Murders, Rapes, Robberies, Assaults, Burglaries, Thefts, Auto Thefts, Arson, Law Enforcement Employees, Police Officers, Crime Map." https://www.city-data.com/crime/crime-Reno-Nevada.html

[94] Nevada Government, City of Sparks Police Department, 2023, "Nevada Crime Statistics, Violent Crime, Sparks Police Department, 2019–2023." https://nevadacrimestats.nv.gov/tops/report/violent-crimes/reno-police-department/2023

Figure 44 shows a five-year trend of property crime statistics compiled by the City of Sparks Police Department between 2019 and 2023 by the number of property crimes committed each year, indicating an increase in property crime between 2022 and 2023, up by 11.64%.

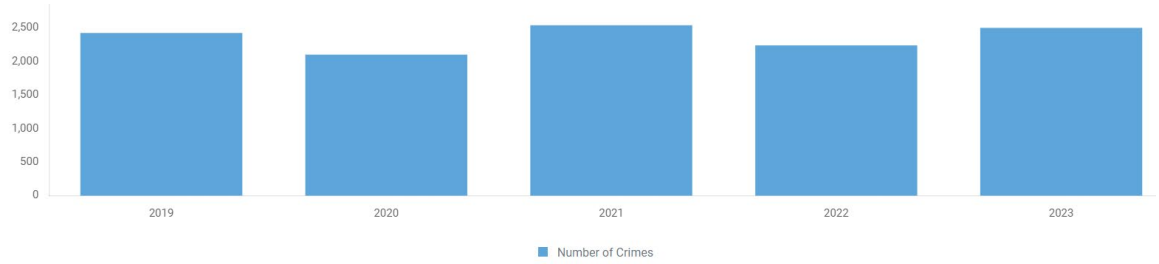


Figure 44: Nevada Crime Statistics, Property Crime, Sparks Police Department, 2019–2023[95]

Figure 45 illustrates monthly violent crime statistics compiled by the City of Sparks Police Department for 2023, indicating the number of actual offenses committed per month and the total number of offenses cleared by the police department.

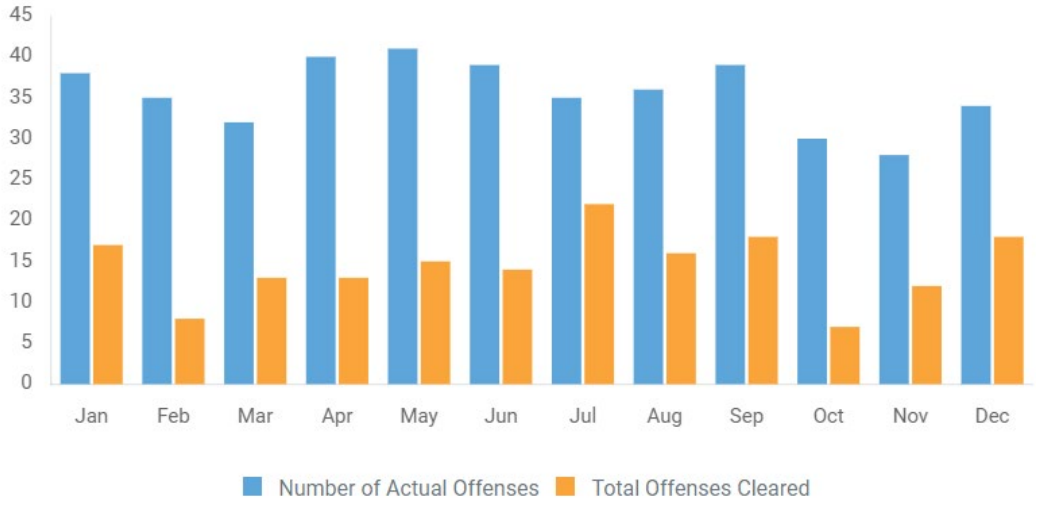


Figure 45: City of Sparks Police Department Violent Crimes Statistics by Month 2023, Actual Offenses and Offenses Cleared[96]

[95] Nevada Government, City of Sparks Police Department, 2023, "Nevada Crime Statistics, Property Crime, Sparks Police Department, 2019–2023." https://nevadacrimestats.nv.gov/tops/report/violent-crimes/reno-police-department/2023

[96] Nevada Government, City of Sparks Police Department, 2023, "City of Sparks Police Department Violent Crimes Statistics by Month 2023, Actual Offenses and Offenses Cleared." https://nevadacrimestats.nv.gov/tops/report/violent-crimes/reno-police-department/2023

VULNERABILITY ANALYSIS

Community well-being includes physical and mental health and is emphasized by the importance of understanding and fostering community resilience. The criminal justice system and the legal system must also address major challenges to law enforcement agencies to maintain staffing to manage workloads due to increased crime rates and implement effective crime prevention measures. Added to this burden on the local jurisdiction, court congestion, delays, and the issues of overcrowded prisons can impact the ability to maintain safety and lead to changes in policy that can cause strategic interventions aimed at addressing the root causes of crime.[97]

ESTIMATED IMPACT AND POTENTIAL LOSSES

Because criminal acts tend to target areas with higher populations, as Sparks grows, its vulnerability to crime and its impact on businesses and citizens will increase. The psychological effects of crime on individuals have social implications that alter community dynamics and foster an environment of fear. Economically, crime decreases property values, causes financial losses to businesses, and can cause job displacement, contributing to broader economic losses.[98]

Figure 46 shows the number of full-time law enforcement employees/police officers per 1000 residents for the State of Nevada and for the City of Sparks from 2003 to 2020. The line graph indicates the number of full-time police officers employed with the City of Sparks has maintained at 1 police officer per 1,000 residents between 2003 and 2020, compared with 2.5 per 1,000 residents State of Nevada full-time law enforcement officers.

[97] Criminal Justice, 2024, "The Impact on Crime in Communities." https://criminal-justice.iresearchnet.com/criminal-justice-process/commission-of-a-crime/the-impact-of-crime-on-communities/

[98] Criminal Justice, 2024, "The Impact on Crime in Communities." https://criminal-justice.iresearchnet.com/criminal-justice-process/commission-of-a-crime/the-impact-of-crime-on-communities/

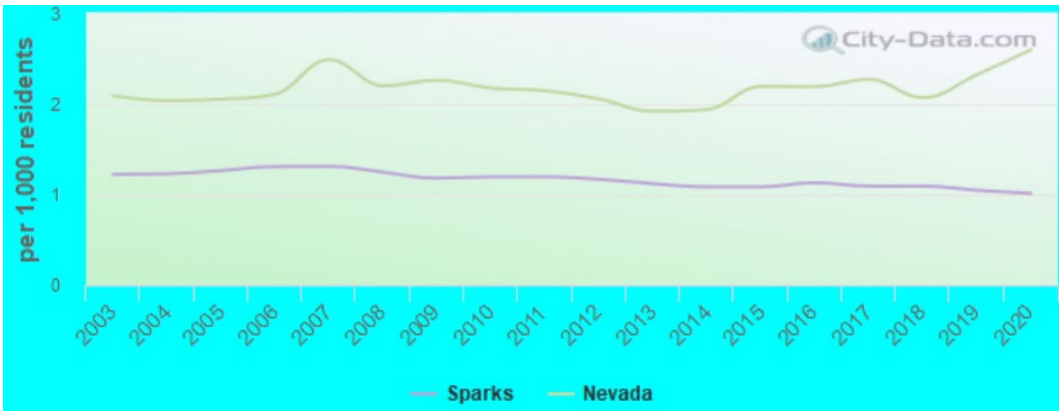


Figure 46: City of Sparks Police Department Full-Time Law Enforcement Employees/Police Officers per 1,000 Residents, 2003–2020[99]

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 65 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 65: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 66 provides the Calculated Priority Risk Index (CPRI) for criminal acts and terrorism impacts in the City of Sparks based on the current plan's hazard risk assessment results. The City of Sparks assigned criminal acts and terrorism a risk factor value of 2.3, reflecting quick onset and medium duration impacts. This risk factor value falls in the range of 2 to 2.4, which is

[99] City-Data.com, 2024, "City of Sparks Police Department Full Time Law Enforcement Employees-Police Officers Per 1,000 Residents, 2003–2021." Crime in Sparks, Nevada (NV): murders, rapes, robberies, assaults, burglaries, thefts, auto thefts, arson, law enforcement employees, police officers, crime map (city-data.com)

considered a medium-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 66: Calculated Priority Risk Index for Criminal Acts and Terrorism in the City of Sparks

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Criminal Acts and Terrorism	2	2	4	3	2	2.3	Medium

VULNERABLE POPULATIONS

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.

Figure 47 shows statistics compiled by the City of Sparks Police Department for the number of murders committed for 2023 and the victim's age.

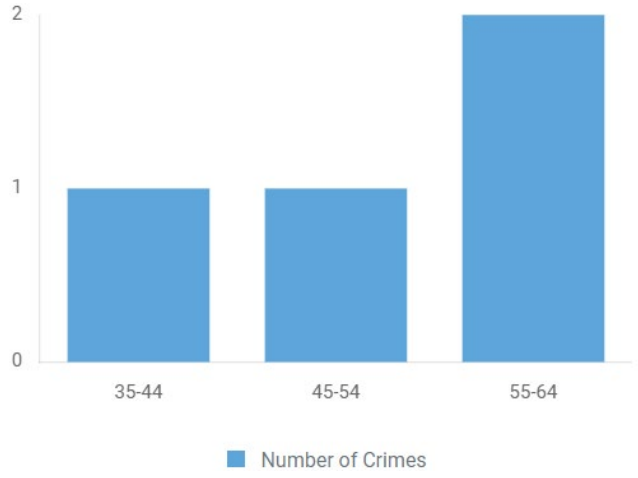


Figure 47: City of Sparks Number of Murders by Victim Age (Murder) 2023[100]

[100] Nevada Government, City of Sparks Police Department, 2023, "City of Sparks Number of Murders by Victim Age (Murder) 2023." Violent Crime 2023 (nv.gov)

Figure 48 shows statistics compiled by the City of Sparks Police Department for the number of murders committed for 2023 and the victim's gender.

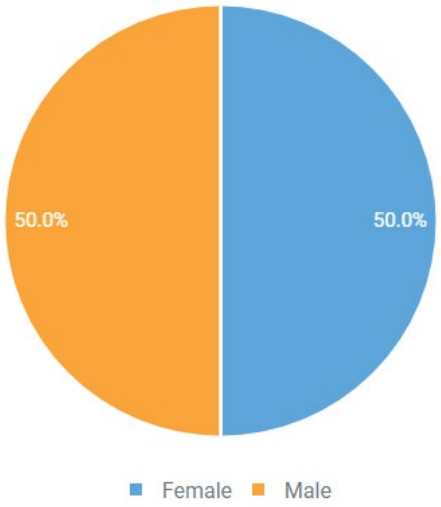


Figure 48: City of Sparks Number of Murders by Victim Gender, 2023 [101]

Figure 49 shows results compiled by the City of Sparks Police Department for the number of murders committed for 2023 and the victim's race.

[101] Nevada Government, City of Sparks Police Department, 2023, "City of Sparks Number of Murders by Victim Gender (Murder) 2023." Violent Crime 2023 (nv.gov)

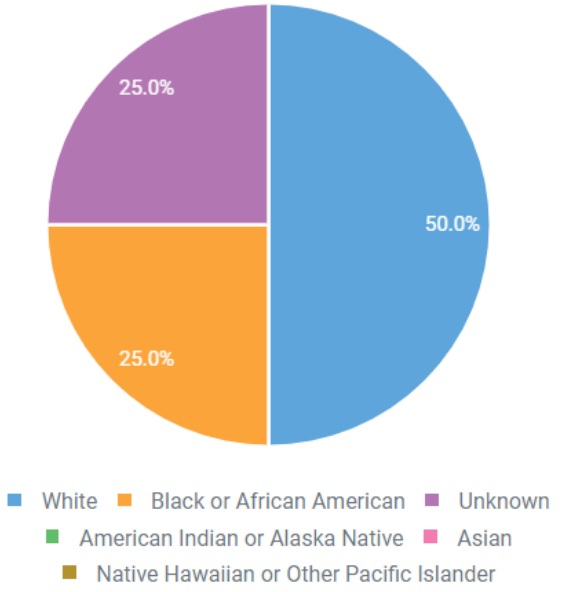


Figure 49: City of Sparks Number of Murders by Victim Race, 2023[102]

Drought

LOCATION

Drought affects broad regions and can include any portion of Washoe County, including the City of Sparks. Historically, the southern section of the County has had less frequent droughts than the central and northern sections because of extensive stored water in reservoirs in the Truckee River basin. However, low snowpack in the Truckee River basin can cause droughts of a greater magnitude in the southern section of the County, as was experienced between 2012 and 2017. With the implementation of the Truckee River Operating Agreement, the Truckee Meadows Water Authority (TMWA) can store credit water in the Boca Reservoir. The reservoir is currently operated for wintertime flood control based on the 1985 Water Control Manual of the U.S. Army Corps of Engineers, which requires the reservoir to have a minimum flood space and prohibits the capture of springtime runoff before April. Stakeholders in the Truckee River Basin recognize that the system can be better operated for both flood control and water supply.

EXTENT

The overall magnitude and potential severity of drought are considered relatively moderate in Washoe County. Drought impacts are wide-reaching and may be economic, environmental, and/or societal. The most significant impacts from droughts in Washoe County are those

[102] Nevada Government, City of Sparks Police Department, 2023, "City of Sparks Number of Murders by Victim Race (Murder) 2023." https://nevadacrimestats.nv.gov/tops/report/violent-crimes/reno-police-department/2023

related to water-intensive activities, such as agriculture; wildland fire protection; municipal, industrial, and commercial use; tourism; and recreation. Reduced electric power generation in the region and deteriorating water quality are also potential problems. Moreover, drought conditions can cause soil to compact and reduce its ability to absorb water, potentially making an area more susceptible to flooding. An ongoing drought can impact the health of existing vegetation, which may also leave an area more prone to beetle kill and create conditions that fuel wildland fires. Drought impacts increase with the length of a drought, as annual carry-over supplies in reservoirs are depleted and water levels in groundwater basins decline.

PREVIOUS OCCURRENCES/HISTORY

The City of Sparks has not reported any previous occurrences of drought.

PROBABILITY OF FUTURE EVENTS

The 2023 Enhanced SHMP states that precipitation in the State of Nevada has been historically difficult to predict, with different models providing varying results. However, the average of projections shown in the State of Nevada Climate Initiative suggests the potential for slightly more precipitation in northern Nevada. If precipitation does increase, it is not expected to offset the drying effects of higher temperatures. Changes in average temperature and/or precipitation will combine with the occurrence of periodic droughts related to precipitation shortfalls and/or periods of warmer than normal temperatures. Climate projections suggest that there is potential for greater year-to-year variability in precipitation. This may further complicate drought planning in the future.

VULNERABILITY ANALYSIS

The TMWA has sufficient water reserves to meet current and future regional water demands in drought years, up to and including a worst-case scenario equivalent to the 1987–1994 drought period, the worst drought period on record. The 2020–2040 Water Resource Plan looks different from TMWA's previous plans, with more emphasis on future conditions and analysis of TMWA's water resources and its ability to provide a reliable water supply under variable climate conditions and continued population growth. Estimating future demand is largely a function of projected population growth for Truckee Meadows. TMWA's 20-year water demand projection estimates that water demand will increase 15%, from approximately 83,000 acre-feet in 2020 to 96,000 acre-feet in 2040.

ESTIMATED IMPACT AND POTENTIAL LOSSES

Droughts are slow-onset hazards, but over time, they can severely affect crops, municipal water supplies, recreational resources, and wildlife. If drought conditions extend over a number of years, the direct and indirect economic impacts can be significant. High temperatures, high winds, and low humidity can worsen drought conditions and make areas more susceptible to wildfires. In addition, human actions and demands for water resources can accelerate drought-

related impacts. Drought impacts occur over large areas and cross jurisdictional boundaries. All existing and future buildings, facilities, and populations are considered to be exposed to this hazard and could be impacted. However, drought impacts are mostly experienced in water shortages and crop losses on agricultural lands and have no impact on buildings. NOAA's National Center for Environmental Information (NCEI) storm database reports no historic or recent crop or property losses from drought in Washoe County.

Common direct impacts of drought include diminished crop yields or total crop loss, the depletion of aquifers, livestock mortality, soil erosion, dust storms, wildfires, reduced electricity production from hydroelectric dams, and reduced water quality or availability. The economic impacts of drought can range from crop losses and increased costs incurred by farmers and ranchers who must buy additional water or feed for livestock to economic losses for tourism and hospitality businesses in the Lake Tahoe Basin if there is a low snowpack. The effects of drought can last from one to several years, and the effects of drought are likely to be compounded the longer drought conditions last.

VULNERABLE POPULATIONS

Drought can impact both surface water and groundwater availability and can have direct, disastrous effects on human populations. The indirect consequences of drought, such as unemployment, reduced tax revenues, increased food prices, reduced outdoor recreation opportunities, higher energy costs as water levels in reservoirs decrease and consumption increases, and water rationing, are not often fully known. This complex web of impacts can affect people and economies well beyond the area physically experiencing drought.

Every resident of the region using water for domestic purposes relies, to some degree, on groundwater supplies. TMWA wells typically supply 15%–20% of annual net water production. These wells provide water to meet summer peak demands. Between June and October during extremely dry years, when Truckee River water is not plentiful, the TMWA relies even more heavily on its wells to meet summer and fall peak demands. Besides its retail customers, the TMWA provides wholesale water to the Sun Valley General Improvement District, whose only source of water is the TMWA. Other water purveyors in the region rely exclusively on groundwater to meet customer demands. All domestic well owners are solely dependent on groundwater to meet their domestic water needs. The TMWA's surface water treatment and groundwater production facilities are operated as an integrated system that allows for conjunctive use, making it possible for TMWA to reliably meet demands under drought and non-drought conditions. Generally, TMWA diverts as much surface water as possible year-round and begins to bring on groundwater production wells later in the spring, when customer demands increase and when needed during drought situations. [103]

[103] Truckee Meadows Water Authority, 2020, https://tmwa.com/wp-content/uploads/2020/11/TMWA-WRP-2020-Final.pdf

DEVELOPMENT TRENDS

The Truckee River Operating Agreement (TROA) allows TMWA flexibility in storing and withdrawing water supplies, thereby increasing the agency's ability to respond to hydrologic drought conditions. Economic development across the region has increased the demand for water and the region's vulnerability to drought. However, the TMWA has sufficient water supplies and production facilities to meet demand through 2035. Truckee Meadows has been experiencing renewed population growth and increased development since recovering from the economic recession. Economic and population growth has been positive since the completion of TMWA's 2035 Water Resource Plan (WRP) in 2016. However, the annual growth rates have not been as fast as those experienced before the start of the Great Recession in 2007. TMWA estimates future population growth and water demand annually to ensure that water resources are sufficient to meet increasing demand.[104]

While humans cannot control the natural drought cycle, the water authority has taken measures to minimize the impact of drought, thereby decreasing Sparks' vulnerability.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 67 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 67: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 68 provides the Calculated Priority Risk Index (CPRI) for drought impacts in the City of Sparks based on the current plan's hazard risk assessment results. The City of Sparks assigned drought a risk factor value of 2.5, reflecting quick onset and long duration impacts. This risk factor value falls in the range of 2.5 to 4.0, which is considered a high-risk hazard. These values

[104] Truckee Meadows Water Authority, 2020, https://tmwa.com/wp-content/uploads/2020/11/TMWA-WRP-2020-Final.pdf

were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 68: Calculated Priority Risk Index for Drought in the City of Sparks

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Drought	3	2	4	4	1	2.5	High

RECENT MITIGATION CASE STUDY

Groundwater is used for drinking water by more than 50% of people in the United States. In Truckee Meadows, groundwater is vital to the community's water supply. Much of the local water demand is met using surface water from the Truckee River. However, during times of low river flows (such as under drought conditions) or when Truckee River water is heavy with sediment or otherwise unavailable, the community may be entirely dependent on groundwater. In Truckee Meadows, up to 30% of drinking water is currently derived from groundwater in a given year. Groundwater wells must be protected or abandoned in accordance with state regulations to keep them from becoming conduits for groundwater contamination. The Washoe County Health District (WCHD) also regulates activities to protect the environment from contamination.[105]

Earthquake

LOCATION

Any area of Washoe County, including the City of Sparks, is vulnerable to the noticeable effects of earthquakes. The most hazardous fault zones in the County are the Mount Rose fault zone, the West Tahoe fault, and Pyramid Lake fault. While these fault zones do not underlie Sparks, smaller faults occur within city boundaries, and the City may experience noticeable shaking and damage from an earthquake along any of the region's faults.

During an earthquake, the City may experience severe seismic ground motion hazards. Most of the City, including areas north of E. Prater Way and east of Vista Boulevard, 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. Areas of the City generally south of Prater Way and E. Prater Way and west of Vista Boulevard could experience more severe shaking. These areas may experience peak ground acceleration with a 2% probability of exceedance in 50 years of greater than 64%

[105] WashoeCounty.gov, 2024, Groundwater & Our Local Water Supply (washoecounty.gov)

gravity, which would be experienced as violent shaking with the potential to cause heavy damage.

EXTENT

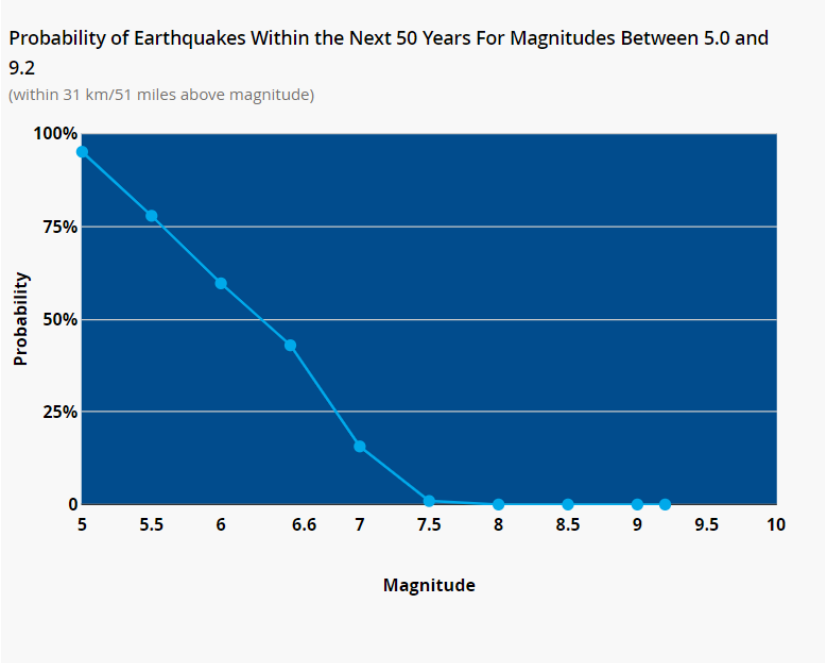
A major earthquake can cause widespread and significant damage to structures in the City of Sparks, as well as injuries and deaths. Because of their potential to damage structures, roads, and utilities, earthquakes may disrupt government operations and the local economy for a period of days to weeks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

PREVIOUS OCCURRENCES/HISTORY

Information on previous major earthquakes with magnitudes greater than 5 on the Modified Mercalli Intensity (MMI) Scale in Washoe County is included in the Base Plan. Shaking from these earthquakes would have been felt in the City of Sparks and may have caused structural damage.

PROBABILITY OF FUTURE EVENTS

A total of 17 earthquakes with a magnitude greater than 5 on the MMI Scale have occurred in Washoe County in the last 150 years. The probability of future occurrence can be estimated at 10%; this means that there is roughly a 10% chance of an earthquake with a 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. With additional development occurring in the City of Sparks, there is an increased probability that future earthquakes will cause damage to structures, roads, and utilities in the City (Figure 50).



MAGNITUDE	PROBABILITY
5.0	95.10%
5.1	92.53%
5.2	92.53%
5.2	89.39%
5.3	85.80%
5.4	81.90%
5.5	77.85%
5.6	73.81%
5.7	69.88%
5.8	66.18%
5.9	62.75%
6.0	59.63%

Figure 50: Probability of 5.0–9.2 Magnitude Earthquakes in Sparks, NV, in the Next 50 Years[106]

VULNERABILITY ANALYSIS

Earthquakes can cause significant, widespread structural damage throughout the region. Critical facilities in Sparks are 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. 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.

ESTIMATED IMPACT AND POTENTIAL LOSSES

The overall magnitude and potential severity of earthquakes is considered Very High in the City of Sparks. Events are handled at the county level. They disrupt services for one to three days, and their economic impacts affect a city or community. In a worst-case scenario, earthquakes can require federal support, impact critical facilities, disrupt services for more than 20 days, and have national economic impacts.

[106] Homefacts, 2024, Earthquake Information for Sparks, Nevada, Sparks, NV Earthquakes | Homefacts

Several critical facilities would be exposed to higher seismic ground motion hazards, including the following:

- **Sparks Police Department** – In an area with potential peak ground acceleration of greater than 64% gravity, with a 2% chance of being exceeded in 50 years. This level of peak ground acceleration would be experienced as violent shaking, with the potential to cause heavy damage.
- **Sparks Fire Department Station 3 and the University of Nevada Farm** – In areas with potential peak ground acceleration of greater than 64% gravity (with a 2% chance of being exceeded in 50 years) or 48% to 64% gravity (with a 10% chance of being exceeded in 50 years). At the high end, peak ground acceleration would be experienced as violent shaking, with the potential to cause heavy damage. At the low end, peak ground acceleration would be experienced as severe shaking, with the potential to cause moderate to heavy damage.
- **Sierra Regional Center (Hospital), Lincoln Park Elementary School, and Sparks Fire Department Station 1** – In an area with potential peak ground acceleration of 48% to 64% gravity (with a 10% chance of being exceeded in 50 years). This level of peak ground acceleration would be experienced as severe shaking, with the potential to cause moderate to heavy damage.

VULNERABLE POPULATIONS

In Sparks, several populations may be considered vulnerable to earthquakes due to various factors. One of the most at-risk groups includes low-income residents who may live in older buildings that are not seismically retrofitted. These structures may not adhere to modern building codes that require earthquake-resistant designs, making them particularly hazardous in the event of a seismic event.

Another vulnerable population includes the elderly, many of whom may have limited mobility and require assistance to evacuate their homes quickly. In the chaos following an earthquake, they may face additional challenges in accessing medical care or evacuation routes. Additionally, individuals with disabilities may also find themselves at increased risk during an earthquake if they rely on accessible infrastructure that may be compromised or if they require assistance from caregivers.

Children in schools can also be particularly vulnerable during an earthquake. Many Sparks schools may not have adequate emergency plans or drills in place to ensure the safety of students and staff. In the event of a seismic activity, the risk of injury in school buildings that may not be properly equipped to withstand earthquakes could be significant.

Finally, the transient population, including tourists or seasonal workers, may lack awareness of local seismic risks and preparedness measures. This lack of preparation can exacerbate vulnerabilities in the event of an earthquake, as they may not understand evacuation routes or emergency procedures specific to the area.

DEVELOPMENT TRENDS

Newer construction in Sparks and new retrofits are better able to withstand seismic forces, decreasing the vulnerability to earthquakes.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 69 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 69: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 70 provides the Calculated Priority Risk Index (CPRI) for earthquake impacts in the City of Sparks based on the current plan's hazard risk assessment results. The City of Sparks assigned earthquake a risk factor value of 2.8, reflecting high probability, quick onset, and long duration impacts. This risk factor value falls in the range of 2.5 to 4.0, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 70: Calculated Priority Risk Index for Earthquake in the City of Sparks

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Earthquake	4	2	4	4	1	2.8	High

Energy Emergency

LOCATION

Any area of the City may be impacted by an energy emergency or power outage. Sparks is an urban area, and sufficient redundancy in electrical infrastructure exists in most areas of the city to prevent widespread power outages as a result of localized damage to the power system. Rural and populated areas alike are known to experience power outages during winter and windstorms that can last several hours to several weeks. The overall effects of a widespread energy emergency would be concentrated in population centers, but the condition is likely to be present throughout the planning area. The electric utility provider for the planning area is NV Energy (formerly Sierra Pacific Power Company). NV Energy owns and operates no facilities that are rated "Critical" according to the Department of Homeland Security criteria for National Critical Facilities.

EXTENT

It is difficult to predict the impacts of future energy emergencies, but they can impact all government and business operations and cause extensive economic losses, among other impacts. Due to the sporadic nature of power outages and other energy emergencies, 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 lasting only a matter of hours. Every several years, more significant power outages are experienced.

The overall magnitude and potential severity of impacts of energy emergencies is considered Low in Washoe County. Typical energy emergency events are handled at the regional level, and economic impacts could affect the entire County. Considering a worst-case scenario, an energy emergency could require federal support, impact critical facilities, disrupt services for several days, and have national economic impacts.

PREVIOUS OCCURRENCES/HISTORY

Historically, utility disruptions have been caused by both natural and human-caused events. These events include earthquakes, wildland fires, floods, and human activities. Most energy emergencies can be traced back to weather events. Outages can affect fewer than 20 customers in rural areas or more than 50,000 in the cities of Reno and Sparks.

Between 2009 and 2015, there were nine large weather outages in the County, resulting in power loss ranging from 8 to 31 days. The 2013 State of Nevada Enhanced HMP lists an additional six significant outages between 2009 and 2014. NV Energy provided updated data on outages across its system for the 2020 HMP update (Table 71).

Table 71: Power Outages, 2014–2018

Year	Number of Outages	Average Duration of Outages (minutes)
2014	934	201
2015	1,323	412
2016	962	219
2017	1,134	223
2018	1,042	192
Grand Total	5,395	259

The 2018 Nevada State Enhanced HMP references a major power outage in Washoe County due to a weather-related event. From November 9 to 10, 2015, a severe winter storm resulted in many broken tree branches because of heavy, wet snow. Over 35,000 customers were without power in Washoe County due to downed power lines.

In July 2019, a power outage affected more than 7,000 customers in Sparks until electrical service was restored to all customers approximately 11 hours later. Longer-duration power outages have led to temporary increases in welfare checks, more need for medical care, and negative impacts on local economic interests.

Interruptions in energy services may also be planned, for example, to allow for system repairs or maintenance. In 2019, NV Energy and Pacific Gas and Electric Company (PG&E) in California 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, these electric providers 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 can affect fuel availability for Washoe County. Outages affecting PG&E's system would cut power to the equipment that controls the operation of the fuel pipeline serving the region.

In January 2019, another winter storm caused 4,000 homes in Washoe County to lose power, requiring 10 specialized NV Energy trouble crews and 50 power line technicians working for over 12 hours to address the issue.



Figure 51: Utility Pole with Power Lines and Transformers[107]

- **On April 11, 2022,** more than 4,400 customers were without power across Northern Nevada. NV Energy reported that the biggest outages were in Washoe and Humboldt Counties and Carson City. The biggest outage in Washoe County was in Sparks and affected more than 700 customers. More than 1,200 customers in Carson City were affected.
- **On August 21, 2023,** more than 6,000 customers in Sparks in the area of Wedekind Regional Park were without power according to the NV Energy Website.
- **On January 21, 2024,** NV Energy reported that over 2,100 NV Energy customers were without power in parts of Northern Nevada. Around 6 a.m., 6,000 NV Energy customers did not have power in the region, but that number dwindled to about 1,100 people by 7:30 p.m., according to NV Energy's website. NV Energy's outage map showed that most of the outages were concentrated in and around Reno and Carson City, with the largest single outage in Reno impacting 845 people.
- **On March 3, 2024,** NV Energy reported many outages across Norther Nevada. More than 2,700 customers across Northern Nevada were without power. In a release, NV Energy stated the outages were related to severe wind and significant snow. NV Energy stated that poor visibility and road conditions increased restoration times.[108]

PROBABILITY OF FUTURE EVENTS

Due to the sporadic history of occurrences, the broad range of potential causes, the unpredictability of these causes, and the improvements in energy supply systems after previous

[107] Reno Gazette Journal, 2015, Jupiter Images, www.jupiterimages.com.

[108] 2News Nevada, 2024, NV Energy Reports Numerous Outages Across Northern Nevada, Sierra | News | 2news.com

failures, the probability of occurrence is difficult to measure for this hazard. The overall probability of future energy emergency events is considered Medium. According to the Nevada Office of Energy, multiple alternative energy sources are in place, which may reduce the extent of a possible energy emergency by providing alternatives in the event of a failure.

The probability of energy emergencies may increase due to climate change. Changes in climate and environment contribute to increased risk of wildfires and other natural disasters. NV Energy has made a number of mitigation measures to protect customers, the community, and equipment from the risk of extreme weather, including public safety outages and other measures.

NV Energy implemented the Public Safety Outage Management (PSOM) program to plan power outages to more areas in Northern Nevada with elevated fire risk, recognizing safety as a priority. Figure 52 shows the PSOM zone for Northern Nevada. The goal of the program is to protect customers and the community from the risk of wildfires in extreme and elevated fire-risk areas of Nevada by shutting off power in one or more of its extreme or elevated fire-risk zones when certain environmental conditions are met, and an evaluation of risk is done with guidance from local emergency management teams and other stakeholders. This helps prevent power lines, things that are blown into power lines, and other equipment from causing a wildfire. Residents in Carson City, Washoe, would be affected by the scheduled power outages. NV Energy monitors weather patterns seven to 10 days ahead for any concerning weather patterns. By the 72-hour mark, NV Energy will begin to communicate with local emergency management officials and discuss where they see risks.

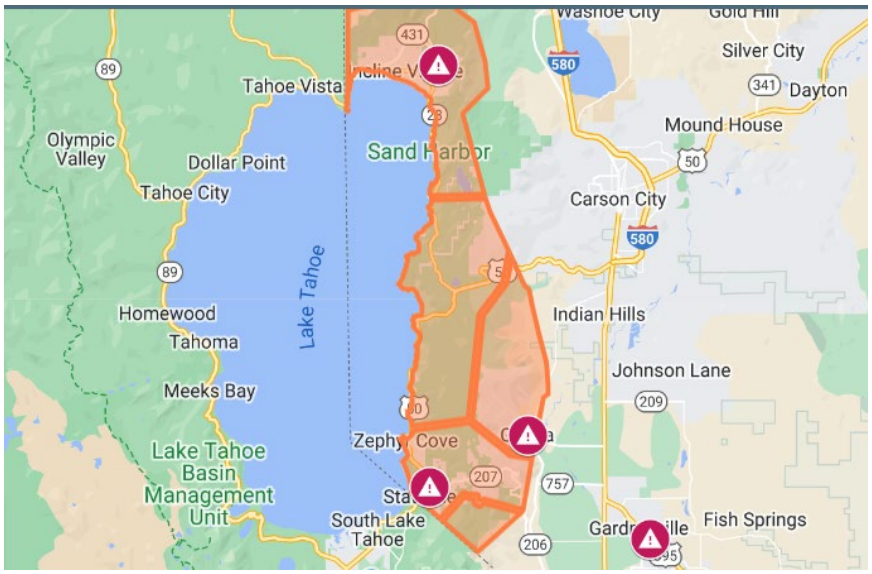


Figure 52: The Public Safety Outage Management Zone for All Northern Nevada

VULNERABILITY ANALYSIS

Prolonged power outages can cause health emergencies and increased demand for emergency medical services, especially in Nevada, where vulnerable people may be exposed to extreme summer or winter weather conditions. Power outages can also cause disrupted utilities or damaged infrastructure, such as frozen pipes, and economic impacts due to the loss of perishable food and other items. Depending on the cause, a power outage or other energy emergency can cause cascading impacts—most significantly, wildland fires—if a downed line or other physical damage caused an outage.

ESTIMATED IMPACT AND POTENTIAL LOSSES

The increased energy demands caused by climate change may increase the potential for energy emergencies. Higher temperatures and extreme heat events are more frequent and increase the power demand, causing widespread power outages and weather-related damage to equipment.

An energy emergency in Sparks could significantly impact the local economy. Businesses relying on electricity may face increased costs and productivity disruptions, potentially leading to layoffs and reduced income for workers. This could hurt overall economic activity and risk the closure of smaller businesses.

Public services would also suffer during an energy emergency, with essential functions like water supply and emergency response potentially disrupted. This would compromise public safety and health, placing additional strain on local government resources.

Residents might see higher utility bills due to fluctuating energy prices, and power outages could disrupt daily life, affecting heating, cooling, and access to electronic devices—especially important during extreme weather.

Infrastructure challenges could arise as well, with traffic lights and public transportation affected, leading to congestion and safety risks on the roads. The overall quality of life could decline for residents as community functioning is hindered.

Lastly, there may be negative environmental consequences if there's a rush to less sustainable energy sources to meet immediate needs, resulting in increased pollution and harm to the local ecosystem. Overall, an energy emergency in Sparks could have wide-ranging effects on the economy, public health, infrastructure, and the environment.

VULNERABLE POPULATIONS

Besides the human toll, utility failures, such as power outages, can disrupt daily routines and activities. They can cause transportation delays, canceled trips, and difficulties commuting to work, school, or other important engagements. They can also disrupt access to essential services, such as clean water, electricity, healthcare facilities, and communication networks,

compromising people's health, safety, and quality of life. Populations with disabilities or limited mobility face heightened vulnerability. Inaccessible infrastructure due to power failures, such as access to ramps, elevators, or accommodations for visual or hearing impairments, can hinder their ability to evacuate, access emergency services, or receive timely information during incidents.

The NV Energy website states that sometimes outages do occur because of events beyond their control, such as extreme weather conditions and vehicle accidents involving utility poles and equipment. Customers who rely on electricity to power their electrically operated medical equipment must plan to have a backup power supply or make alternate plans for using those devices and refrigerating medications. Also, periods of high heat, high winds, and winter snowfall conditions can cause power outages, and extended outages could impact the community, for example, closing stores, transportation, banks, and gas stations.

DEVELOPMENT TRENDS

Nevada Governor's Office of Energy Status of Energy 2023 Report states Nevada's economy relies on the production of safe and affordable energy, providing essential services to Nevadans and attracting new businesses, industries, and jobs to the state. The 2023 comprehensive and balanced energy policy for Nevada provides a wide range of fuels, technologies, and supporting infrastructure to the state. The policy will help Nevada make significant progress toward meeting its energy needs by bringing a diverse energy portfolio to the state.

Future development will create increased demand for utility services. Utility providers generally plan for and complete capital improvements to meet future demands. Factors such as budget constraints or the need to construct new utility plants, like wastewater treatment plants or power generation facilities, may affect the ability of utility providers to serve a significant number of new customers.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 72 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 72: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 73 provides the Calculated Priority Risk Index (CPRI) for energy emergency impacts in the City of Sparks based on the current plan's hazard risk assessment results. The City of Sparks assigned energy emergency a risk factor value of 2.7, reflecting medium probability, medium magnitude, and medium duration impacts. This risk factor value falls in the range of 2.5 to 4.0, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 73: Calculated Priority Risk Index for Energy Emergency in the City of Sparks

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Energy Emergency	3	3	2	3	2	2.7	High

RECENT MITIGATION CASE STUDY

NV Energy has been working to expand its energy generation facilities to incorporate more renewable energy facilities and replace aging equipment on a regular basis. Nevada leads the nation in solar power potential and has already made significant strides in growing its solar energy capacity. Since 2016, the state's solar energy generation has nearly tripled. As of 2022, solar energy generation accounts for 23% of the state's total electricity. Currently, 37% of Nevada's electricity comes from renewable sources, helping meet the growing demands of the state, and ensuring that homes and businesses can rely on a robust and secure energy supply, decreasing vulnerability. The County's upward trend in development increases the overall demand on utilities, increasing vulnerability.

Flood

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 and southern Sparks. The Truckee River headwaters comprise the Lake Tahoe Basin. The river drains part of the high Sierra Nevada and empties into Pyramid Lake, the sole outlet of Lake Tahoe.

Historically, areas of the city prone to riverine flooding include the following:

- About 75% of Sparks's industrial area south of the railroad tracks;
- Recreational and residential areas north of the river, south of Prater Way, and east of McCarran Boulevard;
- Areas between Greg and Mill Streets west of McCarran Boulevard; and
- Bridges over the Truckee River and tributaries, which are closed during major floods (with observed stage readings over 20.5 feet at the Vista gauge).

The 100-year and 500-year floodplains in the planning area are shown in the Flood Section of the Base Plan.

Flash flooding is usually associated with development, urbanization, and inadequate storm drainage systems. Most of Washoe County's population and urbanization sits in the County's southern portion, Reno, and Sparks, along the I-80 and U.S. Highway 395 corridors. The results of the concentrated development were heavily felt during the 2005 flooding events.

Please refer to the base plan, specifically pages 250 and 258, for flood maps.

EXTENT

Severe flooding may cause serious injuries and deaths and damage public facilities and private property. The extent of flooding can be determined by comparing the height of river flows to flood stages determined by U.S. Geological Survey stream gages located in the area. It can also be measured by past flooding damage. Sparks may experience limited localized flooding on an annual basis.

100-year and 500-year floods have a 1 in 100 chance or 1 in 500 chance (i.e., 0.1% or 0.2% chance) of being exceeded within a year. Major flooding at this scale generally occurs in Washoe County because of two types of storm events: (1) heavy, prolonged rainfall on top of a deep snowpack in the Sierra Nevada, and (2) heavy, prolonged rainfall that spills over into the normally rain-shadowed Sparks area. A hybrid of both scenarios can lead to these levels of flooding. Floods of this magnitude occur in river systems whose tributaries may drain large geographic areas and include one or more independent river basins. Truckee River flooding has been of primary concern to the Sparks metropolitan area. Intense storms can overwhelm local waterways and the integrity of flooding control structures.[109]

PREVIOUS OCCURRENCES/HISTORY

In January 2017, northern Nevada experienced significant flooding from a storm that dropped between 3 and 6.5 inches of rain in the region and snow in the mountains. The combination of

[109] Truckee Meadow Water Authority Water Resource Plan, 2020-2040 Water Resource Plan – Truckee Meadows Water Authority (tmwa.com)

heavy rain and mountain snow led to flood conditions in the valleys of the Reno-Sparks area. Other recent major floods in the region that affected Sparks include the following:

- December 24, 2005, to January 3, 2006
- December 16, 1996, to January 6, 1997
- February 11 to February 20, 1986.

The following are the most recent flood incidents that occurred in the City of Sparks as reported by the Storm Events Database: three flooding episodes (flash flood, flooding, and lakeshore flooding) in Sparks between 2019 and 2024 causing no recorded property damage or crop damage, and no injuries.

- **June 3, 2021:** Heavy rainfall and thunderstorms produced excessive runoff, causing flooding of small creeks and streams; urban areas; highways, streets (Figure 53), and underpasses; and other drainage areas and low-lying spots.[110]
- **June 30, 2021:** Near-record high temperatures and increasing moisture led to the development of scattered, slow-moving thunderstorms with heavy rainfall. Training thunderstorms produced heavy rainfall over Spanish Springs, particularly near Pyramid and La Posada. Standing water on many roads and fields made access impossible. Washoe Alert gauge station, not in the core of the storm, reported 1.69 inches in 3 hours.
- **December 23, 2021**: The Nevada Department of Transportation (NDOT) closed I-80 and Rock Blvd underpass (Figure 54)due to minor flooding caused by a series of eastern Pacific winter storm pulses, occasionally aided by induction of warmer subtropical moisture, caused various hazardous winter conditions that disrupted holiday travel and commerce over the Sierra and Wester Nevada.

[110] MyNews4.com, Ramsey Pfeffinger, 2021, https://mynews4.com/news/local/heavy-rain-brings-flood-advisory-to-reno-surrounding-areas



Figure 53: Roads on Tyler Way in Sparks begin to flood on June 3, 2021[111]

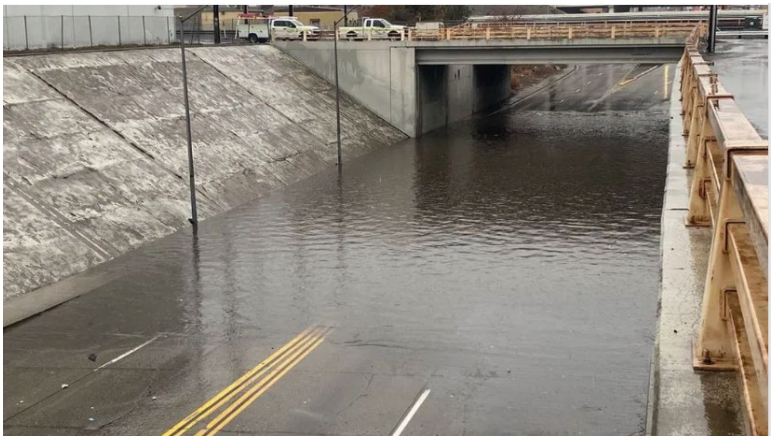


Figure 54: Rock Blvd under water after heavy rainfall in Washoe County[112]

PROBABILITY OF FUTURE EVENTS

Based on the potential increase in high-intensity precipitation events and increased urban development in the Spanish Valley, Sparks may be impacted by an increase in the probability of future floods and flash flooding. RiskFactor.com integrates all major flood types (from tides, coastal surges, rains, and rivers) and uses historical flooding events to calculate risk, in addition to considering future environmental changes. The line graph in Figure 55 compares the flood risk levels of Nevada, Sparks, Incline Villages, and the United States. RiskFactor.com reports

[111] MyNews4.com, 2021, "Roads on Tyler Way in Sparks begin to flood on June 3, 2021," https://mynews4.com/news/local/heavy-rain-brings-flood-advisory-to-reno-surrounding-areas
[112] MyNews4.com, 2021, "Rock Blvd under water after heavy rainfall in Washoe County," Flooding on Rock Blvd. in Sparks prompts road closure (mynews4.com)

6,982 properties, or 18.7% of all properties in Sparks, at risk of flooding over the next 30 years.[113]

VULNERABILITY ANALYSIS

Riverine or flash flooding in the city often results in the washout or flooding of roadways and infrastructure in waterways, such as bridges or culverts. The City of Sparks has concentrated industrial, commercial, and recreational land uses in mapped floodplains along the Truckee River, and most of the city's critical facilities are located outside these floodplains. Flash flooding can affect smaller creeks and streams and areas near burn scars, and critical facilities outside mapped floodplains may be affected.

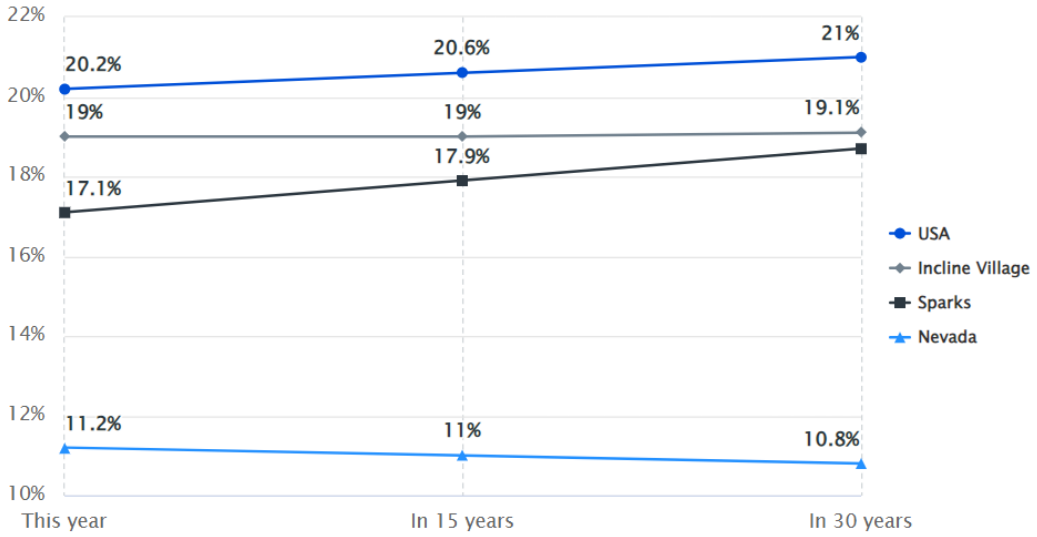


Figure 55: Percentage of Properties in Sparks, NV, at Risk of Flooding

ESTIMATED IMPACT AND POTENTIAL LOSSES

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. Major floods can disrupt, and have in the past disrupted, business activities, transportation, and recreation in the southern part of the city for a period of days or weeks. Four critical facilities, including three dams and one fire station, are located in the 100-year floodplain. One school, the University of Nevada Farm facility, is located in a 500-year floodplain. In addition, RiskFactor.com reports that 620 properties in Sparks are in the Special Flood Hazard Area (Zone A or V).[114]

[113] RiskFactor.com, 2024, Sparks Flooding Risk, Sparks, NV Flood Map and Climate Risk Report | Risk Factor

VULNERABLE POPULATIONS

The City of Sparks is protected by 10 flood risk reduction projects which protect 192 properties in the county. These include four adaptation mitigation measures: (1) 161 properties protected by the I-80 in Sparks adjacent to Sparks Marina adaptation; (2) 31 properties protected by the Washoe County Levee 2 adaptation measure; (3) 4 properties protected by the Washoe County Levee 3 adaptation measure; (4) 2 properties protected by the Reno-Sparks Indian Colony Levee and Flood Wall adaptation measure.[115]

The CDC reports vulnerable populations, such as the elderly, people with disabilities, and children, can be adversely exposed to floodwater and standing water after a flooding incident, exposing individuals to infectious disease, chemical hazards, and injuries. Respiratory illnesses can develop from the growth of some bacteria, viruses, mold, and mildew from flood waters in buildings. Also, floodwaters pose risks to drivers, as cars can be swept away or break down in the flood waters. People can drown in swift moving or rising floodwaters.[116]

DEVELOPMENT TRENDS

The industrial area has been built for years, so the risk is static, but the realignment of the North Truckee Drain has reduced the impact of flooding, decreasing vulnerability.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 74 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 74: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

[115] RiskFactor.com, 2024, Sparks Flooding Risk, Sparks, NV Flood Map and Climate Risk Report | Risk Factor

[116] CDC, 2024, Natural Disasters, What to Do to Prevent Getting Hurt or Sick After a Disaster | Natural Disasters | CDC

Table 75 provides the Calculated Priority Risk Index (CPRI) for flood impacts in the City of Sparks based on the current plan's hazard risk assessment results. The City of Sparks assigned flood a risk factor value of 3.2, reflecting high probability, quick onset, and long duration impacts. This risk factor value falls in the range of 2.5 to 4, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 75: Calculated Priority Risk Index for Flood in the City of Sparks

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Flood	4	2	4	4	3	3.2	High

Hazardous Materials Incident

LOCATION

The potential for contact with hazardous materials is present throughout all areas of Washoe County because of four main factors:

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

The following description defines the diversity of hazardous products that move through the Cities of Reno and Sparks and Washoe County.[117]

1. Transportation Routes – Highways, railways, and commercial and military aviation routes constitute a major threat because of the multitude of chemicals and hazardous substances transported along them. Interstate 80, Highway 395, and other main thoroughfares are areas of concern, as are the Union Pacific railroad tracks.
2. Pipeline – Several pipelines transect the Cities of Reno and Sparks and Washoe County, carrying a wide variety of products for industrial, commercial, and residential use. The Kinder Morgan Pipeline Company, possibly the largest of the pipelines, services Washoe County and the Fallon Naval Air Station with petroleum products. The Paiute Pipeline and

[117] Washoe County LEPC Hazardous Materials Emergency Plan, 2020, Hazardous Materials Emergency Plan (washoecounty.gov)

Tuscarora Pipeline supply high- pressure natural gas for service to the communities and businesses.

3. Business and Industry – The manufacturing and light industrial firms in the Cities of Reno and Sparks and Washoe County offer the potential for hazardous materials incidents. These facilities use and/or store products that may be harmful to the population living and working in the area and to the sensitive ecosystems of the region.
4. Agriculture – Accidental releases of pesticides, fertilizers, and other agricultural chemicals may be harmful to human health and the environment. Most of the agricultural industry consists of ranching and farming operations located in the Cities of Reno and Sparks and Washoe County.
5. Illegitimate Business – Illegitimate businesses, such as clandestine drug laboratories, are a significant threat to human health, property, and the environment. In many instances, the residue is dumped in remote areas of the county or along the side of the road, posing a serious health threat to the unsuspecting person who stumbles across it.
6. Hazardous Waste – Hazardous waste (e.g., used motor oil, solvents, or paint) is occasionally dumped in remote areas of the county or along roadways. Like drug lab residue, illegally dumped hazardous waste poses a threat to human health, property, and the environment.
7. Radioactive Materials – Interstate 80, Highway 395, other main thoroughfares, and railroads are authorized routes for the shipment of radioactive materials.
8. Acts of Terrorism – Terrorist acts are becoming more common today and much more sophisticated. Events in recent years have prompted a move toward terrorist preparedness.

EXTENT

The overall magnitude and potential severity of hazardous materials incidents are considered Low in Washoe County but vary based on the type of facility. The vulnerability to hazardous materials disasters at fixed facilities includes the potential for either an explosive release or insidious leaking of materials into the ground or groundwater. The impact of an accident or spill during roadway or rail transport depends largely on the spill location relative to population centers and waterways.

PREVIOUS OCCURRENCES/HISTORY

The City of Sparks reported no previous occurrences of hazardous materials incidents.

PROBABILITY OF FUTURE EVENTS

The probability of future hazardous materials events varies based on the type of accident considered High. Based on the frequency of past incidents, particularly during transportation of hazardous materials, the overall probability of hazardous materials incidents is considered Medium. As the transport, handling, and production of hazardous materials increase, the expected frequency of accidents involving uncontained releases increases correspondingly.

It is important to note, however, that an increase in hazardous materials regulation is likely to decrease the potential for hazardous materials releases. The probability of a hazardous materials release on a roadway, rail line, or fixed facility is marginally higher than that of pipeline accidents, due to increased potential for human error or mechanical failure.

VULNERABILITY ANALYSIS

Hazardous materials incidents can be caused by a number of factors, including technological failures, natural hazards, such as earthquakes or floods, and 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 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 the I-80 and/or I-580 highway. Many of the critical facilities and valuable assets are near I-80 and I-580, particularly in the Reno/Sparks corridor. Hazardous materials may be transported through the Reno-Tahoe International Airport. In addition, power plants, water and wastewater treatment plants, hospitals, fire stations, and other critical facilities in Washoe County may store hazardous materials on site.

ESTIMATED IMPACT AND POTENTIAL LOSSES

- **Economic:** Increased transportation of hazardous materials in the corridor increases the probability of a release or spill of bulk hazardous materials causing fire, explosion, toxic cloud, or direct contamination of people or property. Damage to property could range from immediate destruction by explosion to permanent contamination by a persistent hazardous material (Increased Vulnerability).
- **Land Use:** Kinder Morgan operates an underground pipeline that transports approximately 13 million barrels of petroleum products (gasoline, diesel, and jet fuel) from the pump station in Rocklin, California, to the Sparks, Nevada, terminal. Jet fuel is then pumped from the Sparks terminal to the Fallon Naval Air Station. Kinder Morgan also shares a storage facility in Sparks[118] (Increased Vulnerability).
- **Future Land Use**: Excavation is the most likely cause of damage to the pipeline. The potential for rupture because of nearby excavation is greatest in areas where the pipeline corridor intersects highways and railroad right of ways and areas of new construction. As

[118] Washoe County Emergency Management and Homeland Security Program, 2020, "Regional Washoe County Hazardous Materials Emergency Response Plan" HAZMAT-Annex-D-12-17-2020.pdf (washoecounty.gov)

the area in the pipeline corridor continues to grow and expand, the potential for damage will also continue to grow[119] (Increased Vulnerability).

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 76 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 76: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 77 provides the Calculated Priority Risk Index (CPRI) for hazardous materials impacts in the City of Sparks based on the current plan's hazard risk assessment results. The City of Sparks assigned hazardous materials impacts a risk factor value of 2.1, reflecting quick onset and medium duration impacts. This risk factor value falls in the range of 2 to 2.5, which is considered a medium-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 77: Calculated Priority Risk Index for Hazardous Materials Incidents in the City of Sparks

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Hazardous Materials Incidents	2	2	4	3	1	2.1	Medium

[119] Washoe County Emergency Management and Homeland Security Program, 2020, "Regional Washoe County Hazardous Materials Emergency Response Plan" HAZMAT-Annex-D-12-17-2020.pdf (washoecounty.gov)

VULNERABLE POPULATIONS

Any release from the pipeline may have severe consequences for the population and the environment. The proximity of the pipeline to the Truckee River and its inlets and outlets signifies a potential threat to the water system. All the communities located along the Truckee River draw their water supply from the river or from wells that are directly affected by any product released from the pipeline. Environmental damage, including the potential for wildland fires, is an additional consideration.

RECENT MITIGATION CASE STUDY

KINDER MORGAN PIPELINE MITIGATION ACTIONS

There are several locations along the pipeline where leak detection can occur; the threshold of detection is about one-tenth of one percent over a period of about 15 minutes. In a catastrophic break, the pipeline can be shut down in about 30 seconds using automatic shutoff valves. Isolation of manual valves is dependent on weather conditions and could require 30 minutes to an hour to close. If this break is caused by a single isolated event, such as a landslide or rockslide, the damage can be detected, contained, and repaired relatively quickly, assuming fair weather conditions and transportation routes are clear.

Infectious Disease

LOCATION

Infectious diseases spread by humans, and vector-borne infectious diseases can occur in both urban and non-urban areas in the County. Areas in the county that are more susceptible to infectious diseases are typically those with higher population density, such as Reno and Sparks, and areas with poor sanitation and limited access to healthcare services. On the other hand, areas more susceptible to vector-borne diseases are often those with standing water or extensive vegetation, providing suitable habitats for disease-carrying vectors, such as mosquitoes and ticks. These are more prevalent in non-urban areas.

EXTENT

The overall magnitude and potential severity of infectious disease outbreak impacts are considered Medium in Washoe County. Typical disease outbreaks are handled at the city or county level. Severe outbreaks may disrupt services for weeks, and economic impacts may be felt at the county level.

The Northern Nevada Public Health 2022 Annual Communicable Disease Summary reports that communicable diseases are a continuing threat to everyone, regardless of age, gender, lifestyle, ethnic background, or socioeconomic status. They cause illness, suffering, and death and place an enormous financial burden on society. Currently, over 90 diseases or conditions are

reportable in Nevada. In 2022, over 60,000 cases were reported to Norther Nevada Public Health. The numbers dramatically increased between 2020 and 2022 because of COVID-19 (see Figure 56).

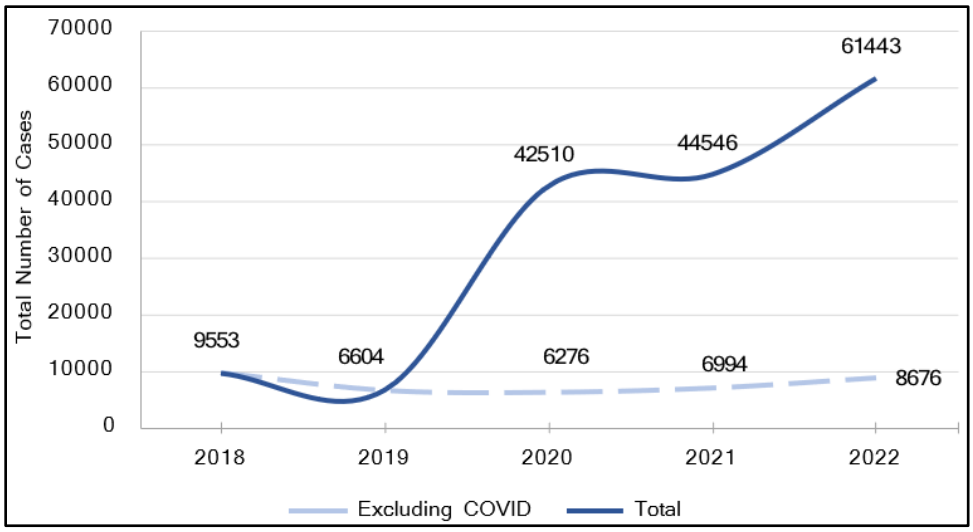


Figure 56: Northern Nevada Annual Communicable Disease Total, 2018–2022

PREVIOUS OCCURRENCES/HISTORY

- **2020–COVID-19:** COVID-19, or coronavirus disease 2019, is caused by the SARS-Co-V-2 virus. It is considered a respiratory illness, but it can affect areas of the body besides the respiratory system. Respiratory symptoms range from mild to severe. COVID-19 was declared a public health emergency of international concern (PHEIC) on January 30, 2020, and a global pandemic by the World Health Organization on March 11, 2020. The United States declared COVID-19 a national emergency from March 13, 2020, to May 11, 2023. The state of Nevada declared COVID-19 a public health emergency on March 12, 2020. Additional guidance and recommendations on gatherings and closure were issued in the weeks following and are detailed in the COVID-19 timeline of the Nevada Department of Health and Human Services Division of Public and Behavioral Health.

PROBABILITY OF FUTURE EVENTS

Climate change can have significant impacts on the spread of infectious diseases. As temperatures and precipitation patterns shift, the geographic range of disease-carrying vectors, such as mosquitoes and ticks, can expand, bringing diseases like malaria, dengue fever, and Lyme disease into new areas. Warmer temperatures can also speed up the reproduction and development of these vectors, allowing them to spread diseases more quickly. In addition, changes in precipitation can create new breeding grounds for disease-carrying organisms. Overall, climate change can create more favorable conditions for the transmission and spread of infectious diseases, posing a threat to global public health.

Cases of infectious disease occur annually in Washoe County, and the probability of future events is estimated at Medium. Based on potentially changing climate patterns, an increase in the likelihood of emerging infectious diseases may impact Washoe County.

VULNERABILITY ANALYSIS

Infectious diseases are known to spread quickly through communities. Many spread through close contact, meaning that highly populated areas like Reno and Sparks are more prone to widespread outbreaks. Public gathering places where people may be together in close quarters, such as schools and childcare facilities, offices, and transportation terminals, provide more opportunities for diseases to pass from one person to another.

Land use changes can have a major impact on infectious disease numbers. This is done by changing the rate of contact between individuals and disease hosts, whether animal, insect, or fungal. Along with this change in contact rate, land use changes can also alter the composition of local species, potentially allowing vector species to become the dominant species.

Outbreaks of infectious diseases most often affect vulnerable populations. However, a worst-case scenario could overwhelm local hospitals and medical facilities and require a surge response.

ESTIMATED IMPACT AND POTENTIAL LOSSES

Vaccine hesitancy has been a public health issue for many years, and it increased during the COVID-19 pandemic. Many infectious diseases are entirely vaccine preventable (e.g., Hepatitis A) or have reduced transmission, extent, and severity (e.g., influenza, COVID-19). Vaccines are a powerful public health tool to prevent and mitigate diseases and reduce the potential for outbreaks. Increases in vaccine hesitancy are of concern, as herd immunity is necessary to help reduce the likelihood of outbreaks.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 78 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 78: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 79 provides the Calculated Priority Risk Index (CPRI) for infectious disease impacts in the City of Sparks based on the current plan's hazard risk assessment results. The City of Sparks assigned infectious disease a risk factor value of 2.2, reflecting medium magnitude and long duration impacts. This risk factor value falls in the range of 2 to 2.4, which is considered a medium-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 79: Calculated Priority Risk Index for Infectious Disease in the City of Sparks

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Infectious Disease	2	3	1	4	1	2.2	Medium

VULNERABLE POPULATIONS

Population growth could increase the risk of infectious disease outbreaks and their impact on hazard mitigation for Nevada. The estimated population of Washoe County in 2024 was 499,064, with a growth rate of 0.21% in the past year, according to the most recent United States census data. Washoe County is the second largest county in Nevada. The 2010 population was 421,969, and it has grown 18.27% since that time. An increase in the population can impact infectious disease risk. For example, areas with higher population densities saw earlier outbreaks of COVID-19. Population density has been found to be a risk factor for the spread of infectious diseases, particularly those that spread from person to person and through food and water. Furthermore, vector-borne illnesses can also increase or change patterns with increasing population density.

Various populations are vulnerable to communicable diseases, and understanding these groups is crucial for effective public health interventions. One vulnerable population consists of infants and young children whose immune systems are still developing, making them more susceptible to infection. Their proximity to daycare centers and schools increases the risk of disease transmission.

Another vulnerable group is the elderly, particularly those with preexisting health conditions or weakened immune systems. Age-related declines in immune function can make them more

susceptible to infectious diseases and increase the severity of illness. Long-term care facilities and nursing homes often house a significant proportion of elderly individuals, further amplifying the risk of disease outbreaks.

Individuals with compromised immune systems (such as those with HIV/AIDS), cancer, organ transplants, or autoimmune diseases are highly vulnerable. These conditions weaken their ability to fight infections, leaving them more susceptible to communicable diseases. Strict infection control measures and targeted prevention strategies are essential for protecting this group.

Homeless populations also face increased vulnerability to communicable diseases due to factors such as crowded living conditions, limited access to healthcare, poor nutrition, and higher rates of substance abuse. These circumstances can contribute to the spread of infections such as tuberculosis, hepatitis, and respiratory illnesses in homeless communities.

Lastly, marginalized and socioeconomically disadvantaged populations may be at higher risk. Factors such as limited access to healthcare, overcrowded living conditions, inadequate sanitation, and lack of education can increase the vulnerability to communicable diseases.

DEVELOPMENT TRENDS

An increased population in the same area increases the vulnerability of infection. Infectious, communicable, and vector-borne diseases can significantly impact development trends in many ways. They can strain healthcare systems, lead to workforce absenteeism, and cause economic disruptions. In addition, investment in infrastructure and public services may be diverted to disease control efforts, affecting overall development. Furthermore, the fear of contracting these diseases can affect consumer behavior, tourism, and foreign investment, influencing economic growth and development. The burden of infectious diseases can hamper development's social, economic, and environmental aspects, and emerging infectious diseases can pose vulnerabilities to economic and land use trends in several ways.

- **Economic:** These diseases can increase healthcare expenditures and reduce productivity due to illness or workforce absenteeism. This can strain healthcare systems and have direct economic impacts on businesses and industries.
- **Land Use:** Emerging infectious diseases can also influence land use patterns. For instance, areas affected by outbreaks may experience changes in land development plans, shifting the focus toward healthcare infrastructure and away from other projects. Moreover, the occurrence of infectious diseases can lead to changes in travel patterns, affecting tourism and trade, which can further impact land use and economic trends.
- **Future Land Use:** Infectious diseases can affect future land use by impacting population distribution and density. An increased population can lead to more urbanization, which may lead to converting agricultural land into residential and commercial uses. In addition, the spread of infectious diseases can lead to changes in land use patterns, such as the creation

of quarantine zones or restricted areas to control the spread of the diseases. This can impact land use for agriculture, housing, and other purposes.

Radiological Waste Transport

LOCATION

Radiological waste could be transported along rail systems, major airports, and highway corridors in Washoe County. The zones of potential impact extend beyond these transportation facilities. The sizes and shapes of those zones are affected by the material released and atmospheric and environmental effects, such as wind speed and water flow.

EXTENT

The potential magnitude and severity of impacts from a radiological waste transport incident in Washoe County are categorized as Very High. Incidents involving the release of radioactive materials can necessitate federal support for response efforts, impact critical facilities, cause disruptions in services for weeks, and have widespread economic repercussions across the nation.

PREVIOUS OCCURRENCES/HISTORY

The City of Sparks reported no previous occurrence for Radiological Waste Transport.

PROBABILITY OF FUTURE EVENTS

Medical, construction, and traditional radiological materials, including waste, are commonly transported on major transportation routes through Washoe County. As traffic on these routes increases, the potential for radiological waste transport incidents increases. However, given the safety measures in place to prevent these incidents and the fact that no incidents have been reported in Washoe County, the probability of future events is estimated to be Very Low.

VULNERABILITY ANALYSIS

The MPT determined that hazards from transporting radiological waste have a low probability of occurring. However, the vulnerability of the public, continuity of operations, and infrastructure to radiological waste transport are assessed below. A radiological incident on a transportation corridor could cause a fire or explosion, dispersing radiological particles that contaminate people and property. Depending on several factors, communities in the immediate vicinity of the event would be the most vulnerable. Moreover, if radioactive materials are not effectively contained, they can spread through the air, soil, and/or water. In the immediate aftermath of a radiological incident on a roadway, the materials pose a substantial risk to first responders and other emergency personnel. Due to the infrequent occurrence of these accidents, emergency personnel may not be sufficiently trained in appropriate response

protocols. Radiological materials incidents on transportation corridors require extensive administrative and operational support from impacted jurisdictions. Remote communities may not have the capacity to direct a response to a radiological incident.

Radiological materials would impact jurisdictions' continuity of operations, particularly if a major transportation corridor were affected. Radiological incidents could require the mobilization of resources to evacuate and/or shelter in place. Remote communities with few resources may be limited in their ability to mobilize these resources, and larger communities would have to expend more resources to protect population centers from the impacts of a radiological incident. Infrastructure and facilities near the radiological incident could be temporarily or permanently contaminated or physically impacted by a radiological incident.

ESTIMATED IMPACT AND POTENTIAL LOSSES

Climate change can significantly impact the transportation of radiological waste. As extreme weather events become more frequent and intense, the risks associated with transporting radiological materials also increase. For example, extreme weather events, such as heavy storms, flooding, and hurricanes, can disrupt transportation routes and infrastructure, potentially leading to accidents or incidents involving radiological waste.

Furthermore, rising global temperatures can affect the stability and safety of transportation routes, increasing the likelihood of road and infrastructure damage. This, in turn, can pose significant challenges to the safe transport of radiological waste and increase the risk of incidents such as spills or releases of radioactive materials.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 80 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 80: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 81 provides the Calculated Priority Risk Index (CPRI) for radiological waste transport impacts in the City of Sparks based on the current plan's hazard risk assessment results. The City of Sparks assigned radiological waste transport a risk factor value of 2.2, reflecting quick onset and long duration impacts. This risk factor value falls in the range of 2 to 2.4, which is considered a medium-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 81: Calculated Priority Risk Index for Radiological Waste Transport in the City of Sparks

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Radiological Waste Transport	1	3	4	4	1	2.2	Medium

VULNERABLE POPULATIONS

In Sparks, several populations may be vulnerable to incidents related to the transport of radiological waste. These include low-income communities, which often lack the resources to effectively respond to emergencies or access information about potential risks. Additionally, the elderly population may be particularly at risk due to mobility issues and potential health complications that could arise in the event of an incident.

Children are another vulnerable group, as they are more susceptible to the harmful effects of radiation. Schools located near transportation routes for radiological waste could face heightened risks, and children may have less awareness of safety protocols during an emergency.

Furthermore, individuals with disabilities may also face challenges in evacuating quickly or understanding the scope of the incident. Communities that lack robust emergency response plans or access to timely information may find themselves at greater risk as well.

Lastly, residents living near major highways or transportation hubs used for radiological waste transport are inherently more exposed to potential accidents.

DEVELOPMENT TRENDS

Despite population growth in Washoe County, the risk of incidents during the transport of radiological waste is small. However, an area's development trends may change if climate change impacts the transportation of radiological waste. Since the last plan, vulnerability has remained unchanged.

Extreme Weather (Winter Storm)

LOCATION

Any area of the city may be affected by winter storms. High elevations in the western portion of Washoe County experience the effects of winter storms, often snowstorms, with greater frequency than low elevations. Winter storms plunge southward from arctic 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.

EXTENT

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

PREVIOUS OCCURRENCES/HISTORY

There are no FEMA declarations for winter storms from 2019 to 2024.

Sparks's annual average snowfall is 6 inches, with snowfalls generally occurring in November through March, according to data from 2010–2019 climate normal. The same source shows 8.26 inches average annual precipitation; monthly averages of 0.87 inches and higher occur in the same months.

The NCEI database reports average annual snowfall for Sparks from 1991 to 2020 at 6.8 inches.

The 2018 State of Nevada Enhanced HMP lists the following severe winter storms occurring in Washoe County over the past 20 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 damage.
- **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**: In a severe winter storm, heavy, wet snow-downed power lines, 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.
- **December 10, 2022:** A stronger winter storm brought another round of heavy snow, strong winds, and travel impacts on Sierra passes December 9–11. Peak snowfall totals occurred through the period of December 10–11 with 2–4 feet of snow widely reported in Sierra locations and northeast CA. Storm total snowfall amounts even exceeded 5 feet over parts of the Sierra crest. Several inches of new snow also fell over some western Nevada valleys, with a foot plus falling across some eastern Sierra foothill areas as well. Strong winds having gusts of 65–75 mph in far western Nevada resulted in reports of $8M in damage across parts of Sparks during the early morning of December 10.
- **February 22, 2022:** Another inside slider tracked through the region with more snow and wind. This inside slider-type system moved into the region late Sunday through Tuesday. It brought periods of snow showers, increased wind, travel difficulties, and much lower temperatures to the region through Wednesday night. Snow Monday and into Tuesday morning overperformed in some areas, with several inches of new snow falling in bands over parts of the eastern Sierra, and western NV. A vehicle crash occurred the morning of Tuesday, February 22, around 6:00 a.m. PST involving two vehicles and three passengers were injured. A slider-type weather system moved over the region late Sunday, February 20, into the morning of Tuesday, February 22, producing a couple rounds of snowfall.

PROBABILITY OF FUTURE EVENTS

The probability of severe winter storms is high, and the potential impact of future climate conditions could increase the risk of severe winter storm events. However, since severe winter storms occur each year, Sparks has a number of mechanisms in place to promote safety.

VULNERABILITY ANALYSIS

Vulnerabilities from winter storms include those related to power outages and impairments to transportation. Because nearly all social and economic activities depend 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. Physical damage to electrical infrastructure as a result of ice or snow, downed trees, or debris can cause power outages, as can increases in demand beyond the capacity of the electrical system.

ESTIMATED IMPACT AND POTENTIAL LOSSES

Power outages may disrupt businesses, especially facilities without backup generators, potentially increasing the economic impact of extreme weather events. Members of the community who are isolated or have disabilities may be more vulnerable, especially those who may be trapped in their homes from power failures, heavy snow and ice, and debris from falling

trees and power lines. Snowstorms can also adversely impact employees without certain benefits, as closures may result in unpaid time away from work.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 82 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 82: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 83 provides the Calculated Priority Risk Index (CPRI) for extreme weather (including winter storm) impacts in the City of Sparks based on the current plan's hazard risk assessment results. The City of Sparks assigned extreme weather a risk factor value of 2.5, reflecting high probability, medium duration, and medium frequency impacts. This risk factor value falls in the range of 2 to 2.5, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 83: Calculated Priority Risk Index for Extreme Weather in the City of Sparks

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Extreme Weather	4	1	1	3	3	2.5	High

VULNERABLE POPULATIONS

During severe winter storms, dangerous roads are closed at Highway 580, going south toward Washoe Valley, restricting emergency access to Mount Rose ski resorts and Incline Village community access roads. Planning Team Members report multi-car pile ups on highways at Donner pass due to severe winter storm conditions. Emergency sheltering is required for

residents when the I-80 Donner pass closes. In addition, natural gas transports are delayed or cut off by winter storms road closing. Food shortages also have been issues in the pass due to food chain distribution issues when transportation is delayed by closures on the I-80 Donner Pass.

Extreme Weather (Windstorm)

LOCATION

Any area of the city may be affected by windstorms. Windstorms can cause power outages from downed power lines, tree damage, damage to homes and other buildings and above-ground structures, and damaged or blocked roads and bridges.

EXTENT

A severe windstorm could cause moderate damage and disrupt economic activity, electric service, government operations, and transportation across the city. High winds can accompany other types of extreme weather events, such as thunderstorms and winter storms, and typically occur multiple times each year.

PREVIOUS OCCURRENCES/HISTORY

There are no FEMA declarations for windstorms from 2019 to 2024.

High winds can accompany winter storms and severe thunderstorms and may occur multiple times a year. The National Oceanic and Atmospheric Administration's National Climatic Data Center records that the Reno-Sparks area experienced 143 days with weather events that had measured wind speeds above 40 knots (46 miles per hour) between January 2015 and July 2024. One of these high wind events resulted in reports of $25K in property damage outside the City of Sparks.

PROBABILITY OF FUTURE EVENTS

The city is likely to continue to experience a high frequency of windstorms. There is no reliable data indicating whether windstorms will increase or decrease in frequency or intensity due to climate change. However, changes in the environment have resulted in warmer seas, changing weather patterns, and increasing incidents of severe windstorms as the atmosphere warms and increases the energy available for storms to create intense wind events, often originating in warmer oceans that feed storms that develop into major wind events as they head toward land. Risk Factor.com reports minimal wind risk factor for City of Sparks, which means there is a very low likelihood that hurricane, tornado, or extreme weather winds will impact the area, with 36,

263 properties identified at risk. Therefore, the likelihood of a windstorm resulting in very severe winds (a 1-in-3,000-year hurricane) is unlikely to occur in Sparks.[120]

VULNERABILITY ANALYSIS

Windstorms may affect any above-ground structures and can cause secondary effects, such as damage to buildings, power outages caused by fallen trees or tree limbs, or disruption to transportation if roads are blocked by debris. Sparks businesses, residents, and visitors who rely on electric power would be affected in the event of a power outage caused by a windstorm, and high winds could disrupt government operations and business activities, especially those operating outdoors.

Vulnerability to wind for any area is determined primarily by its topography, surface roughness, and proximity to the sea. Damage to roofs, walls, and windows can depend on the angle at which the wind approaches a house. Major damage structures can occur if construction codes have not been updated and building materials have not been tested against severe winds. Also, the layout and use of space in buildings, dense neighborhoods, or proximity to commercial buildings can increase vulnerability to debris. Proximity to large bodies of water, such as Lake Tahoe, can increase wind speed in areas. Having trees, hills, and plants between bodies of water and homes may block the wind from storms and reduce damage to homes (Figure 57).[121]

[120] RiskFactor.com, 2024, Wind Risk Factor, Sparks, NV Hurricane Map and Climate Risk Report | Risk Factor

[121] RiskFactor.com, 2024, Wind Risk Factor, Sparks, NV Hurricane Map and Climate Risk Report | Risk Factor

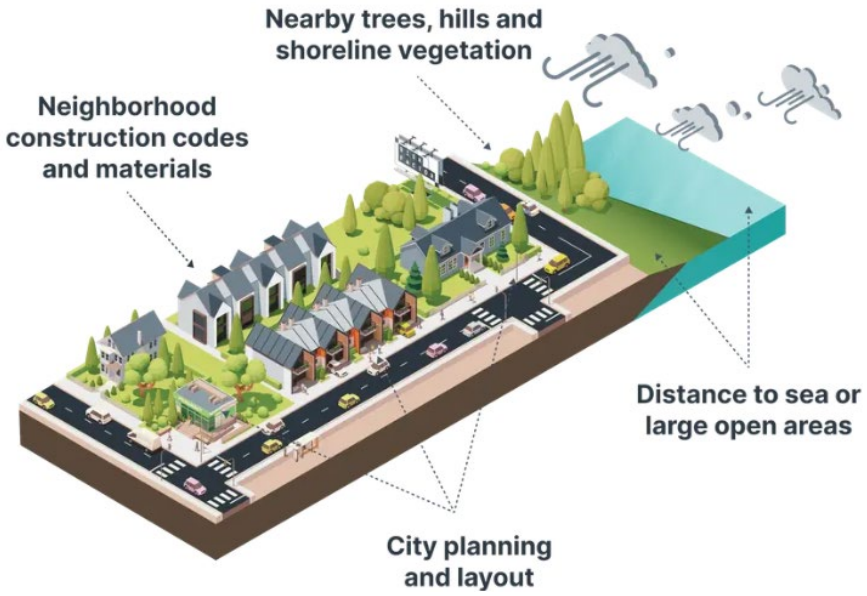


Figure 57: Common Vulnerabilities to Wind Damage[122]

ESTIMATED IMPACT AND POTENTIAL LOSSES

Power outages may disrupt businesses, especially facilities without backup generators, potentially increasing the economic impact of extreme weather events. Members of the community who are isolated or have disabilities may be more vulnerable, especially those who may be trapped in their homes from power failures, heavy snow and ice, and debris from falling trees and power lines. Snowstorms can also adversely impact employees without certain benefits, as closures may result in unpaid time away from work.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 84 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

[122] RiskFactor.com, 2024, "Common Vulnerabilities to Wind Damage," Sparks, NV Hurricane Map and Climate Risk Report | Risk Factor

Table 84: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 85 provides the Calculated Priority Risk Index (CPRI) for extreme weather (including windstorm) impacts in the City of Sparks based on the current plan's hazard risk assessment results. The City of Sparks assigned extreme weather a risk factor value of 2.5, reflecting high probability, medium duration, and medium frequency impacts. This risk factor value falls in the range of 2 to 2.5, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 85: Calculated Priority Risk Index for Extreme Weather in the City of Sparks

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Extreme Weather	4	1	1	3	3	2.5	High

VULNERABLE POPULATIONS

In Reno several populations are particularly vulnerable to the impacts of windstorms. The elderly are often at greater risk due to mobility challenges and health concerns that can hinder their ability to seek shelter quickly.

Low-income families may also face significant vulnerabilities. Those living in substandard housing are less likely to have structures that can withstand strong winds, increasing the likelihood of damage or injury during storms. Furthermore, financial constraints may limit their ability to prepare adequately for such events, making them more reliant on community resources for assistance.

Homeless individuals are another group that faces severe risks during windstorms. Without access to stable shelter, they are left vulnerable to the elements and lack crucial information about storm warnings and safety measures.

Children and individuals with disabilities are particularly susceptible during windstorms as well. Young children may not have the awareness or understanding to react appropriately in emergencies, while those with disabilities might face logistical challenges in evacuating or accessing safe spaces.

Residents of mobile homes are at heightened risk, as these structures are often less durable in high winds, which increases the potential for significant damage. Lastly, outdoor workers, such as those in construction, are also exposed to hazardous conditions and debris, making them more vulnerable during wind events.

Extreme Heat

DESCRIPTION

An emerging hazard for Washoe County is extreme heat. Extreme heat occurs when summertime temperatures are much hotter and/or more humid than average. Historically, the seasonal maximum heat index is 90.17 degrees, but it is expected to increase to over 96 degrees by mid-century.[123] Extreme heat conditions are determined by comparing temperature and humidity to average conditions for the affected location at that time of year.[124] Extreme heat can have negative health impacts, particularly on populations with underlying health risks. Extreme heat can also increase the negative impacts of drought and the probability of wildfire.

LOCATION

Extreme heat may also occur anywhere in Washoe County. However, urban areas are more likely to experience extreme heat conditions because of the heat island effect, in which the impervious surfaces concentrated in cities increase the surrounding area's temperature higher than temperatures in more rural areas.[125] Figure 58 shows areas of urban heat island effects in Washoe in 2020, according to heat severity data provided by the Trust for Public Land. The data use Landsat 8 imagery and ground-level thermal sensors to show where certain areas of cities are hotter than the average temperature for that same city as a whole.

[123] ClimRR Climate Projection Report, Washoe County. https://climrr.anl.gov/climateprojections
[124] Center for Disease Control and Prevention, 2024. https://www.cdc.gov/heat-%20health/about/index.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fextreme-%20heat%2Fabout%2Findex.html
[125] United States Environmental Protection Agency, “Heat Island Effect.” https://www.epa.gov/heatislands#:~:text=Heat%20islands%20are%20urbanized%20areas,as%2%200forests%20and%20water%20bodies

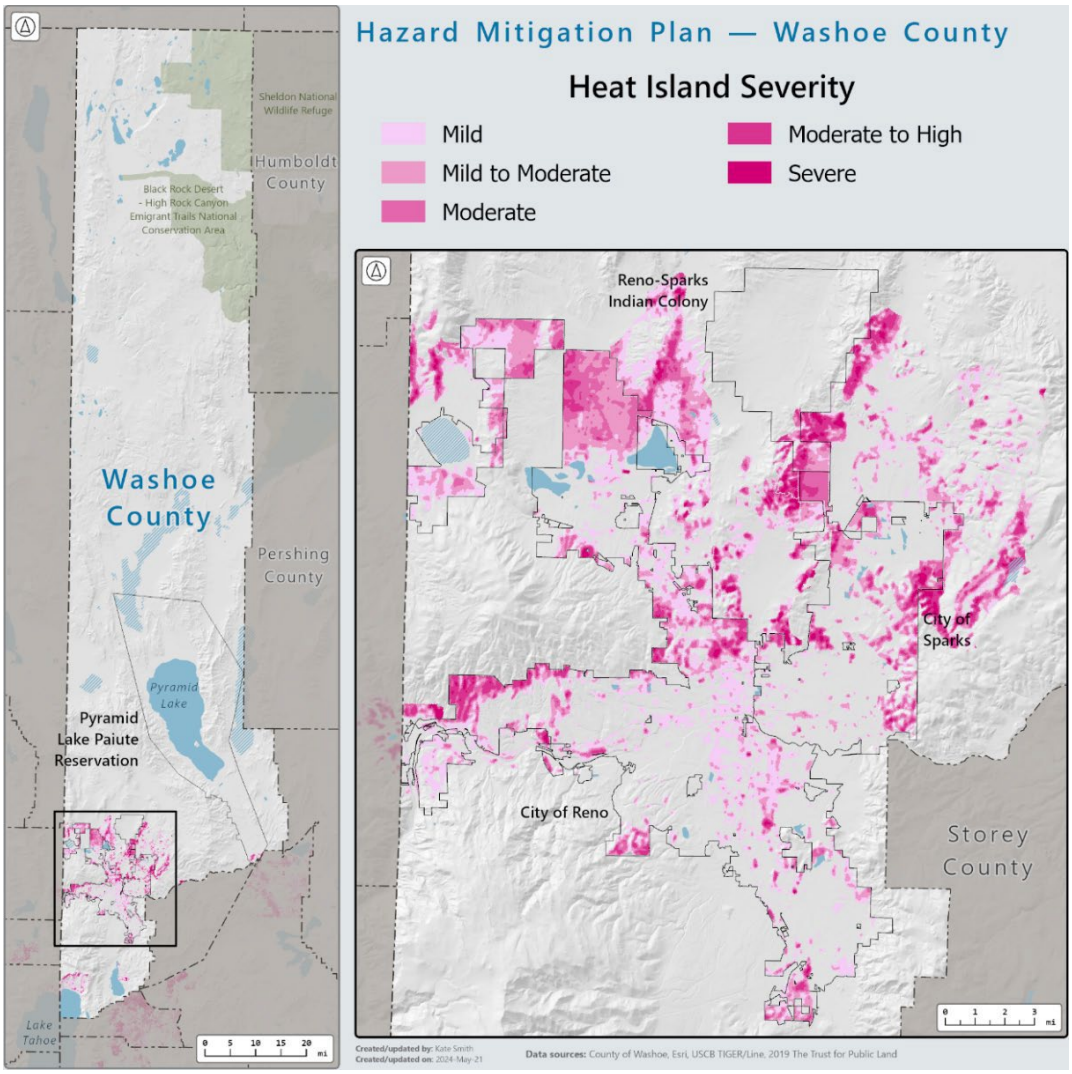


Figure 58: Heat Severity in Washoe County

EXTENT

The magnitude and potential severity of impacts of Extreme weather is considered Low. Typical Extreme weather events are handled at the city or county level, can disrupt local government and business services for a period of days to weeks, and can have economic impacts on a statewide scale. Considering a worst-case scenario, an extreme weather event could require federal-level support, could impact critical facilities, and disrupt services for more than 20 days, and could have nationwide economic impacts.

The heat index is what the temperature feels like to the human body when relative humidity is combined with air temperature. There is a direct relationship between air temperature and relative humidity and the heat index. As air temperature and relative humidity increase, the

heat index increases.[126] When the heat index is high, the body has more difficulty cooling itself through evaporation of perspiration to maintain a comfortable temperature. The potential for negative health consequences increases with higher heat index values.

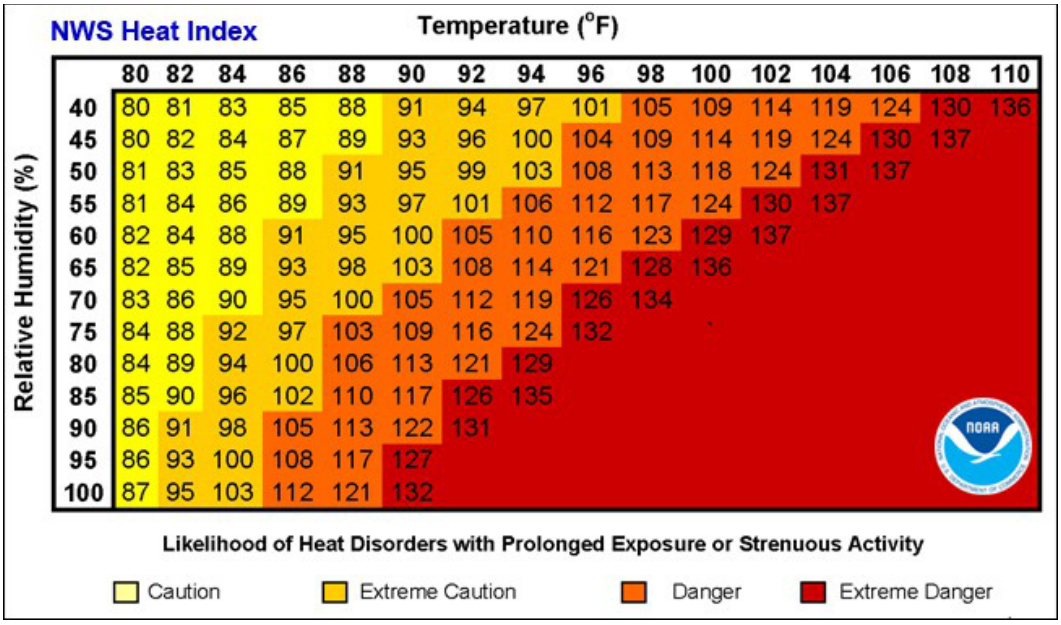


Figure 59: National Weather Service Heat Index[127]

PREVIOUS OCCURRENCE/HISTORY

No excessive heat events have been recorded for Washoe County in the NCEI Storm Events Database. However, excessive heat watches and warnings have occurred in recent years, including in 2021[128] and 2023.[129] These warnings included information to help individuals avoid heat-related illness and the locations of cooling centers.

Figure 60 shows a maximum temperature of red days at 27 per year (minimum temperature days 5), maximum temperature orange days at 34 per year (minimum temperature days 16), and maximum temperature yellow days at 97 per year (minimum temperature days 55),

[126] National Weather Service, "What is the Heat Index?" https://www.weather.gov/ama/heatindex
[127] National Weather Service, "What is the Heat Index?" https://www.weather.gov/ama/heatindex
[128] Reno Gazette Journal, "Excessive heat warning issued for Reno area beginning Sunday," https://www.rgj.com/story/news/2021/06/26/excessive-heat-warning-reno-area-beginning-sunday/5357958001/
[129] Reno Gazette Journal, "Reno expecting 102-degree temps this weekend; excessive heat watch into next week." https://www.rgj.com/story/news/2023/07/10/reno-expecting-102-degree-temps-this-weekend-heat-watch-through-monday-july-17-evening/70398343007/

maximum temperature green days at 120 per year (minimum temperature days 202). All temperature readings were recorded at the Reno Airport. The top right of the graph shows the dates in 2024 when heat warnings, advisories and conditions were issued, between June 11 and August 7.

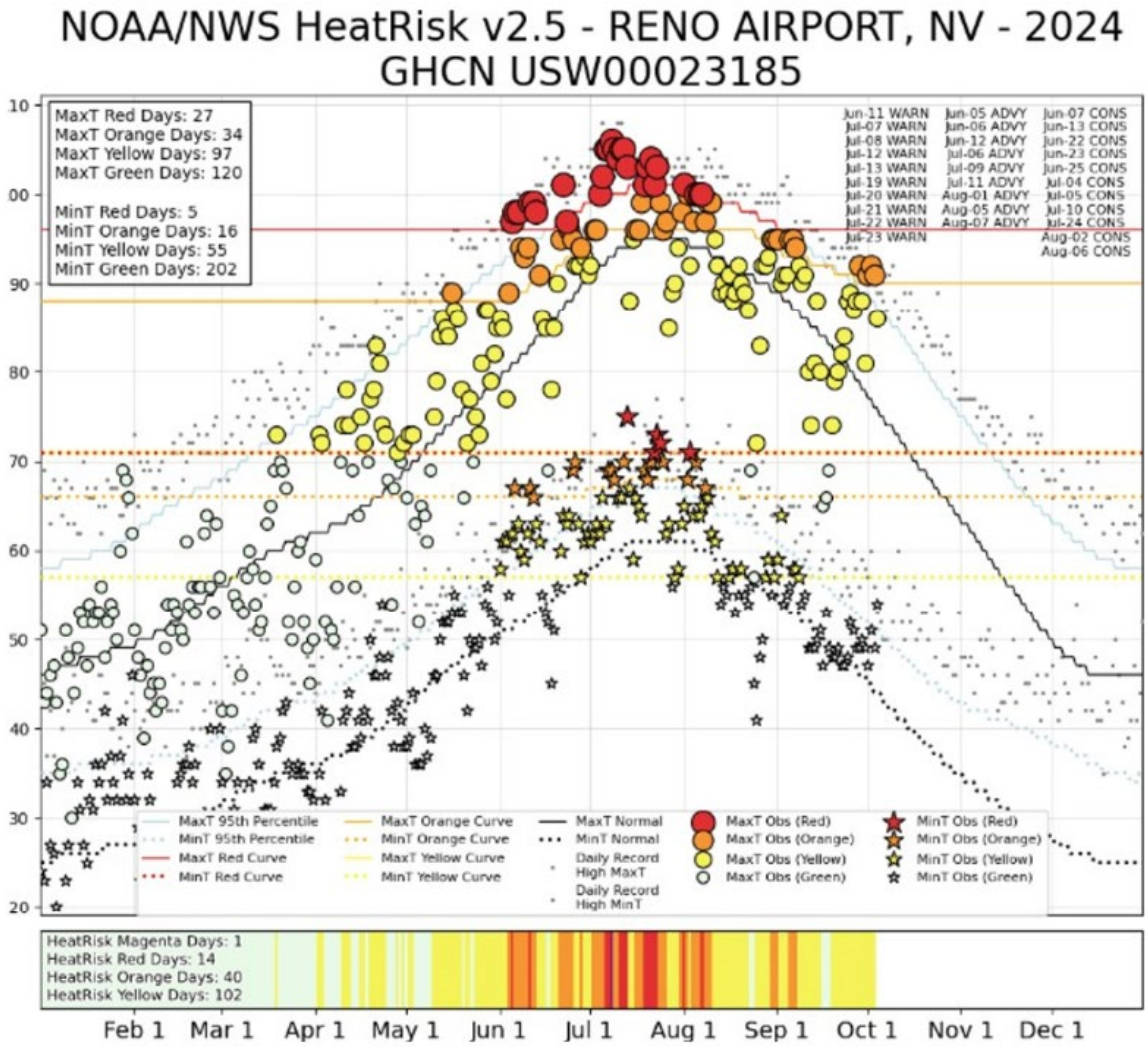


Figure 60: NOAA/NWS Heat Risk Graph, 2024 Reno Airport[130]

PROBABILITY OF FUTURE EVENTS

The probability of future extreme heat events is considered Medium. There have not been a significant number of historic events, but occurrences are expected to increase in the future. The overall probability of an Extreme weather event is High, and the potential impact of future climate conditions could increase the risk of Extreme weather events. However, since Extreme

[130] National Oceanic and Atmospheric Administration, National Weather Service, "HeatRisk Information, Reno Airport," https://www.wpc.ncep.noaa.gov/heatrisk/historical/

weather occurs every year in Washoe County, local and state jurisdictions and emergency response personnel are experienced in responding to such scenarios.

Table 86 provides the Calculated Priority Risk Index of each jurisdiction as per the current plan hazard risk assessment results. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4.

Table 86: Calculated Priority Risk for Extreme Weather in Washoe County

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value
Extreme Weather (Winter Storm, Windstorms, Extreme Heat)	4	2	1	4	3	2.9

IMPACTS OF CLIMATE CHANGE AND VARIATIONS

The 2018 Nevada Enhanced SHMP provided the following statement related to future climate conditions: There are some aspects to Nevada Extreme weather for which we have better confidence in anticipating the impacts of climate change, while for many other aspects much is unknown.

Based on the most recent long-range simulations, climate change can be expected to lead to more episodes of extreme heat in Nevada, especially in southern Nevada. The number of 105°+ days will likely increase, making the duration and severity of heat waves more extreme. Perhaps of more importance, based on the scientific consensus and what has already been observed, average overnight low temperatures are projected to increase, perhaps considerably, in the coming decades. This will remove the mitigating effect of cooling off at night, which has helped northern Nevada minimize health impacts from recent heat waves.

Recent studies conducted by the Desert Research Institute conclude that climate change and an intense urban heat island have made Reno the fastest warming city in the U.S. The warming temperatures pose risks to Reno's communities, as heat is the number one weather-related cause of death in the U.S.



Figure 61: NOAA Mapping of Heat Islands, Including Reno-Sparks, Nevada[131]

The following represent the potential impacts on future climate conditions of extreme heat:

- Continuing increase in average temperatures across the region, along with increases in extreme heat events.
- Prolonged exposure to extreme heat can cause heat-related illnesses like heat exhaustion and heat stroke, especially in vulnerable groups such as the elderly, children, and those with existing health issues. It can also worsen chronic respiratory and cardiovascular conditions.
- Higher temperatures increase air conditioning use, straining energy supplies and risking power outages, which can worsen public health during heat waves.
- Extreme heat disrupts outdoor work, reducing labor productivity in agriculture, construction, and other outdoor industries, which can negatively impact local economies.
- Higher temperatures often lead to lower precipitation, worsening drought conditions. This results in water shortages that affect agriculture, drinking water supplies, and natural ecosystems.
- Extreme heat can dry out vegetation, raising wildfire risks. This threatens lives and property and can have lasting ecological impacts.

[131] Desert Research Institute, "Reno/Sparks selected to be part of Urban Heat Mapping Campaign," 2024. https://www.dri.edu/reno-sparks-selected-to-be-part-of-urban-heat-mapping-campaign/

- Urban areas face extreme heat from the heat island effect, where buildings absorb and retain heat. This leads to higher temperatures in cities, increasing health risks and energy demands.
- Extreme heat impacts wildlife behavior and distribution, potentially endangering species that cannot adapt to rising temperatures.

VULNERABILITY ANALYSIS

Extreme heat is associated with more fatalities than any other severe weather event in the United States. During extreme heat events, a person's body temperature may rise faster than it can cool itself, which can lead to heat-related illnesses, such as heat exhaustion or heat stroke. Older adults, young children, pregnant women, and individuals with chronic diseases, such as cardiovascular or respiratory conditions, are at the highest risk. Outdoor workers and unhoused populations are also particularly vulnerable. People who live in social isolation, including linguistic isolation or those living alone with few social relationships, also are at higher risk.

Social factors, including race and ethnicity, income, and educational attainment, are correlated with many health outcomes, including heat-related illness. Lower-income individuals may not live in housing with air conditioning and are at risk. Those living and working near urban heat islands may be more vulnerable.

Extreme heat events can also have negative impacts on worker productivity, such as time lost on the job when people need to take more frequent or longer breaks to avoid overheating or when it is too hot to work at all. Extreme heat can also affect the agricultural sector, such as livestock health and crop yields.

Heat waves can damage transportation infrastructure and pose challenges for maintenance and construction. Higher temperatures can put stress on bridge infrastructure through thermal expansion of bridge joints and paved surfaces, and deterioration of steel, asphalt, protective cladding, coats, and sealants. When the roadway surface expands at a crack or joint, heat can cause the pavement to buckle and warp, sometimes requiring closure for urgent repairs.

Extreme heat can accelerate the deterioration or threaten the integrity of some types of asphalt pavement through the softening, rutting, and migration of liquid asphalt.

Extreme heat is also related to wildfire risk. High temperatures contribute to drying out of vegetation, which may burn more rapidly once ignited. These conditions are exacerbated if they occur during times of drought.

ESTIMATED IMPACT AND POTENTIAL LOSSES

Extreme heat impacts public health, leading to illnesses like heat exhaustion and heat stroke, particularly among vulnerable groups such as the elderly. It intensifies dehydration and respiratory issues, placing additional strain on healthcare systems during heat waves.

In agriculture, extreme heat can reduce crop yields and harm livestock, impacting food supply and potentially driving up prices. The economic effects are broad; productivity declines in outdoor jobs, and energy demand surges for cooling, which can strain power grids and lead to outages that disrupt businesses.

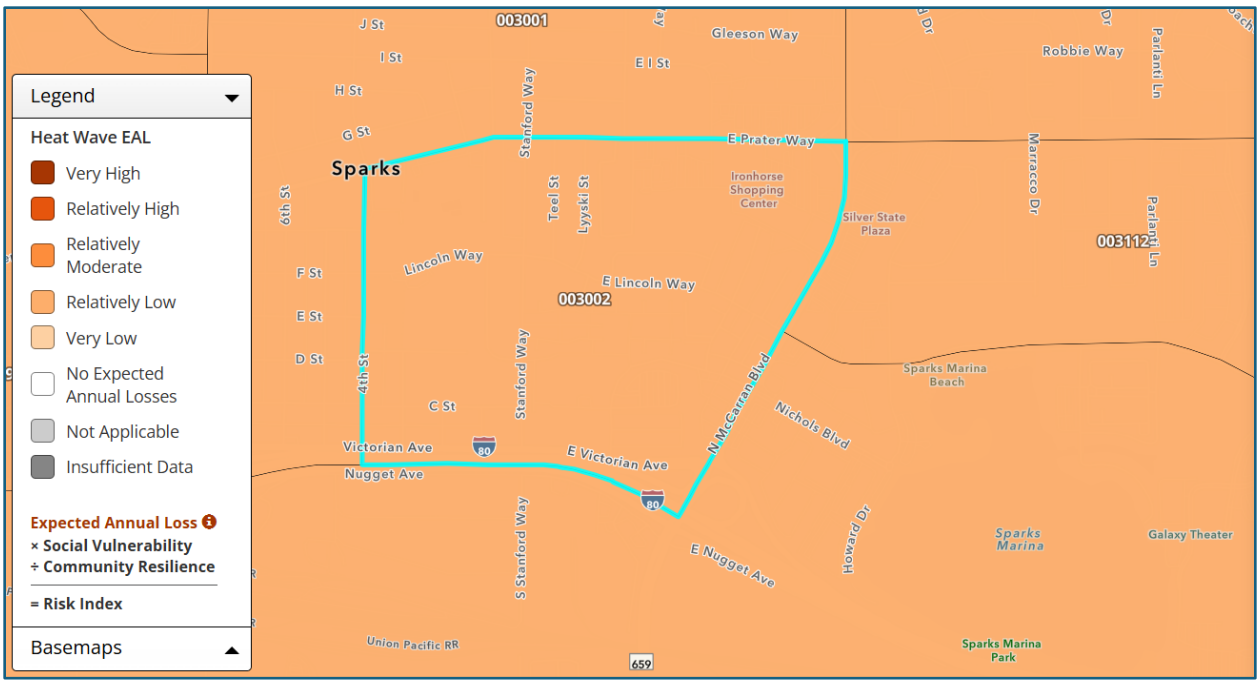
Infrastructure also suffers, with roads and buildings at risk of damage from heat-related expansion, resulting in costly repairs. Additionally, extreme heat can worsen drought conditions and threaten water quality, impacting ecosystems and biodiversity.

The social ramifications are significant, as communities may face increased public health risks, crime rates, and social unrest during extreme heat events, especially if access to cooling resources is limited.

Cascading impacts of extreme heat include:

- Health Risks
- Increased Energy Demand
- Water Supply Stress
- Agricultural Impacts
- Wildfire Risks
- Economic Consequences
- Social Disparities
- Ecosystem Disruption

Figure 62 shows NRI Expected Annual Loss from Heatwaves for City of Sparks at $914, with a rating of relatively low expected annual losses, and a risk score of 22.7.



Heat Wave	Relatively Low
	Score 22.7
0	100
Expected Annual Loss	**$914**
Exposure	**$38B**
Frequency	**0.5 events per year**
Historic Loss Ratio	**Very Low**

Figure 62: NRI City of Sparks Heat Expected Annual Loss Score, Map, and Legend[132]

VULNERABLE POPULATIONS

In Washoe County, certain populations are particularly vulnerable to the impacts of extreme heat. One of the most affected groups is the elderly. Older adults often face challenges related

[132] FEMA, "National Risk Index City of Sparks Heat Wave Score, Map, and Legend." https://hazards.fema.gov/nri/map

to mobility and health, making it difficult for them to prepare for or respond to severe weather conditions adequately. Their increased susceptibility to heat can put them at greater risk during extreme events.

Children also represent a vulnerable population during such weather occurrences. Young kids may require supervision and assistance, especially during heat waves. This group relies on caregivers to ensure their safety, which can be especially challenging during times of inclement weather.

Low-income families are another critical demographic at risk. Economic constraints often limit their access to proper shelter and cooling resources, making them more susceptible to the adverse effects of extreme temperatures. This vulnerability can be dangerous during heat waves, when access to safe and insulated housing is crucial.

Additionally, the homeless population faces significant challenges during severe weather events. Without stable housing, individuals experiencing homelessness are left without adequate protection from the elements, putting them at heightened risk for health issues during extreme weather.

Individuals with disabilities are also disproportionately affected. Those with physical or cognitive impairments may experience difficulties accessing necessary resources during extreme heat events. This can exacerbate their vulnerability when timely action is needed.

Medical patients who rely on electrically powered devices, such as oxygen concentrators, may face life-threatening situations during extreme heat, especially if power outages occur.

Outdoor workers, including construction and agricultural laborers, are particularly affected by extreme heat. Their exposure to harsh weather conditions without proper protection can lead to severe health risks.

Lastly, individuals with limited English proficiency may struggle to understand safety protocols. This language barrier can impede their ability to seek help or take necessary precautions during extreme heat events.

DEVELOPMENT TRENDS

Recent Development Trends

- Economic: Increased regional economic development continues to increase the potential for disruptions during and after severe weather 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: Future development in more remote areas of the County may increase the cost of responding to extreme heat events and increase the risk to residents, particularly the elderly or those with medical conditions.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 87 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 87: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 88 provides the Calculated Priority Risk Index (CPRI) for extreme weather (including extreme heat) impacts in the City of Sparks based on the current plan's hazard risk assessment results. The City of Sparks assigned extreme weather a risk factor value of 2.5, reflecting high probability, medium duration, and medium frequency impacts. This risk factor value falls in the range of 2 to 2.5, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 88: Calculated Priority Risk Index for Extreme Weather in the City of Sparks

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Extreme Weather	4	1	1	3	3	2.5	High

Transportation Incident (Aircraft Crash)

LOCATION

Washoe County has four publicly operated airports: the Reno–Tahoe International Airport (RNO), the Reno–Stead Airport (RTS), the Spanish Springs Airport (N86) in Reno, and the Empire Airport (1A8) in Empire. There are also several privately operated airports in the County that serve commercial, non-commercial, private commuter, and recreational aircraft. The greatest volume of commercial aircraft service passes through Reno–Tahoe International Airport. Federal agencies, such as the Bureau of Land Management, also operate and lease airports in Nevada.

EXTENT

It is difficult to estimate the extent or probability of the occurrence of an aircraft accident. This type of incident is most likely to occur during takeoff or landing. Aircraft crashes often cause injuries or death to people in the aircraft and on the ground. Crashes can also damage or destroy structures or cause secondary hazards, such as fires or the release of hazardous materials. Aircraft crashes are typically handled at the local level and can disrupt transportation and business services nearby. The magnitude and potential severity of the impact of an aircraft crash is considered Medium in Washoe County. Such events are not likely to have significant regional impacts.

PREVIOUS OCCURRENCES/HISTORY

The City of Sparks reported no previous occurrence of aircraft crashes.

PROBABILITY OF FUTURE EVENTS

Weather conditions are associated with up to 70% of aircraft incidents.[133] Climate change is likely to impact the occurrence, extent, or probability of aircraft crashes in Washoe County. Furthermore, increased development and urbanization can increase the number of people on the ground who may be affected by an aircraft crash. The probability of an aircraft crash with severe consequences on the ground is considered Medium.

VULNERABILITY ANALYSIS

Aircraft crashes, particularly those that involve small aircraft, may happen farther away from the runway near flight tracks. Buildings and above-ground infrastructure may be damaged or destroyed by an aircraft crash. Crashes are likely to cause injury or death to the pilot and

[133] Department of Transportation, Weather and Aviation: How Does Weather Affect the Safety and Operations of Airports and Aviation, and How Does FAA Work to Manage Weather-related Effects?https://www.transportation.gov/sites/dot.gov/files/docs/kulesa_Weather_Aviation.pdf

passengers on a plane and can cause injuries and fatalities on the ground. Aircraft crashes are localized events and can be handled by local governments.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 89 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 89: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 90 provides the Calculated Priority Risk Index (CPRI) for transportation incident impacts in the City of Sparks based on the current plan's hazard risk assessment results. The City of Sparks assigned transportation incident a risk factor value of 1.5, reflecting medium duration, and medium probability impacts. This risk factor value falls in the range of 0 to 1.9, which is considered a low-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 90: Calculated Priority Risk Index for Transportation Incidents in the City of Sparks

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Transportation Incident	2	1	1	3	1	1.5	Low

VULNERABLE POPULATIONS

In Sparks, certain populations are particularly vulnerable to transportation incidents, including aircraft-related events. One significant group is the elderly, who often face mobility challenges and are more susceptible to health complications. During an emergency, they may struggle to evacuate quickly or access medical care, placing them at increased risk.

Low-income families in Sparks also face heightened vulnerability. These residents may rely heavily on public transportation and often live in areas closer to flight paths, increasing their exposure to potential incidents. Limited resources for disaster preparedness can hinder their ability to respond effectively during emergencies, making targeted outreach and support essential for this demographic.

Children and youth represent another vulnerable segment of the population. Schools and playgrounds situated near transportation routes mean that children may be at risk during incidents. Their limited awareness of surroundings can complicate evacuation efforts, highlighting the necessity for comprehensive safety education and planning that involves parents and caregivers.

Individuals with disabilities form yet another group that is particularly vulnerable during transportation incidents. Challenges related to mobility can prevent them from evacuating swiftly or safely in emergencies. Emergency response procedures must consider the diverse needs of disabled individuals to ensure equitable protection and support.

Additionally, residents living near the airport face unique risks associated with aircraft incidents. Communities adjacent to flight paths may experience environmental hazards, necessitating tailored evacuation and safety measures to protect those living in close proximity to potential risks.

Finally, tourists and temporary residents in Sparks may not be familiar with local safety protocols, increasing their vulnerability during transportation incidents. Providing clear information and guidance ahead of time can help mitigate risks for this transient population.

Volcano

A volcano is an opening or rupture of the Earth's surface that allows ash, gases, and/or molten rock under tremendous pressure to emerge from below the surface. Volcanic activity over long periods can either form mountains, as molten rock is gradually extruded, or rapidly obliterate mountains during explosive eruptions.

Depending on the type of volcano, an eruption can be among the more spectacular of natural hazard events, ejecting materials thousands of feet into the air, darkening skies, and blanketing surrounding areas with fine powdery ash or rivers of molten lava. Because of advanced geologic and seismic monitoring techniques, warning times for major eruptions are usually measured in weeks or months, and the duration of volcanic activity typically ranges from a few weeks to a few years.

Volcanic hazards can be described in terms of the distance from the volcano in which they may occur. Proximal hazards such as lava flows, pyroclastic flows, and lahars are considered to have an impact within 30 miles. Distal hazards, such as eruption clouds and ashfalls, may impact areas further than 30 miles from the volcano.

LOCATION

No active volcanoes are in the City of Sparks.

ESTIMATED IMPACT AND POTENTIAL LOSSES

The potential impacts and estimated losses to the City of Sparks due to a volcanic event can vary significantly depending on the eruption's severity. One major concern is air quality; volcanic eruptions can release ash and gases that impact health, leading to increased healthcare costs and reduced productivity.

Infrastructure could also be severely affected, with buildings, roads, and utilities at risk from ashfall or lava flow. The costs of repairing such damage could be substantial. Additionally, essential services like water supply and electricity might be disrupted, complicating recovery efforts.

Economically, the city could face reduced tourism and business interruptions, leading to financial losses and higher unemployment. Emergency response would entail significant costs, including evacuation plans and shelter for displaced residents. Long-term environmental changes could also affect local ecosystems, agriculture, and wildlife, further impacting industries reliant on these resources. Overall, the consequences of a volcanic eruption could be extensive and challenging for Sparks.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 91 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 91: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 92 provides the Calculated Priority Risk Index (CPRI) for volcano impacts in the City of Sparks based on the current plan’s hazard risk assessment results. The City of Sparks assigned

volcano a risk factor value of 1.3, reflecting long duration impacts. This risk factor value falls in the range of 0 to 1.9, which is considered a low-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 92: Calculated Priority Risk Index for Volcano in the City of Sparks

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Volcano	1	1	1	4	1	1.3	Low

VULNERABLE POPULATIONS

In Reno several populations could be considered vulnerable to volcanic activity. Local residents are at the forefront, as they live in areas that may be affected by ashfall, lava flows, or other volcanic hazards. Many residents may not be fully aware of the risks or evacuation routes, particularly if they are new to the area.

Tourists and visitors also represent a vulnerable population. Reno attracts many people, especially during peak seasons for skiing and outdoor activities. These individuals may lack knowledge about volcanic risks and may not have a clear understanding of how to respond in the event of an emergency, which can complicate evacuation efforts.

Low-income communities could face significant challenges during a volcanic event. Limited resources can hinder access to emergency information or transportation for evacuation. Without the means to relocate quickly, these populations may experience heightened risk during a volcanic crisis.

Additionally, elderly and disabled individuals are particularly vulnerable due to mobility challenges or health concerns. They may require extra assistance to evacuate safely and might be less able to respond swiftly in an emergency situation. Similarly, young children need attentive care during such events, as they may be more susceptible to health impacts from ashfall and require guidance to navigate the situation effectively.

Finally, outdoor workers, such as those in agriculture or forestry, may face unique risks during volcanic activity. Exposure to volcanic ash and deteriorating air quality can pose health threats, making it essential for this group to stay informed and prepared for possible emergencies.

PROBABILITY OF FUTURE EVENTS

The probability of future volcanic events in Sparks, Nevada is considered unlikely. Nevada is not known for volcanic activity, and the nearest significant volcanic systems are located far from this area.

Wildland Fire

LOCATION

South of Baring Boulevard and N. McCarran Boulevard, Sparks is largely built out. Developed properties and open spaces in this part of the city have very low to moderate potential for wildland fire. Since the 1990s, development has spread from the city's urban center north into areas with increased fire risk. Wildland–Urban Interface (WUI) areas occur in the foothills of the northern and eastern parts of the city, where the potential for wildland fire is rated between moderate and very high. As residential development occurs in the foothills, more homes are in areas of increased fire risk in the WUI. For example, in the Spanish Springs Valley north of Vista Boulevard, residential development has occurred in an area with high to very high fire potential.

EXTENT

As economic growth continues to increase demand for residential and commercial growth, more development is likely to occur in the foothills east of the city center and to the north in the Spanish Springs Valley. Increased development in these areas increases the risk that future wildland fires will damage structures, including homes and businesses.

In Washoe County, wildland fires are frequent and inevitable due to the arid climate; availability of fuels, such as sagebrush, rabbit brush, and cheat grass; and mountainous terrain. The vast majority of wildland fires burn between June and October. While Washoe County experiences wildland fires nearly every year, fewer fires have occurred in the City of Sparks. Based on recent historic occurrences of wildland fires, there is an estimated 10% to 15% chance of a wildland fire occurring in the city each year.

PREVIOUS OCCURRENCES/HISTORY

Past wildland fires in the city limits between 2015 and 2024 are listed below. This information supplements data on wildland fires that may have affected the city listed in the Wildfire Section of the Base Plan.

- **In 2017, the Earthstone Fire** burned 41,515 acres in the northeastern part of the city. This fire was human caused.
- **In 2017, the Prater Fire** burned 2,816 acres in the eastern part of the city near the foothills (see Figure 63). The cause of this fire has not been determined.
- **The I-80 Fire in 2017** burned 514 acres adjacent to I-80 on the southern edge of the city. The cause of this fire has not been determined.
- **In 2016, the S Fire** burned 2,554 acres in the southeastern part of the city near the foothills. The cause of this fire has not been determined.

Based on these recent events and recorded historic occurrences of wildland fires, there is an estimated 35%–45% chance of a fire occurring within city boundaries each year.



Figure 63: Map of Burn Area Prater Fire 2017, 6 Square Miles[134]

MOST RECENT INCIDENTS

- **June 11, 2024, The Sullivan Fire** burned in and around the City of Sparks, threatening the communities of Sparks, Sun Valley, and Spanish Springs (combined population 147K), with mandatory evacuations temporarily issued and later rescinded for the area along Wedekind Rd. northwest of North McCarran Blvd. and Pyramid Way, according to Washoe County. The fire threatened water towers and power transmission lines, destroying one transformer and road infrastructure. Multiple agencies helped battle the blaze, including the Sparks Fire Department and the Bureau of Land Management. The Sparks Police Department reported several vehicle accidents in the area due to onlookers. Figure 64 and Figure 65 provide more details about this fire.

[134] RiskFactor.com, 2024, "2017 Prather Fire Burn Area Map," Sparks, NV Wildfire Map and Climate Risk Report | Risk Factor



Figure 64: Sullivan Fire Burning behind Hug High School in Sparks[135]

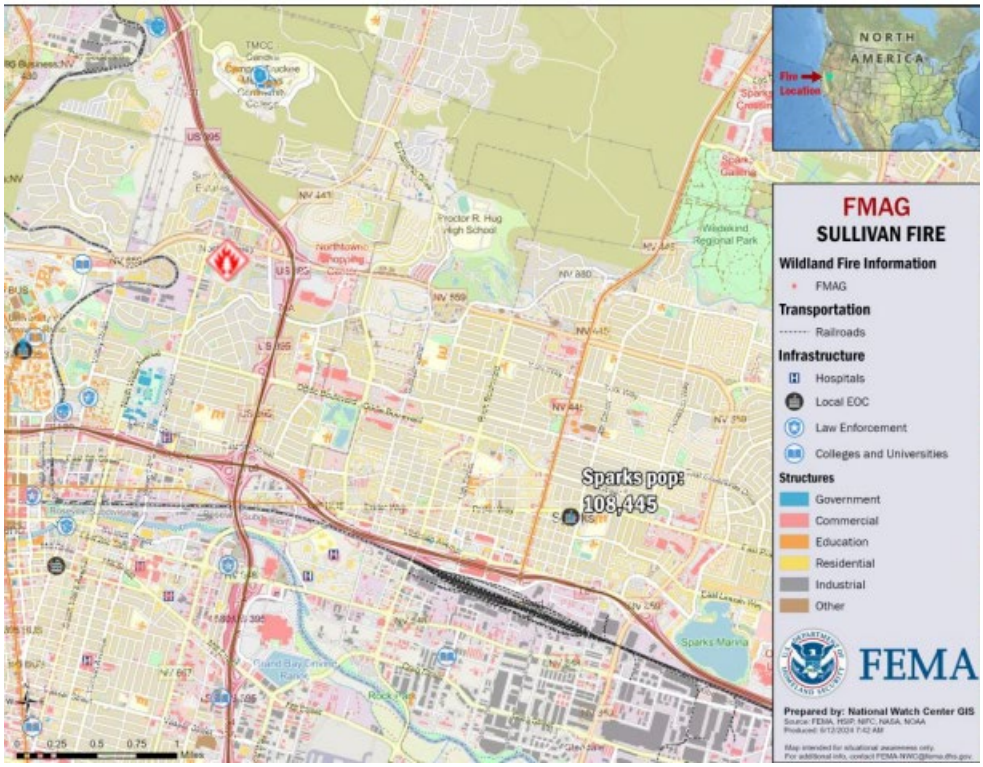


Figure 65: Information Map for the Sullivan Wildland Fire from the Fire Management Assistance Grant Program[136]

[135] MSN.com, June 12, 2024, "Sullivan Fire Burning behind Hug High School in Sparks," Sullivan Fire burns estimated 150 acres behind Hug High School, evacuations lifted (msn.com)
[136] FEMA, 2024, "Daily Operations Briefing 6-12-2024," FEMA Daily Ops Briefing 06-12-2024.pdf (govdelivery.com)

- **October 29, 2023:** Multiple agencies stopped forward progress on a fire that burned in the hills east of Sparks. The fire broke out during the evening hours of October 29 in the area above Northern Nevada Medical Center off Prater Way. Fire officials estimated the blaze burned roughly 10–20 acres. Structures in the area were briefly threatened, but no evacuations were issued.
- **July 4–5, 2023, Northeast Sparks –** Fireworks started a 5-acre brush fire in Sparks near Los Altos Parkway in the area of Culpepper Drive. The fire was reported around 10:30 p.m. No buildings were threatened, but the fire could be seen from nearby homes.
- **August 23, 2021, California Dixie and Caldor Fires –** Dense smoke from massive wildfires burning in neighboring California created hazardous air quality in the Reno–Tahoe area, canceling flights and forcing the closure of schools, parks, and popular summer beaches. Government air monitors recorded some of the region's most hazardous conditions in years. The National Weather Service issued an air quality alert for parts of northeast Nevada's Elko County, more than 300 miles (482 kilometers) east of the closest California fires. Smoke blowing from the Dixie and Caldor fires in California blanketed northern Nevada on and off for weeks, leaving particulate matter in the air and causing ash to rain on cars in some areas.

PROBABILITY OF FUTURE EVENTS

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.

The Washoe County Fire Plan identified 41 communities in the risk/hazard assessment for Washoe County.[137] Nearly half of these areas have high and extreme fuel hazard conditions within one mile of the community boundary. In some cases, hazardous fuel conditions occur within the community boundaries. Many of the areas classified as moderate fuel hazards have a large component of cheatgrass. During years with above-normal precipitation and abundant growth of cheatgrass, perennial grass, and annual forbs, these areas can escalate into high fuel hazard conditions. Table 93 lists five factors for fire hazard used to arrive at the community hazard assessment score: community design, construction materials, defensible space, availability of fire-suppression resources, and physical conditions, such as vegetative fuel load and topography.

[137] Washoe County Fire Plan, 2004 Executive Summary – Washoe County Fire Plan – Nevada Community Wildfire Risk / Hazard Assessment – RCI (rci-nv.com)

Table 93: Community Fire Risk and Hazards Assessment Results

Community	Interface Condition	Interface Fuel Hazard Condition	Ignition Risk Rating	Community Hazard Rating
High- and Extreme-Hazard Community				
Red Rock	Intermix	Low to High	High	High
Moderate-Hazard Communities				
Mogul (I-80 Corridor West)	Classic	Moderate	High	Moderate
Reno-Northwest	Classic	Moderate to High	High	Moderate
Reno-Southeast	Intermix	Moderate to High	High	Moderate
Verdi	Intermix	Moderate to Extreme	High	Moderate
Low-Hazard Communities				
Reno-Southwest	Classic	Low to High	High	Low
Sparks	Classic	Low to Moderate	Low	Low

Populated areas in Sparks have greater likelihood of wildfire than 76% of communities in the U.S. (Figure 66) and are predominantly exposed to wildfire from indirect sources, such as embers or home-to-home ignition. In the City of Sparks, 33,344 properties (89%) have some risk of being affected by wildfire over the next 30 years. Of those, 30,391 residential structures, 458 commercial structures, 21 infrastructure facilities, and 57 social facilities are at major risk.[138]

[138] RiskFactor.com, 2024, "Major Fire Factor," Sparks, NV Wildfire Map and Climate Risk Report | Risk Factor

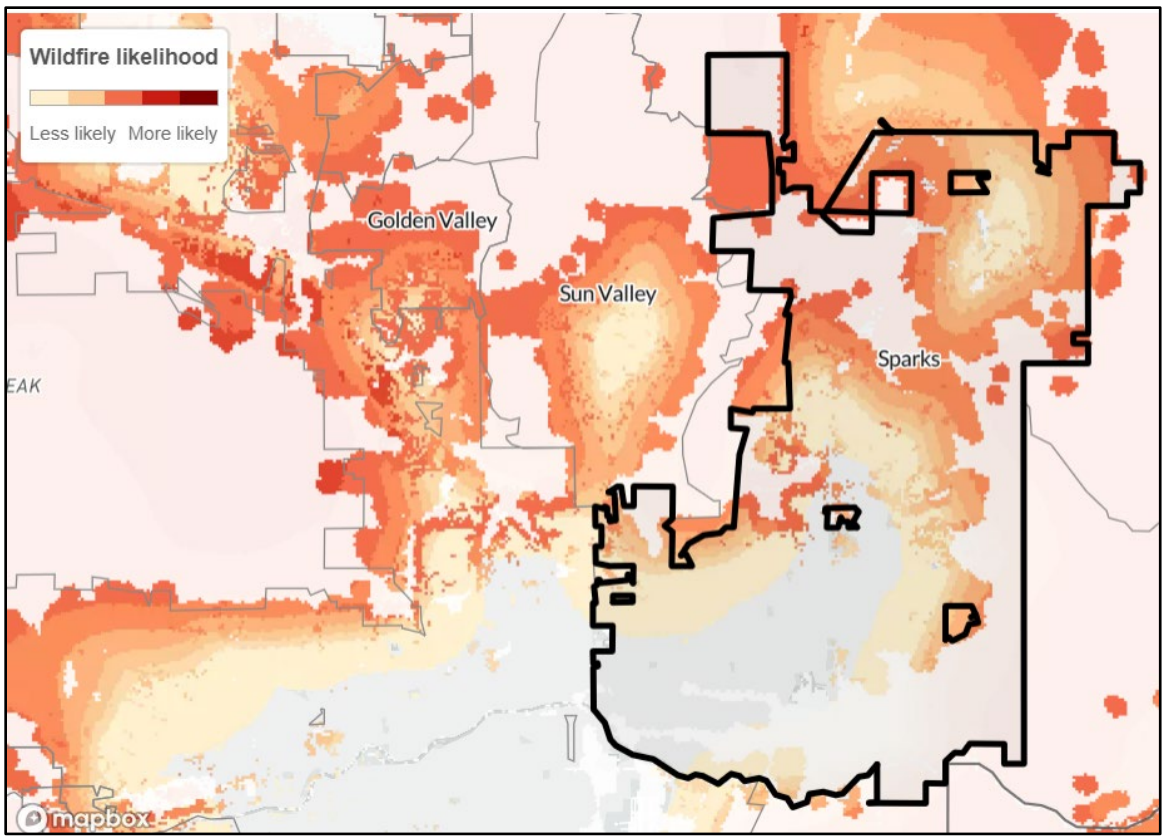


Figure 66: City of Sparks Populated Areas Wildfire Likelihood[139]

VULNERABILITY ANALYSIS

As development continues to increase in the WUI, the risk of wildland fire damage to homes and other structures will increase. New development in the Spanish Springs Valley has extended the response area for the city's fire department, resulting in longer response times that may increase the city's vulnerability to wildland fires. Currently, the city relies on the Truckee Meadows Fire Protection District to provide a response to fires in areas of the Spanish Springs Valley through a mutual aid agreement. Mitigation action AH-5 (2019 HMP), discussed in Section 5, is designed to address this vulnerability.

ESTIMATED IMPACT AND POTENTIAL LOSSES

Besides damaging properties, wildfire can also cut off access to utilities and emergency services, impact evacuation routes, and affect the overall economic well-being of an area. Overall, Sparks has a major risk of wildfire over the next 30 years. This is based on the level of risk the properties face, rather than the proportion of properties with risk.

[139] Wildfire Risk to Communities, 2024, "City of Sparks Populated Areas Wildfire Likelihood." Wildfire Risk to Communities

Figure 67 illustrates the key factors that make an area vulnerable to wildfire, including vegetation and fuel sources, possible ignition sources, topography, and weather conditions. Dry grass is a type of fuel source that can catch fire and spread quickly in high winds. Electric transmission lines, frequent lightning strikes, and human causes can cause wildfires. Land surface features or topography—such as mountains, hills, creeks, and other bumps—and weather conditions work together to determine how fast and how far wildfires spread. Fires climb uphill, and high winds can spread fire quickly and carry fire embers further.

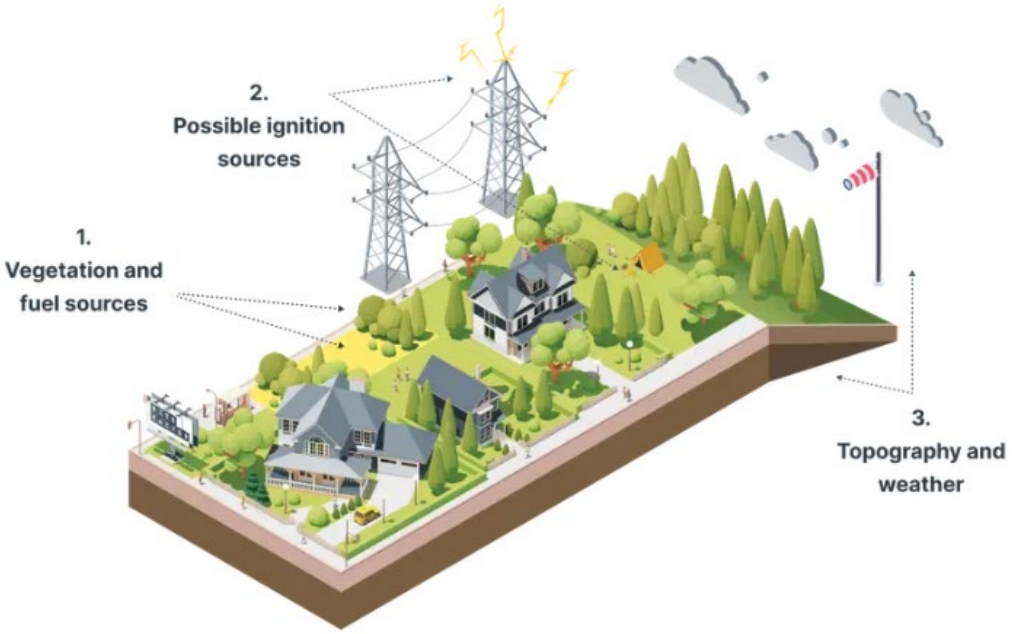


Figure 67: Key Factors that Make an Area Vulnerable to Wildfire[140]

VULNERABLE POPULATIONS

Diminished air quality is an environmental impact that can result from a wildfire event and pose a potential health risk. The smoke plumes from wildfires can contain potentially inhalable carcinogenic matter. Fine particles of invisible soot and ash that are too small for the respiratory system to filter can cause immediate and possibly long-term health effects. The elderly and those with compromised respiratory systems may be more vulnerable to the effects of diminished air quality after a wildfire event. Table 94 provides the statistics on vulnerable populations living in the City of Sparks. Figure 68 shows the areas with vulnerable populations in Sparks.

[140] RiskFactor.Com, 2024, "Key Factors that Make an Area Vulnerable to Wildfire," Sparks, NV Wildfire Map and Climate Risk Report | Risk Factor

Table 94: Demographics of the City of Sparks by Vulnerability to Wildfire[141]

Vulnerable populations
All areas in Sparks

Indicator	Number	Percent
Families in poverty	2,393 ±408	7% ±1.2%
People with disabilities	17,787 ±1,146	13.3% ±0.9%
People over 65 years	20,955 ±990	15.6% ±0.9%
People under 5 years	8,670 ±887	6.5% ±0.7%
People of color	58,759 ±4,773	43.9% ±3.8%
Black	2,670 ±547	2% ±0.4%
Native American	1,717 ±449	1.3% ±0.3%
Hispanic	43,714 ±3,100	32.6% ±2.5%
Difficulty with English	5,453 ±787	4.4% ±0.6%
Households with no car	2,788 ±425	5.5% ±0.9%
Mobile homes	3,751 ±439	7.4% ±1.6%

[141] Wildfire Risk to Communities, 2024. "City of Sparks Population Demographics by Vulnerability to Wildfire." https://wildfirerisk.org/explore/vulnerable-populations/48/48409/

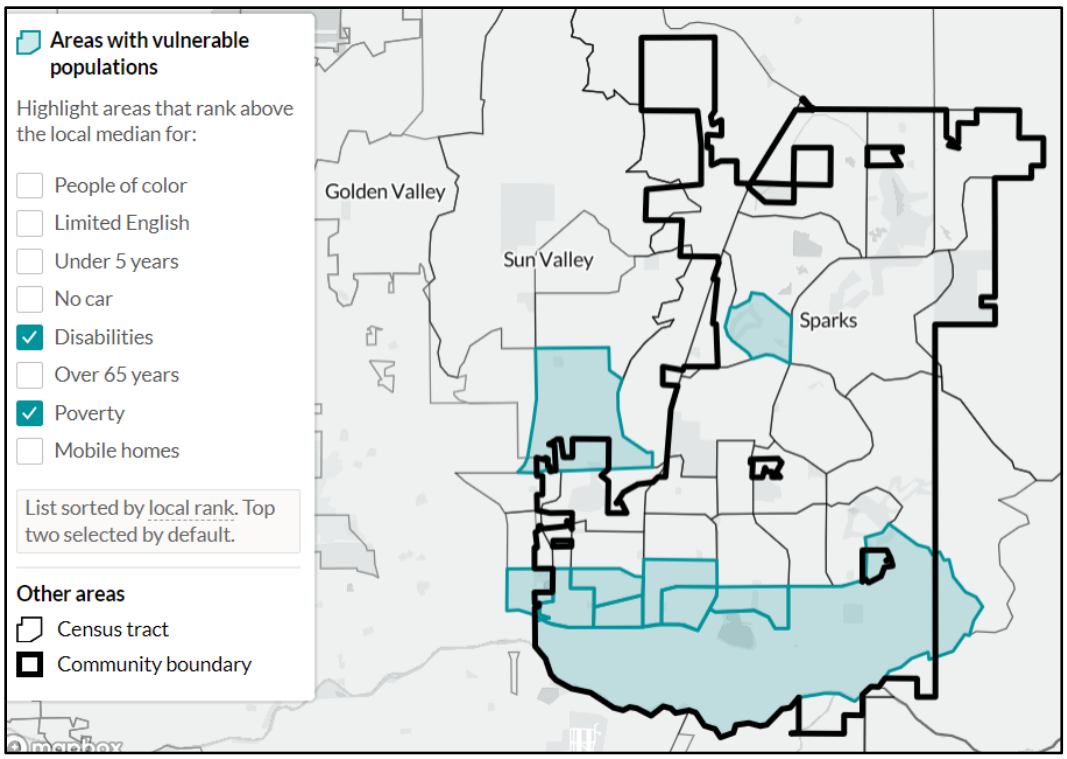


Figure 68: Areas in the City of Sparks with Vulnerable Populations – Disabilities and Poverty

The Climate and Economic Justice Screening Tool from the U.S. Climate Resilience Toolkit was used to determine what vulnerabilities impact the City of Sparks. According to this tool, which uses 2020 U.S. Census data, the City of Sparks has several disadvantaged populations identified by census tract, as they meet the threshold for more than one of the following categories: climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development. According to the Climate and Economic Justice Screening Tool, the portion of Sparks considered disadvantaged is represented in Figure 69.

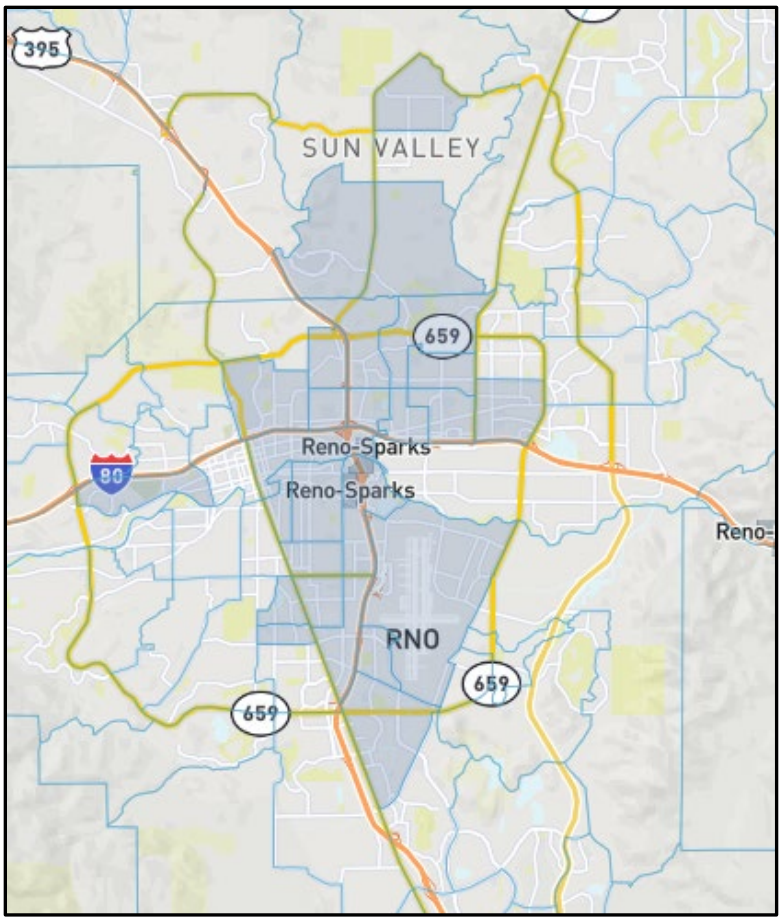


Figure 69: 27 Census Tracts in Washoe County Designated as Disadvantaged (in Gray)[142]

DEVELOPMENT TRENDS

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 1,700 single-family units.

Regional economic development in the City of Sparks has resulted in demographic changes and increased urban growth that have put more people and structures in the WU, increasing vulnerability to wildland fire. Recent development in unincorporated areas of the County near the cities of Reno and Sparks has occurred in the Wildland Urban Interface, increasing

[142] Climate & Economic Justice, 2024, "Ren-Sparks-27 Census tracts designated as disadvantaged in gray," Explore the map – Climate & Economic Justice Screening Tool (geoplatform.gov)

vulnerability to wildland fire. The 2024 Washoe County Lands Bill conveyed 15,860 acres of public land around Reno and Sparks to be sold at auction to developers; an additional 3,400 acres are designated for specific purposes, including roadway expansions, regional parks, and K–12 school sites, increasing the WUI. Continued regional growth and development pressure are likely to cause additional development outside the urban centers of Reno and Sparks in the WUI. As new areas are developed, additional fire response resources will be needed to quickly respond to reported fires and limit damage.[143]

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 95 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 95: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 96 provides the Calculated Priority Risk Index (CPRI) for wildland fire impacts in the City of Sparks based on the current plan's hazard risk assessment results. The City of Sparks assigned wildland fire a risk factor value of 2.5, reflecting medium probability, long duration, and high frequency impacts. This risk factor value falls in the range of 2 to 2.5, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

[143] The Nevada Independent, Gabby Birenbaum, 2024, Exclusive: Rosen introduces Washoe county lands bill years in the making – The Nevada Independent

Table 96: Calculated Priority Risk Index for Wildland Fire in the City of Sparks

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Wildland Fire	3	1	1	4	4	2.5	High

RECENT MITIGATION CASE STUDY

DEFENSIBLE SPACE PUBLIC EDUCATION PROGRAM

Sparks Fire Department Community Risk Reduction Division proactively focuses on educating the community about the benefits of proper safety practices and identifying and eliminating hazardous conditions posing a threat to life, property, and the environment. The Fire Department's Defensible Space program encourages residents to create defensible space around their home by implementing the three "R's" into their landscaping design: Removal, Reduction, and Replacement. They encourage the removal of dead or flammable vegetation, the reduction of vegetation by pruning or mowing, and providing space between plants and trees removes the continuous fuel bed that might otherwise exist throughout the yard. The more contiguous and denser the vegetation in yards, the greater the threat of wildfire to the home. The program encourages replacing flammable vegetation with less hazardous choices, shorter plants for taller plants, and non-woody plants for evergreens or junipers. The Fire Department provides the following website to calculate an effective defensible space home: http://www.livingwithfire.info.[144]

JURISDICTION-SPECIFIC VULNERABILITIES

Table 97: Vulnerable Assets in the City of Sparks

Vulnerable Assets	What makes this group/asset vulnerable during hazards? Have there ever been issues with recovery after an event?
People (residents, workers, visiting populations, and socially vulnerable populations like seniors, individuals with disabilities, lower-income individuals, etc.)	
Unhoused population	Homeless encampments along the Truckee River in danger due to floods and likely not receiving timely information regarding emergencies. None

[144] City of Sparks Fire Department, 2024,"Fire Prevention, Defensible Space, Living in Nevada Means Learning to Live in an Environment That Burns," Sparks Fire Department, NV (cityofsparks.us)

Vulnerable Assets	What makes this group/asset vulnerable during hazards? Have there ever been issues with recovery after an event?
Senior population	Seniors and health compromised susceptible to degraded air quality during large wildland fire events. No past events
Bilingual population (Spanish)	The City of Sparks is seeing growth in the percentage of population that does not speak English as their first language. No past events
Structures (residential, commercial, industrial, government-owned, planned capital improvement, etc.).	
	The entirety of the industrial area is susceptible to Truckee River Flooding. Recover after 1996–1997 flood and 2017 flood takes weeks
Reno/Sparks Wastewater Treatment plant	Older infrastructure, including the regional wastewater treatment plant, were constructed before modern earthquake mitigation measures being required.
Economic Assets (major employers, primary economic sectors, key infrastructure like telecommunications networks, etc.)	
None	
Natural, Historic, and Cultural Resources (areas of conservation, beaches, parks, critical habitats, community centers, historic places, etc.)	
Multiple parks along Rock Blvd, through Industrial Park	Continued development into the WUI and along floodways place these areas at higher risk
Critical Facilities and Infrastructure (hospitals, law enforcement, water, power, transportation systems, etc.)	
Northern Nevada Medical Center	Backs up to wildland
Truckee Meadows Water Reclamation Facility (TMWRF)	Isolated during the 1997 and 2017 floods. Access by helicopter was required in 1997 to relieve crews and adjacent to WUI.
Community Activities (major local events, such as festivals, or economic events, like farming or fishing)	
Various Public Events	Large gatherings are common in Victorian Square, including Star Spangled Sparks (4th of July celebration), Rib Cook off, approximately 10 concerts at the Nugget Events Center, various other special events place a large number of people in a small area.

VULNERABILITY ASSESSMENT

ASSET INVENTORY

Local assets that may be affected by hazards include residents, properties, utilities, and infrastructure. GIS data from federal, state, and local databases were used to inform the vulnerability assessment and identify critical infrastructure. The Vulnerability Assessment Section of the Base Plan discusses the sources and types of data used in the RHMP. 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 Sparks may be incomplete. Similarly, valuation information has not been compiled by the region, so valuation data were 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 in the next plan update.

REPETITIVE LOSS PROPERTIES

No repetitive loss properties currently exist in the City of Sparks.

EXPOSURE ASSESSMENT

Table 98 summarizes the exposure of critical facilities in the City of Sparks to hazards that can be mapped.

Table 98: Exposure Assessment of Critical Facilities in the City of Sparks

Type	Name	Address	Jurisdiction	Flood Zone	Seismic Ground Motion (2% Probability)	Seismic Ground Motion (10% Probability)	Landslide Susceptibility	Wildland Fire Hazard Potential
Dam	Sun Valley Detention Dam	N/A	Sparks	–	48–64	32–48	Low	1
Dam	Spanish Springs Stormwater Detention Facility	N/A	Sparks	100-year Flood Zone	48–64	32–48	Low	1
Dam	Sidehill Detention Basin	N/A	Sparks	–	48–64	32–48	Low	1
Dam	D'andrea Ranch Hole #6 Pond	N/A	Sparks	–	48–64	32–48	Low	1
Dam	Wetlands at Kiley Ranch	N/A	Sparks	–	48–64	32–48	Low	1
Dam	North Spanish Springs Flood Sediment Basin	N/A	Sparks	100-year Flood Zone	48–64	32–48	Low	1
Dam	North Spanish Springs Flood Detention Facility	N/A	Sparks	100-year Flood Zone	48–64	32–48	Low	1
Dam	D'andrea Detention Basin #1	N/A	Sparks	–	48–64	32–48	Low	1
Dam	D'andrea Detention Basin #3	N/A	Sparks	–	48–64	32–48	Low	1
Fire Station	Sparks Fire Department Station 2	2900 North Truckee Lane	Sparks	–	48–64	32–48	Low	1
Fire Station	City Of Reno Fire Department Station 17	500 Rockwell Boulevard	Sparks	–	48–64	32–48	Low	1

Type	Name	Address	Jurisdiction	Flood Zone	Seismic Ground Motion (2% Probability)	Seismic Ground Motion (10% Probability)	Landslide Susceptibility	Wildland Fire Hazard Potential
Fire Station	Sparks Fire Department Station 3	1750 East Greg Street	Sparks	100-year Flood Zone	64+	48–64	Low	1
Fire Station	Wadsworth Volunteer Fire Department 225	400 Stampmill Road	Sparks	–	48–64	32–48	Moderate	1
Fire Station	Sparks Fire Department Station 4	1450 Disc Drive	Sparks	–	48–64	32–48	Low	1
Fire Station	Sparks Fire Department Station 5	6490 Vista Boulevard	Sparks	–	48–64	32–48	Low	1
Fire Station	Sparks Fire Department Station 1	1605 Victorian Avenue	Sparks	–	48–64	48–64	Low	1
Fire Station	Hungry Valley Volunteer Fire Department	Eagle Canyon Drive	Sparks	–	48–64	32–48	Low	1
Police Station	Sparks Police Department	1701 East Prater Way	Sparks	–	64+	32–48	Low	1

Land Use and Development Trends

FEMA

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

Sparks's population continues to grow as economic development and more moderate housing prices compared with California draw new residents to the region. Since the 1990s, Sparks has been expanding to the north into the Spanish Springs Valley, where most new housing is being constructed. This relatively new development may be vulnerable to key hazards outlined in the RHMP, particularly wildland fires.

The vulnerability subsection of each hazard profile 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 99 provides a snapshot of how vulnerability has changed since development of the 2020 HMP.

Table 99: Recent Development Trends

Type of Hazard Event	Changes in Land Use	Changes in Population	Changes in Conditions (e.g., climate change)	Overall Vulnerability
Avalanche and Landslide	No changes	No changes	No changes	No changes
Criminal Acts and Terrorism	No changes	No changes	No changes	No changes
Drought	No changes	No changes	No changes	Decreased – while the natural drought cycle is not controllable by humans, the water authority has taken measures to minimize the

Type of Hazard Event	Changes in Land Use	Changes in Population	Changes in Conditions (e.g., climate change)	Overall Vulnerability
				impact of drought
Earthquake	No changes	No changes	No changes	Decreased – newer construction and new retrofits are better able to withstand seismic forces
Energy Emergency	No changes	Increased – Sparks Population is now approx. 120,000	No changes	Increased – more population exacerbates any shortage of energy during extreme heat or cold
Flood	No changes	No changes	No changes	Decreased – the industrial area has been built out for years so the risk is static, but the realignment of the North Truckee Drain has reduced the impact of flooding
Hazardous Materials Incident	No changes	No changes	No changes	No changes

Type of Hazard Event	Changes in Land Use	Changes in Population	Changes in Conditions (e.g., climate change)	Overall Vulnerability
Infectious Disease	No changes	Increase in population	No changes	Increased – more people in the same area increases the likelihood of infection
Radiological Waste Transport	No changes	No changes	No changes	No changes
Extreme Weather (Winter Storm, Windstorms, Extreme Heat)	No changes	Increase in population, senior population seeking retirement homes	No changes	Increased – more people and more development subject to the same number of storms
Transportation Incident	No changes	Increase in population increases the risk of road accidents on existing infrastructure conditions	No changes	No changes
Volcano	N/A	N/a	N/A	N/A
Wildland Fire	Almost all development in Sparks is on the perimeter, most of which is in or near the WUI	Increase housing subdivisions due to increase in population	No changes	Increased vulnerability

Type of Hazard Event	Changes in Land Use	Changes in Population	Changes in Conditions (e.g., climate change)	Overall Vulnerability
		on outer limits of city		

Capability Assessment

FEMA	**C1.** Does the plan document [the City of Spark'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))

Planning and Regulatory

Planning and regulatory capabilities are the plans, policies, codes, and ordinances that prevent and reduce the impacts of hazards.

Table 100: Planning Capabilities of the City of Sparks

Plan	Do you have this? (Y/N)	Does the plan address hazards? (Y/N)	How can the plan be used to implement mitigation actions?	When was it last updated? When will it next be updated?
General Plan	Yes	No	Need further investigation	2021, 2030
Capital Improvement Plan	Yes	No	Need further investigation	Annually updated
Climate Change Adaptation Plan	No	N/A	N/A	N/A

Plan	Do you have this? (Y/N)	Does the plan address hazards? (Y/N)	How can the plan be used to implement mitigation actions?	When was it last updated? When will it next be updated?
Community Wildfire Protection Plan	Yes	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.
Economic Development Plan	No	N/A	N/A	N/A
Land Use Plan	Yes	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.
Local Emergency Operations Plan	Yes	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.

Plan	Do you have this? (Y/N)	Does the plan address hazards? (Y/N)	How can the plan be used to implement mitigation actions?	When was it last updated? When will it next be updated?
Stormwater Management Plan	Yes	Yes	Used to identify potential hazards and mitigation projects to address them	2016
Transportation Plan	Yes	Yes	Support HMP goals for mitigation actions	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.
Substantial Damage Plan	No	N/A	N/A	N/A
Other? (Describe)	Washoe County has a Damage Assessment Plan that serves the same intent and covers all jurisdictions.			

Table 101: Regulations and Ordinances of the City of Sparks

Plan	Does this regulation/ordinance effectively reduce hazard impacts?	Is it adequately administered and enforced?	When was it last updated? When will it next be updated?
Building Code	Yes	Yes	2018, but we will be adopting the 2024 updates later this year
Flood Insurance Rate Maps	Yes	Yes	Available online and at Washoe County
Floodplain Ordinance	No	N/A	N/A
Subdivision Ordinance	Yes	Yes	Chapter 17 of Sparks Muni Code
Zoning Ordinance	Yes	Yes	Chapter 20 of Sparks Muni Code
Natural Hazard Specific Ordinance (Stormwater, Steep Slope, Wildfire)	No	N/A	N/A
Acquisition of Land for Open Space and Public Recreation Use	No	N/A	N/A
Prohibition of Building in At-Risk Areas	Yes – development in the floodway is prohibited with the exception of improvements that	Yes	Thorough research revealed a lack of sufficient information to evaluate or

Plan	Does this regulation/ordinance effectively reduce hazard impacts?	Is it adequately administered and enforced?	When was it last updated? When will it next be updated?
	would not impede flow e.g., a parking lot. Development in the flood plain is required to 1 foot above Base Flood Elevation.		categorize this, indicating a need for further investigation.
Other? (Describe)			

Administrative and Technical

Administrative and technical capabilities include staff and their skills. They also include tools that can help you carry out mitigation actions. If you do not have local staff, consider how state and regional partners can help.

Table 102: Administrative Capabilities of the City of Sparks

Administrative Capability	Do you have this? (Y/N)	Is staffing adequate?	Is staff trained on hazards and mitigation?	Is coordination between agencies and staff effective?
Chief Building Official	Yes	Yes	Yes	Yes
Civil Engineer	Yes	No – several vacant positions have to be filled	Yes	Yes, when staffing allows for such coordination
Community Planner	Yes	Yes	Yes	yes

Administrative Capability	Do you have this? (Y/N)	Is staffing adequate?	Is staff trained on hazards and mitigation?	Is coordination between agencies and staff effective?
Emergency Manager	Yes	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.
Floodplain Administrator	No	No	N/A	We have a CFM, but no floodplain administrator title position.
Geographic Information System (GIS) Coordinator	Yes	No	No	Yes
Planning Commission	Yes	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.
Fire Safe Council	No	N/A	N/A	N/A

Administrative Capability	Do you have this? (Y/N)	Is staffing adequate?	Is staff trained on hazards and mitigation?	Is coordination between agencies and staff effective?
CERT (Community Emergency Response Team)	No	N/A	N/A	N/A
Active VOAD (Voluntary Agencies Active in Disasters)	No	N/A	N/A	N/A
Other? (Please describe)				

Table 103: Technical Capabilities of the City of Sparks

Technical Capability	Do you have this? (Y/N)	How has the capability been used to assess/mitigate risk in the past? (Answer or N/A)	How can the capability be used to assess/mitigate risk in the future?
Mitigation Grant Writing	Yes	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.
Hazard Data and Information	No	NA	NA

Technical Capability	Do you have this? (Y/N)	How has the capability been used to assess/mitigate risk in the past? (Answer or N/A)	How can the capability be used to assess/mitigate risk in the future?
GIS	Yes	NA	NA
Mutual Aid Agreements	No	NA	Need to ask Fire Dept.
Other? (Please describe)			

Financial

Financial capabilities are the resources to fund mitigation actions. Talking about funding and financial capabilities is important to determine what kind of projects are feasible given their cost. Mitigation actions like outreach programs are lower cost and often use staff time and existing budgets. Other actions, like earthquake retrofits, could require substantial funding from local, state, and federal partners. Partnerships, including partners willing to donate land, supplies, in-kind matches and cash, can be included.

Table 104: Financial Capabilities of the City of Sparks

Funding Resource	Do you have this? (Y/N)	Has this funding resource been used in the past and for what types of activities?	Could this resource be used to fund future mitigation actions?	Can this be used as the local cost match for a federal grant?
Capital Improvement Project Funding	Yes	Thorough research revealed a lack of sufficient information to evaluate or categorize this,	Thorough research revealed a lack of sufficient information to evaluate or categorize this,	Thorough research revealed a lack of sufficient information to evaluate or categorize this,

Funding Resource	Do you have this? (Y/N)	Has this funding resource been used in the past and for what types of activities?	Could this resource be used to fund future mitigation actions?	Can this be used as the local cost match for a federal grant?
		indicating a need for further investigation.	indicating a need for further investigation.	indicating a need for further investigation.
General Funds	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.
Hazard Mitigation Grant Program (HMGP/404)	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.
Building Resilient Infrastructure & Communities (BRIC)	Yes	Seismic risk analysis for the regional wastewater treatment plant	Yes	Yes

Funding Resource	Do you have this? (Y/N)	Has this funding resource been used in the past and for what types of activities?	Could this resource be used to fund future mitigation actions?	Can this be used as the local cost match for a federal grant?
Flood Mitigation Assistance (FMA)	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.
Public Assistance Mitigation (PA Mitigation/406)	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.
Community Development Block Grant (CDBG)	Yes	Urban residential street sidewalk upgrades.	Yes	Yes
Natural Resources Conservation Services (NRCS) Programs	No	N/A	N/A	N/A

Funding Resource	Do you have this? (Y/N)	Has this funding resource been used in the past and for what types of activities?	Could this resource be used to fund future mitigation actions?	Can this be used as the local cost match for a federal grant?
U.S. Army Corps (USACE) Programs	No	N/A	N/A	N/A
Property, Sales, Income, or Special Purpose Taxes	Yes	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.
Stormwater Utility Fee	Yes	Yes, storm drain infrastructure improvement	Yes	Yes
Fees for Water, Sewer, Gas, or Electric Services	Yes	Fees for Sewer that are used for sewer infrastructure improvements	Yes	Yes
Impact Fees from New Development and Redevelopment	Yes	Used for new improvements for new development or redevelopment areas	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for

Funding Resource	Do you have this? (Y/N)	Has this funding resource been used in the past and for what types of activities?	Could this resource be used to fund future mitigation actions?	Can this be used as the local cost match for a federal grant?
			need for further investigation.	further investigation.
General Obligation or Special Purpose Bonds	Yes	Capital for the new Fire Station 6 to provide coverage to Northwest Sparks	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.
Federal-funded Programs (Please describe)	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.
Other State-funded Programs (Please describe)	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for

Funding Resource	Do you have this? (Y/N)	Has this funding resource been used in the past and for what types of activities?	Could this resource be used to fund future mitigation actions?	Can this be used as the local cost match for a federal grant?
	further investigation.	for further investigation.	need for further investigation.	further investigation.
Private Sector or Nonprofit Programs	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.
Other?				

Education and Outreach

Education and outreach capabilities are programs and methods that could communicate about and encourage risk reduction. These programs may be run by a participant or a community-based partner. Partners, especially those who work with underserved communities, can help identify additional education and outreach capabilities.

Table 105: Education and Outreach Capabilities of the City of Sparks

Education and Outreach Capability	Do you have this? (Y/N)	Does this resource currently incorporate hazard mitigation?	Notes
Community Newsletter(s)	Yes – MySparks App and city website	Yes – both are used to send and receive information to/from the community	

Education and Outreach Capability	Do you have this? (Y/N)	Does this resource currently incorporate hazard mitigation?	Notes
Hazard Awareness Campaigns (such as Firewise, Storm Ready, Severe Weather Awareness Week, School Programs)	Yes	significant outreach through website, news and social media regarding many hazards, such as wildfire awareness, Extreme weather, winter driving	
Public Meetings/Events (Please Describe)	Yes	All city committees and commissions are required to hold public meetings at least quarterly	
Emergency Management Listserv	Yes	The City's Emergency Management Team is on a consolidated email list for quick communication	
Local News	YES	The city's PIO team works very closely with local media to distribute information during emergencies and special events	
Distributing Hard Copies of Notices (e.g., public libraries, door-to-door outreach)	No	N/A	
Insurance Disclosures/Outreach	No	N/A	

Education and Outreach Capability	Do you have this? (Y/N)	Does this resource currently incorporate hazard mitigation?	Notes
Organizations that Represent, Advocate for, or Interact with Underserved and Vulnerable Communities (Please Describe)	Yes	City staff works with regional teams to communicate with homeless, senior and other communities	
Social Media (Please Describe)	Yes	Sparks PIO team used Facebook, X, Instagram and Nextdoor to communicate with the public for all issues, including hazard mitigation and during emergencies	
Other? (Please Describe)			

National Flood Insurance Program Participation

The National Flood Insurance Program **(**NFIP) is a Federal Emergency Management Agency **(**FEMA) program that provides flood insurance to millions of policyholders across the country. The plan must describe participation in the NFIP for each participant, as applicable, in accordance with NFIP regulatory requirements.

Table 106: Floodplain Management, Mapping, and Insurance for the City of Sparks

Question	Response
Who is the floodplain manager? Is this their primary or secondary role?	Robert Bidart, PE – Secondary Role
Does the floodplain manager have adequate training and capacity for their role? If not, what else is needed?	Yes, but additional training is always warranted.
How does the community enforce its floodplain rules? Does enforcement include monitoring compliance and acting to correct violations?	Yes, through Planning and Building Departments in the Admin Review process and building permit process.
When was the community's most recent Community Assistance Visit (CAV)?	Over 10 years.
Were any violations noted on the community's most recent CAV?	There were violations that rendered the Community ineligible for CRS rating.
Is there an upcoming CAV? If not, is one needed?	No.
When was the most recent floodplain management ordinance adopted?	12/26/1995
Does your community participate in the Community Rating System (CRS)? If so, describe the steps the community has taken to achieve the CRS goals.	No
Does the community's floodplain management ordinance include any higher standards? If so, please list.	No
Who is responsible for permitting?	Building Department
How does the community issue development permits in the special flood hazard area?	Through Planning and Building Department.
Does the community maintain elevation certificates?	Yes
Does the community track the number of buildings in the special flood hazard area? If yes, are there any trends?	Yes, not aware of any trends.
How many repetitive loss (RL) structures does the community have? (List number and type of structure)	27, 1 single family, 21 non-residential and 5 non-residential business
How many severe repetitive loss (SRL) structures does the community have? (List number and type of structure)	0
Have any RL/Stable properties been mitigated since the last plan update?	none
Who is responsible for making substantial damage/substantial improvement determinations?	Building Department Inspectors

Question	Response
How does the substantial damage/substantial improvement process work in your community?	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.
Is there sufficient staff and training to make substantial damage/substantial improvement determinations?	Staff and training are needed.
How are substantial damage/substantial improvement requirements messaged to the public before and after an event?	Through City PIO
Have any substantially damaged/substantially improved structures been mitigated since the last plan update?	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.
How will the community remain in compliance with the NFIP moving forward? (simply stating "the community will continue to comply with the NFIP" will not meet FEMA's planning requirements)	"Not sure how to address this question"
How does the community support map change requests? This could be requests during the Risk MAP process or through Letters of Map Amendment or Revision.	"Not sure how to address this question"
When did the latest FIRM become effective?	March 16, 2009
When was the latest Flood Insurance Rate Map (FIRM) adopted?	March 16, 2009
Is the FIRM and FIS report in an accessible location? How would the public get access to their flood map information?	Through Washoe County
Does the community use any Risk MAP products? If so, describe.	No
Does the community collect updated floodplain data or modeling? Is this shared with partners and with FEMA?	Yes
How does the community educate the public on floodplain management and the availability of flood insurance, in and out of the floodplain?	The City does not do much flood awareness education. That is largely done by the Truckee Meadows Flood Management Authority.
How does the community engage with insurance agents on flood insurance?	N/A

Question	Response
Does the community (or state) have flood hazard disclosure laws?	Yes – statewide law requires disclosure before transfer of title in all real estate transactions
How familiar is the public with their flood insurance options?	Not Sure
How many properties have flood insurance in the community?	251
Are there any areas where flood insurance is lacking?	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.
Other comments?	

No repetitive loss properties are located in the City of Sparks.

Opportunities to Expand and/or Improve Capabilities

Table 107: The City of Sparks's Opportunities to Develop Capabilities

Capability Type	Opportunity to Expand and/or Improve
Planning and Regulations	Flood Hazard – Limited opportunity as the vast majority of the flood plain has been developed for many years. Current regulations regarding development are adequate to address any new projects.
Administrative and Technical	None
Financial	Grants to support seismic risk mitigation for municipal facilities, particularly regional wastewater plant and older public safety facilities
Education and Outreach	Possible expansion of Public Service Announcements to cover flood insurance information for residents

Plan Integration

FEMA	**C6.** Does the Plan describe a process by which it will incorporate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate?

An updated plan must explain how the plan participants incorporated the previous mitigation plan, when appropriate, into other planning mechanisms over the last 5 years. This demonstrates progress in local mitigation efforts. Planning mechanisms refer to the governance structures used to manage local land use development and community decision making, such as budgets, comprehensive plans, capital improvement plans, or other long-range plans, codes, and ordinances. Table 108 lists the previous plans that have been integrated into this one.

Table 108: Integration of Previous Plans by the City of Sparks

Plan Name	Description
Washoe County Regional Hazard Mitigation Plan – 2020	Regional HMP adopted by the City of Sparks and used until update/current revision
Planning and Zoning/ Building Code	Used and considered when updating codes
Master Plan – Valid until 2030, but with updates every 4 years	Used and considered when updating master plan

The plan must also identify the local planning mechanisms where the updated hazard mitigation information/actions may be integrated and how. Listing specifics, such as who will be responsible, the timeframe for the update, and ongoing work, such as hiring a contractor or gathering data, can help meet this requirement. Table 109 lists opportunities for future plan integration.

Table 109: Opportunities for Future Plan Integration for the City of Sparks

Plan Name	Description
Community Wildfire Protection Plan (CWPP)	Creating CWPP for City of Sparks and will use HMP information.
Building Code	Used and considered when updating codes.
Master Plan – Valid until 2030, but with updates every 4 years	Used and considered when updating master plan.

Mitigation Strategy

FEMA	**C4.** Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure?

Review of 2020 Hazard Mitigation Actions

As part of the mitigation strategy update, all mitigation actions identified in the 2020 plan were evaluated to determine the status of the action and whether any ongoing or incomplete actions should be included as actions in the 2025 plan update. Table 110 shows the results.

Table 110: Status of Previous Mitigation Actions by the City of Sparks

ID	Mitigation Action	Lead Department	Status for Plan Update	Should this action be retained in the plan update? (Yes/No)
MH-5	Build an additional fire/rescue station (Station 6) so response times are equal to 4 minutes of travel time (City of Sparks)	Sparks Fire Department	Approved by City Council in 2024. Estimated for completion in October 2025.	No due to estimated completion date and secured funding.
MH-9	Implement and/or use Community Emergency Response Teams and the Citizens Homeland Security Council, to shift burden from sworn officers, where appropriate (All Partners)	All Jurisdictions: • Emergency Managers • Police Departments	In progress and ongoing. CERT is used by all regional agencies, as needed, but is run through the Washoe County Sheriff's Office.	No
MH-15	Address needed technological updates and repairs for the City of Sparks' Mobile Command Center, including providing new radios, repairing the telescoping pole for the camera, and providing other updated equipment (City of Sparks)	Sparks Police Department	In progress – radio upgrade began. Item is no longer needed as there are now better alternatives for remote response for dispatch and leadership to be on site.	No
MH-16	Develop an evacuation plan for northern Sparks, including	City of Sparks	In progress – working with WCEM on evacuation study opportunities/funding	Yes

ID	Mitigation Action	Lead Department	Status for Plan Update	Should this action be retained in the plan update? (Yes/No)
	evacuation routes, available emergency services, a communications strategy, animal evacuation support, and many other support functions (City of Sparks)		and City of Sparks (CoS) Emergency Management will be responsible.	
WF-1	Develop surge capabilities in the region to handle burn patients (All Partners)	Renown Health	IHCC brought in burn training on two occasions and flew providers to Las Vegas to train with UMC. There is also a burn appendix in the MCIP.	N
WF-8	Develop standardized policies and regulations across Washoe County governing open burning (City of Sparks)	Sparks Fire Department	Not completed. No longer needed.	N
WF-9	Manage fuels through targeted grazing on an as-needed basis (City of Sparks)	Sparks Fire Department	In-Process. Applied for grant funding for goat grazing around wastewater treatment plant specifically. Pending approval of grant.	Y
WF-10	Partner with Nevada Division of Forestry (NDF) crews on fuel	Sparks Fire Department	In progress – change from NDF to TMFPD. Partnership has already begun.	Y

ID	Mitigation Action	Lead Department	Status for Plan Update	Should this action be retained in the plan update? (Yes/No)
	reduction on an as-needed basis (City of Sparks)			
WF-11	Place containers around the City of Sparks for residents to dump wood and brush from their yards (City of Sparks)	Sparks Fire Department	Not started. With CWPP efforts, will aim to find homeowner associations and neighborhood efforts for green waste cleanup.	Y
WF-12	Partner with NDF to develop educational materials and multi-media blasts (City of Sparks)	Sparks Fire Department	In progress. Partnerships are with all fire agencies and governmental agencies like NDF. Will continue.	Y
WF-13	Adopt 2018 wildland fire code Countywide (All Partners)	Regional Fire Protection Districts	Completed. Adopted 2020 when available. Will adopt new code when applicable.	N
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)	Regional Fire Protection Districts	In progress. Will aim to incorporate Sparks-specific examples in tabletops and drills but remain focused on working as a region in this process.	Y
FL-1	Update flood maps to incorporate recently completed flooding mitigation projects along the	Washoe County Emergency Management and	As of Nov 2023: Ongoing map updates in progress, including Risk Map, FEMA flood map	No

ID	Mitigation Action	Lead Department	Status for Plan Update	Should this action be retained in the plan update? (Yes/No)
	Truckee River in Sparks (Washoe County, City of Reno, City of Sparks, Truckee River Flood Management Authority [TRFMA])	Homeland Security Reno Fire Department Sparks Fire Department	updates currently under review by the City of Reno and Washoe County. TRFMA – TRFMA is the lead. In March 2023, TRFMA submitted the Truckee River remapping package to FEMA for initial review. Comments were received in May 2023 and responses to comments were recently submitted.	
FL-2	Update FEMA Flood Insurance Rate Maps to incorporate recent Letter of Map Revision, Conditional Letter of Map Revision, and changes in topography and impervious surfaces using regional LiDAR data (Washoe County, City of Reno, City of Sparks)	Washoe County Community Services Department	In Progress. TRFMA has submitted the Physical Map Revision to FEMA for their review. 6–18 months out as of Nov 2023.	No
FL-7	Install larger drainage pipes to reduce flooding in and around Baring Blvd (City of Sparks)	Sparks Public Works	As of Nov 2023: CoS – In progress, construction with Phase 2 of RTC Sparks Blvd widening TRFMA – Construction with Phase 2 of RTC Sparks Blvd widening	No

ID	Mitigation Action	Lead Department	Status for Plan Update	Should this action be retained in the plan update? (Yes/No)
FL-8	Increase flow capacity at bottle neck sections of the Truckee River in the City of Sparks (City of Sparks)	Sparks Public Works	As of Nov 2023: CoS – In progress, TRFMA is lead (Vista Narrows) TRFMA – TRFMA is the lead for the Vista Narrows Floodplain Terracing Project. TRFMA has completed the 65% design for the Vista Narrows Project. Environmental permit applications have been submitted to the regulatory agencies for review. TRFMA is working with downstream stakeholders (e.g., Storey County, PLPT) to address impacts and develop a plan for mitigation. Construction is expected in 2024–2025.	No
FL-9	Complete drainage ditch improvements (Washoe County, City of Reno, City of Sparks, RSIC, PLPT)	All Jurisdictions: • Public Works	As of Nov 2023: Steamboat Ditch preliminary evaluation completed. Other ditches not started.	No
FL-14	Complete improvements to address undersized drainage ditches and systems Countywide (Washoe County, City of Reno, City of Sparks, RSIC, PLPT)	All Jurisdictions: • Public Works • Engineering	As of Nov 2023: CoS – in progress	No

ID	Mitigation Action	Lead Department	Status for Plan Update	Should this action be retained in the plan update? (Yes/No)
FL-17	Create a master Emergency Action Plan for dams in the City of Sparks to create consistency and eliminate the confusion caused by plans in different formats (City of Sparks)	Sparks Community Services Sparks Engineering Services	CoS – Completed	No
FL-18	Construct a storm drain pump station and force main and gravity main improvements at the intersection of Vista Blvd. and Prater Way to address flash flooding at this intersection (City of Sparks)	Sparks Community Services Sparks Engineering Services	CoS – Completed	No
FL-19	Complete a feasibility study, including a geotechnical investigation, hydraulic model, and outfall recommendations, to investigate detaining stormwater behind the Spanish Springs Dam to meter discharge to the North Truckee Drain during floods and winter storms (City of Sparks)	Sparks Community Services Sparks Engineering Services	In process. Sparks Blvd widening project w/RTC, currently in design, have looked at flood hazards on N. Truckee Drain between Baring Blvd. and Lincoln Way.	Yes

ID	Mitigation Action	Lead Department	Status for Plan Update	Should this action be retained in the plan update? (Yes/No)
FL-36	Sparks Levees and Floodwalls Glendale to Greg: Replacement of the existing levee on the north bank with on-bank floodwalls to minimize construction and right-of-way impacts on the TMWA Glendale Water Treatment Plant. Trail can be incorporated into floodwall maintenance road (TRFMA, City of Sparks)	TRFMA	Truckee Meadows Water Authority (TMWA) Levee (Glendale Ave Bridge to Greg St Bridge): Construct a levee approximately 3,000 ft long along the north bank of the Truckee River with one portion set back from the riverbank (as space allows). Estimated cost is $4.5M in 2021 dollars. TRFMA plans to work collaboratively with TMWA on site access, fencing, and security. This design concept is a shift from the previous (2016) version of the Flood Project plan, which included a floodwall. Planned construction: 2026–2027 or 2027–2028.	Yes
FL-37	Mill Street Levee – Greg to Rock: Reduced south bank floodplain terracing with the associated levee move closer to the Truckee River. Reduces excavation costs and reduces impacts on the existing Pioneer Ditch (Costs included in Element 19 Sparks Levees and Floodwalls: Glendale to Greg.) (TRFMA, City of Sparks)	TRFMA	Reno–Tahoe International Airport Berm & Terracing (Greg St Bridge to Rock Blvd Bridge): Excavate a floodplain terrace and construct an earthen berm along the south bank of the Truckee River near the airport (Greg St Bridge to Rock Blvd Bridge). The floodplain terrace would be revegetated with low-growing plant species because of airport safety regulations. The estimated cost to	Yes

ID	Mitigation Action	Lead Department	Status for Plan Update	Should this action be retained in the plan update? (Yes/No)
			construct the floodplain terrace is $2.4M in 2021 dollars. The amount of fill material required for the berm would be approximately 90,000 cubic yards or less; construction cost is estimated at $2.7M in 2021 dollars. Cost savings may be achieved by using spoil material from the Vista Narrows Floodplain Terracing Project. If necessary to alleviate a minor rise in water level due to the airport berm, construct a small berm on the north bank of the Truckee River. This design concept is a shift from earlier plans, which included a levee. A wide berm with a gentle slope is now the preferred alternative because a levee would be more of an obstacle to landing aircraft, and therefore a safety concern. Planned construction: 2026–2027 or 2027–2028.	
FL-38	Terracing Greg to Rock: Reduced terracing to stabilize the riverbank, reduce the amount of excavation, and avoid the existing Pioneer	TRFMA	Same as FL-37	Yes

ID	Mitigation Action	Lead Department	Status for Plan Update	Should this action be retained in the plan update? (Yes/No)
	Ditch. The terracing and associated levee are moved northward toward the Truckee River and levee ties into the McCarran Blvd. bridge (TRFMA, City of Sparks)			
FL-39	Abutment, pier, and bank scour protection measures (as required) from Rock Blvd Bridge to Vista Narrows. Includes East McCarren Blvd Bridge (TRFMA, City of Reno, City of Sparks)	TRFMA	This mitigation action requires further analysis to determine exactly what is required along the reach.	No
FL-40	Mill Street Levee – Rock to McCarran: Reduced south bank floodplain terracing with the associated levee move closer to the Truckee River. Reduces excavation costs and reduces impact on the existing Pioneer Ditch. Pioneer Ditch will be piped to allow for use of the fill disposal area (TRFMA, City of Sparks)	TRFMA	Mill/McCarran Levees & Terracing (Rock Blvd Bridge to McCarran Blvd Bridge): Currently in 60% design phase (June 2024). Planned construction: 2027–2028. Between the Rock Blvd Bridge and the McCarran Blvd Bridge, relocate the Truckee River channel and increase its sinuosity, excavate floodplain terraces, and construct levees to reduce flood risk, restore the ecosystem, and enhance recreational opportunities. The updated conceptual design omits	Yes

ID	Mitigation Action	Lead Department	Status for Plan Update	Should this action be retained in the plan update? (Yes/No)
			floodwalls and includes higher levees on both the north and south banks of the Truckee River, as well as a lower "intermediate" levee on the south side. The intermediate levee would be designed to contain a 50-year flood event. Ecosystem restoration is proposed to improve instream and riparian habitat for fish and wildlife species. Recreational enhancements may include nature-based activities along the river corridor and improved river access, as well as sports fields and park facilities on the south side in between the intermediate levee and the outer, high levee. The estimated cost to construct the levees (north, south, south intermediate) is $20.4M. Excavation of the floodplain terraces and ecosystem restoration is estimated to cost $20M. TRFMA has already invested more than $48M to acquire 110 acres of land in this area (more than 1.2 miles of river frontage on the south bank of the river). Implementation of this flood project element will significantly reduce flood	

ID	Mitigation Action	Lead Department	Status for Plan Update	Should this action be retained in the plan update? (Yes/No)
			risk for the north and south industrial areas and the airport.	
FL-42	Sparks Levees and Floodwalls – Rock to McCarran: Replacement of the north bank levee with on-bank floodwalls to minimize impacts on existing properties and railroad spurs. Some minor terracing on the north bank. Fill localized low lying areas on the landside of the floodwall. Trail can be incorporated into floodwall maintenance road (TRFMA, City of Sparks)	TRFMA	Same as FL-40	Yes
FL-43	Terracing – Rock to Steamboat: Benching on north bank at Living River Parkway. Minimized terracing on south bank along Treatment Plant. Remove existing buildings as necessary (TRFMA, City of Sparks)	TRFMA	Same as FL-40	Yes
FL-45	Sparks Levees and Floodwalls – McCarran to Vista: Replacement of	TRFMA	North Bank Levee & Floodwall (McCarran Blvd Bridge to east edge of	Yes

ID	Mitigation Action	Lead Department	Status for Plan Update	Should this action be retained in the plan update? (Yes/No)
	existing levee with on-bank floodwalls for approximately 20,000 feet east of McCarran to reduce overall footprint. Construction of levees for most of the remainder of the reach. Floodwall will be used near Larkin Circle to eliminate impacts on the roadway (TRFMA, City of Sparks)		Sparks Industrial Area at Vista): Construct a levee and floodwall (where necessary) on the north bank of the Truckee River from the McCarran Blvd Bridge to the eastern edge of the Sparks Industrial Area at Vista. This section of levee and floodwall is approximately 3.2 miles long. Previous conceptual plans included mostly floodwall; the latest plan prioritizes levee construction to reduce costs, avoid seepage problems, and allow for recreational trail access on the levee crown (for example, a bike path). The cost of this project element is roughly estimated at $33.2M in 2021 dollars (this portion of the flood project requires additional study). Note that this reach includes the North Truckee Drain Realignment Project, a flood hazard mitigation project partially funded by TRFMA and completed in 2018 (refer to past plans or visit trfma.org for more information). Planned construction: 2029–2030.	

ID	Mitigation Action	Lead Department	Status for Plan Update	Should this action be retained in the plan update? (Yes/No)
EQ-3	Retrofit dialysis centers to maintain potable water service following a disaster (Washoe County, City of Reno, City of Sparks)	Dialysis Centers (Fresenius, DaVita)	I am not sure what work if any TMWA did on this project but IHCC purchased a portable water tank, so did Renown and Saints to provide portable water to their healthcare systems. The third water tank was donated to Northern Nevada Healthcare Systems. IHCC did explore provided portable water to dialysis facilities however they do not own the facilities and retrofitting them would require an agreement with the property managers which was not explored.	No
EQ-7	Conduct study to determine City of Sparks facilities in need of reinforcement to withstand earthquakes (City of Sparks)	Sparks Engineering Services	Dam assessment to begin Sept, 2024	Yes
EQ-8	Reinforce City of Sparks facilities not meeting seismic standards based on seismic study (City of Sparks)	Sparks Engineering Services	Anticipated in 2025, following assessment (EQ-7) In progress – Seismic study of wastewater treatment plant completed and submitted to CoS in November 2024. Pending next steps based on report results.	Yes

ID	Mitigation Action	Lead Department	Status for Plan Update	Should this action be retained in the plan update? (Yes/No)
EQ-9	Complete seismic strength evaluations of critical facilities in all jurisdictions, including schools, community colleges, public infrastructure, and other critical facilities, to identify vulnerabilities for mitigation to meet current seismic standards. Mothball or demolish life-threatening buildings, particularly unreinforced masonry buildings (Washoe County City of Sparks, RSIC, PLPT)	Washoe County, City of Sparks, RSIC, PLPT: • Public Works • Engineering • School Districts	Per WC CSD, as of April 2, 2024: Not aware of any seismic assessments of County-owned buildings with the exception of Bower's Mansion. Seismic retrofits were done to the mansion several years ago based on inspections and recommendations made by an engineer specializing in historic structures. Some seismic retrofitting done to the historic portion of the Courthouse at 75 Court St. many years ago. In progress	No
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)	All Jurisdictions: • Public Works • Engineering	Seismic risk and flow metering analysis for Sun Valley and Spanish Springs dams begins Sept. 2024 with any necessary mitigation in 2025	Yes
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)	NV Energy	To date 45,208 poles in tiered fire areas have been replaced with an additional 5,500 poles replaced in non-wildfire areas to increase circuit resilience Pole replacement projections:	No

ID	Mitigation Action	Lead Department	Status for Plan Update	Should this action be retained in the plan update? (Yes/No)
			• 2024: 1,385 poles • 2025: 2,038 poles • 2026: 1,704 poles As of 2022 the standard for pole replacement in high threat areas includes the use of covered conductor (tree wire) and Ductile iron poles for overhead builds. In areas where the installation of Ductile iron poles is not feasible wood pole with fiberglass fire wrapping used Ongoing	
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)	NV Energy	To date 52.8 miles of copper wife have been replaced since 2020. Currently 13.5 miles of copper wire replacement is projected through 2026 and another 27.6 miles beyond 2026. Removed 100% of street-light and night guard attachments. Identified 1,200 secondary/service attachments and developed a formal plan for removal. Identified 32 segments, totaling 80 miles, for undergrounding overhead infrastructure. Currently 19/32	No

ID	Mitigation Action	Lead Department	Status for Plan Update	Should this action be retained in the plan update? (Yes/No)
			segments, totaling 33 miles, in various stages of progress. Ongoing	
EE-5	Install backup generators for critical infrastructure and facilities along with other measures to improve reliability (e.g., alarms, meters, remote controls, and switchgear up-grades) (All Partners)	All Jurisdictions: • Emergency Management	There was a project several years ago to attempt to identify the types of generators needed but unaware where that project was left off.	No
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)	Law Enforcement Agencies Facility Managers	Ongoing. WCEM hired a Homeland Security Program Coordinator to build relationships with LE and intelligence agencies. Measures have taken place in the Washoe County School District (WCSD) and UNR, including a gun detection dog (WCSD) and automatic specialized locking doors (UNR).	No
CA-3	Install crash-worthy type barriers, barricades, and bollards in downtown Sparks to help reduce	Sparks Community Services	Mostly complete – one phase remains for the Victorian Square pedestrian safety improvements	Yes

ID	Mitigation Action	Lead Department	Status for Plan Update	Should this action be retained in the plan update? (Yes/No)
	the risk of errant or intentional vehicle attacks through large crowds at special events (City of Sparks)	Sparks Engineering Services		
DT-2	Implement current TMWA Conservation Plan including encouraging transition to less water-intensive landscaping on both public and private properties (City of Reno, City of Sparks, RSIC, PLPT)	City of Reno, City of Sparks, RSIC, PLPT: • Water Utilities • Planning Departments	The Reimagine Reno Master Plan contains Policy 2.5C Drought Tolerant Landscaping, which requires the use of "landscaping which utilizes drought tolerant plant materials, efficient irrigation, incorporates soil amendments to support plant health and resiliency, and other low water usage practices." In addition, Title 18, Section 18.04.806, Water Conservation, addresses landscaping plan requirements that aim to reduce water consumption by limiting the amount of lawn/turf, requiring water-conserving irrigation systems, low water consumption plants, and preventing overspray, among other items.	No

ID	Mitigation Action	Lead Department	Status for Plan Update	Should this action be retained in the plan update? (Yes/No)
ID-1	Implement a range of emission reduction strategies (e.g., policies geared toward renewable energy measures and projects, reduction in vehicle miles traveled, and increased use of transit and multi-modal transportation) to reduce levels of particulate matter, ozone, and other criteria pollutants (All Partners)	WCHD Air Quality Management Division	In progress. NNPH – Air Quality continues to advocate for code requirements related to land use planning and building requirements that would help reduce emission associated with the transportation sector. The AQMD also engages with Washoe County RTC and participates on the RTC TAC.	No

* Note: AQMD = Air Quality Management Division, CERT = Community Emergency Response Team, CoS = City of Sparks, CSD = Community Services Department, CWPP = Community Wildfire Protection Plan, IHCC = Inter-Hospital Coordinating Council, LE = Law Enforcement, NDF = Nevada Division of Forestry, NNPH = Northern Nevada Public Health, NV = Nevada, PLPT = Pyramid Lake Paiute Tribe, RSIC = Reno-Sparks Indian Colony, RTC = Regional Transportation Commission, TAC = Technical Advisory Committee, TMFPD = Truckee Meadows Fire Protection District, Truckee Meadow Water Authority, UNR = University of Nevada Reno, UMC = University Medical Center, WCEM = Washoe County Emergency Management, WCHD = Washoe County Health Department, WCSD = Washoe County School District, WCCSD = Washoe County Community Services District

Considered Mitigation Actions

The City of Reno considered a broad range of actions, including actions that benefit vulnerable populations and current and new development, as a part of this plan update. There are four main types of mitigation actions:

- Local plans and regulations
- Structure and infrastructure projects
- Natural systems protection
- Education and awareness programs

The results are presented in Table 111.

Table 111: Considered Mitigation Actions of the City of Sparks

Mitigation Action	Type of Action	Selected? (Y/N)	If not selected, why not?
Seismic retrofit of aging infrastructure	Analyze and determine necessity of any seismic retrofits for existing city facilities	No	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.
Fuel management on WUI	Where residential neighborhoods abut native vegetation, manage fuel loading or defensible space to minimize wildfire risk	No	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.

2025–2029 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 Sparks]? (Requirement §201.6(c)(3)(iii))

Table 112 presents the mitigation action plan for the next five years. In that table, Community Lifelines are defined at Lifelines Toolkit v2.0 (fema.gov) and include the new Water Systems lifeline. Timeframes are defined as follows:

- Short term: Less than 1 year
- Medium term: 1–3 years
- Long term: 3–5 years

THIS PAGE INTENTIONALLY LEFT BLANK

Table 112: 2025–2029 Mitigation Implementation Plan for the City of Sparks

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
1	TMWA* Levee (Glendale Ave Bridge to Greg St Bridge)	Flooding	People/ Structures/ Economic Assets/ Critical Facilities & Infra-structure	City of Sparks Engineering Services, TRFMA	TMWA	TRFMA Flood Management Project Plan (2023 Map Book), the NRS 377B Infra-structure Tax Plan (administered by TRFMA), and TRFMA's 5-Year CIP (FY2024–2025)	Existing TRFMA project funds Possible funding or in-kind contribution from TMWA, such as site access/ easements, fencing?	Total for design, permitting, construction, and contingency = $5.7M (from TRFMA's FY2024–2025 CIP)	Would provide 100-yr flood protection for TMWA's Glendale Water Treatment Plant and surrounding area.	30 years	Planned construction: FY2026–2027 or FY2027–2028. 1–3 years	Medium
Description: Construct a levee approximately 3,000 ft long along the north bank of the Truckee River with one portion set back from the riverbank (as space allows). The estimated cost is $4.5M in 2021 dollars. TRFMA plans to work collaboratively with TMWA on site access, fencing, and security. This design concept is a shift from the previous (2016) version of the Flood Project plan, which included a floodwall.												
2	Reno–Tahoe Inter-national Airport Berm & Terracing (Greg St Bridge to Rock Blvd Bridge)	Flooding	People/ Structures/ Economic Assets/ Critical Facilities & Infra-structure/ Community Activities	City of Sparks Public Works Department, TRFMA	RTAA,* City of Reno	TRFMA Flood Management Project Plan (2023 Map Book), the NRS 377B Infra-structure Tax Plan (administered by TRFMA), and TRFMA's 5-Year	Existing TRFMA project funds Possible funding or in-kind contribution from RTAA,	Total for design, construction, and contingency = $6.1M (from TRFMA's FY2024–2025 CIP)	Would provide 100-yr flood protection for the Reno–Tahoe International Airport and	30 years	Planned construction: FY2026–2027 or FY2027–2028. 1–3 years	Medium

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
						CIP (FY2024–2025)	such as easements?		surrounding area.			
Description: Excavate a floodplain terrace and construct an earthen berm along the south bank of the Truckee River near the airport (Greg St Bridge to Rock Blvd Bridge). The floodplain terrace would be revegetated with low-growing plant species because of airport safety regulations. The amount of fill material required for the berm would be approximately 90,000 cubic yards or less. If necessary, to alleviate a minor rise in water level because of the airport berm, construct a small berm on the north bank of the Truckee River. This design concept is a shift from earlier plans, which included a levee. A wide berm with a gentle slope is now the preferred alternative because a levee would be more of an obstacle to landing aircraft, and therefore a safety concern. Cost savings may be achieved by using spoil material from the Vista Narrows Floodplain Terracing Project.											
3	Mill/ McCarran Levees & Terracing (Rock Blvd Bridge to McCarran Blvd Bridge)	Flooding	People/ Structures/ Economic Assets/ Natural, Historic, and Cultural Resources/ Critical Facilities & Infrastructure/ Community Activities	City of Sparks Public Works Department, TRFMA	Washoe County CSD, City of Reno, City of Sparks, USFWS, NDOW*	TRFMA Flood Management Project Plan (2023 Map Book), the NRS 377B Infra-structure Tax Plan (administered by TRFMA), and TRFMA's 5-Year CIP (FY2024–2025)	Existing TRFMA project funds Possible grant funding through USBR, USFWS, FEMA	Property acquisition (~$6M) + design, permitting, contingency (~$7.8M) + construction of levees, terraces, channel realignment, ecosystem restoration (~$32.2M) =Total of $46.5M (from TRFMA's FY2024–2025 CIP)	Would provide 100-yr flood protection for extensive industrial areas in the north and south, and for RTIA.* It would restore the Truckee River ecosystem, creating habitat for federally listed fish species and improving	30 years	Currently in 60% design phase (June 2024). Planned construction FY2027–2028 or FY2028–2029 3–5 years	High

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
									water quality (for example, TMDL* for temperature and dissolved oxygen). It would also provide the local community (and tourists) with open space/ park amenities and various outdoor recreational opportunities.			
Description: Between the Rock Blvd Bridge and the McCarran Blvd Bridge, relocate the Truckee River channel and increase its sinuosity, excavate floodplain terraces, and construct levees to reduce flood risk, restore the ecosystem, and enhance recreational opportunities. The updated conceptual design omits floodwalls and includes higher levees on both the north and south banks of the Truckee River and a lower "intermediate" levee on the south side. The intermediate levee would be designed to contain a 50-year flood event. Ecosystem restoration is proposed to improve instream and riparian habitats for fish and wildlife species. Recreational enhancements may include nature-based activities along the river corridor and improved river access and sports fields and park facilities on the south side between the intermediate levee and the outer, high levee. TRFMA has already invested more than $48M to acquire 110 acres of land in this area (more than 1.2 miles of river frontage on the south bank of the river). Implementation of this Flood Project element will significantly reduce flood risk in the north and south industrial areas and the airport.											
4	North Bank Levee & Floodwall	Flood	People/ Structures/ Economic	City of Sparks Public Works	City of Sparks, Washoe County CSD	TRFMA Flood Management Project Plan (2023	Existing TRFMA project funds	Estimate for design, construction,	Would provide 100-yr flood	30 years	Planned construction: FY2029–	High

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
	(McCarran Blvd Bridge to east edge of Sparks Industrial Area at Vista)		Assets/ Critical Facilities & Infra-structure/ Community Activities	Department, TRFMA		Map Book), the NRS 377B Infra-structure Tax Plan (administered by TRFMA), and TRFMA's 5-Year CIP (FY2024–2025)		and contingency = $48.8M (includes an estimate for inflation until actual construction) (from TRFMA's FY2024–2025 CIP)	protection for the Sparks Industrial Area, a warehousing and manufacturing district that is significant to the region's economic growth and stability.		2030 and FY2030–2031. Note: construction may be split into smaller projects that are prioritized based on what sections are most vulnerable. 3–5 years	
	Description: Construct a levee and floodwall (where necessary) on the north bank of the Truckee River from the McCarran Blvd Bridge to the eastern edge of the Sparks Industrial Area at Vista. This section of levee and floodwall is approximately 3.2 miles long. Previous conceptual plans included mostly floodwalls. The latest plan prioritizes levee construction to reduce costs, avoid seepage problems, and allow for recreational trail access on the levee crown (for example, a bike path). This portion of the Flood Project requires additional study to refine designs and cost estimates. Note that this reach includes the North Truckee Drain Realignment Project, a flood hazard mitigation project partially funded by TRFMA and completed in 2018 (refer to past plans or visit trfma.org for more information).											
5	Spanish Springs and Sun Valley Dam Assessment	Earthquake	Structural integrity of the dams and metering of the outfall	City of Sparks Public Works Department, Nevada Division of Water Resources	None	RHMP, partner plans and protocols.	Sparks Stormwater utility funding	$200,000	Possibly identify deficiencies in the dams, improve outfall to minimize flooding	50 years	1 year	High

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
Description: Assess Spanish Springs and Sun Valley Dams												
6	Assess, repair, and/ or replace infrastructure that may fail during earthquakes (e.g., Keystone Ave. Bridge).	Earthquake	people	City of Sparks Department of Transportation, Public Works	Washoe County CSD, City of Reno, RTC	RHMP, partner plans and protocols.	City of Sparks general funding	$1M	Protect lives and property	30 years	1–3 years	Low
Description: Assess, repair, and/ or replace infrastructure that may fail during earthquakes (e.g., Keystone Ave. Bridge).												
7	Victorian Square pedestrian safety improvements	Pedestrian safety	Reduce vulnerability of crowds to accidental or deliberate attack by vehicles	City of Sparks Department of Public Works	None	RHMP, Public works plans.	City of Sparks general funding	$1,000,000	Protect crowds during downtown special events	50 years	1–3 years	Medium
Description: Reduce the vulnerability to pedestrians, create an assessment of hazards.												
8	Themed Months/ Days per Hazard	Avalanche and Landslide, Drought, Extreme	Residents and visitors	City of Sparks Emergency Management	Subject matter experts/ agencies for specific hazards	RHMP itself	City of Sparks, WCEM, funded –	$500.00 + staff time only to write proclamations	Increased community awareness and resilience	30 years	1 year	High

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
	(including proclamations)	Weather, (Extreme Heat, Windstorms, Winter Storms), Flood, Earthquake, Volcano		Division, WCEM	(USGS, fire agencies, LE, NWS/NOAA, etc.)		staff time, EMPG, SERC funds	and appear, as needed				
Description: Public awareness campaign												
9	Volcano Awareness Program	Volcano	Residents and visitors	City of Sparks Emergency Management Division, WCEM	USGS Menlo Park	RHMP itself	General funds, EMPG, SERC funds	Possibly USGS or local. Need better understanding from SME about cost and whether there are studies that could be used for reference	Increased awareness and understanding of potential impact, cleanup time, etc.	Beneficial until update is available or needed based on volcanic activity/ occurrence	1 year	Medium
Description: Public awareness campaign												

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
10	Develop an evacuation plan for northern Sparks	Flood, Winter Storm, Wildfire	People and animals	City of Sparks Emergency Management Division	Need further investigation	RHMP, LE and Fire Dept plans	Emergency Management Operational Budget	$100,000	Protect property and lives	30 years	1–3 years	Medium
Description: Including evacuation routes, available emergency services, a communications strategy, animal evacuation support, and many other support functions (City of Sparks)												
11	Manage fuels through targeted grazing on an as-needed basis (City of Sparks)	Wildfire	People and infrastructure	City of Sparks Fire Department	Need further investigation	RHMP, partner plans and protocols.	General funds	$50,000/year	Protect property and lives	30 years	1–3 years	Medium
Description: Manage fuels through targeted grazing on an as-needed basis (City of Sparks)												
12	Partner with NDF* crews on fuel reduction as needed	Wildfire	People and infrastructure	City of Sparks Fire Department	Need further investigation	RHMP, Fire Dept plans	General funds	$5,000/year	Protect property and lives	30 years	1–3 years	Medium
Description: Partner with NDF* crews on fuel reduction as needed												

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
13	Place containers around the City of Sparks for residents to dump wood and brush from their yards	Wildfire	People and infrastructure	City of Sparks Fire Department or Public Works Department	Need further investigation	City of Sparks and Fire Dept plans and protocols	General funds	$150,000/year	Protect property and lives	30 years	1–3 years	Medium
Description: Place containers around the City of Sparks for residents to dump wood and brush from their yards												
14	Partner with NDF to develop educational materials and multi-media blasts	Wildfire	People and infrastructure	City of Sparks Fire Department	Need further investigation	RHMP, partner plans and protocols	General funds	$25,000	Protect property and lives	30 years	1–3 years	Medium
Description: Partner with NDF to develop educational materials and multi-media blasts												
15	Review and update (as needed) evacuation plans for communities	Wildfire	People and infrastructure	City of Sparks Emergency Management Division, Regional Fire	Need further investigation	Fire Departments plans and protocols	Existing operating budget of City of Sparks and Fire	$10,000/ plan. $50,000/year	Protect property and lives	30 years	1 year	Medium

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
	in wildland fire-prone areas and hold evacuation drills at least once every two years (All Partners)			Protection Districts			Protection Districts.					
Description: 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)												
16	Complete a feasibility study	Flood	People and infrastructure	City of Sparks Community Services, Sparks Engineering Services	Need further investigation	Need further investigation	Engineering budget funding	$150,000	Protect property and lives	30 years	1–3 years	Medium
Description: Complete a feasibility study, including a geotechnical investigation, hydraulic model, and outfall recommendations, to investigate detaining stormwater behind the Spanish Springs Dam to meter discharge to the North Truckee Drain during floods and winter storms (City of Sparks)												
17	Reinforce City of Sparks facilities	Earthquake	People and infrastructure	City of Sparks Engineering Services	Need further investigation	Need further investigation	ES General funds	$1M	Protect property and lives	30 years	3–5 years	Medium
Description: Reinforce City of Sparks facilities not meeting seismic standards based on seismic study (City of Sparks)												

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
18	Special Events Working Group	Criminal Acts and Terrorism	Residents and visitors; First responders; Event promoters/ organizers	City of Sparks Emergency Management Division	N/A	N/A	Special Events/EM Budget	$100,000	Previous plan had some considerations for safety. Now need to add verbiage for building an events working group to stand up and staff EOC during events in the region	Immediate and continuously	Short term	High
19	Evacuation Routes in the area – study	All Hazards requiring persons to leave the area	Residents and visitors; LE, Fire, etc.	City of Sparks Emergency Management Division	LE, Fire Agencies	N/A	Emergency management budget funding	$100,000	Loss of life, property, time spent by responders guiding persons out of area	Immediate and continuous. There are always additional persons due to tourism and general residents. Also, there is never not a time when evacuation	Medium. Hire a contractor to complete the study, then decide based on findings	Medium

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
										might be necessary.		
Description: Perform a study to map evacuation areas that best serve the residents, visitors and first responders during an incident.												
20	EV Ready Code Change	Energy emergency	Children, older adults, those with heart/lung disease, low-income and underserved communities	NNPH – AQMD	City of Reno City of Sparks Washoe County CSD	Building code amendment recommendation to be adopted by municipalities	General fund	Staff Time	Better air quality	Beneficial continuously until updated	In the next 5 years	Low
Description: Amend the building code for an EV Ready Code that will provide for better air quality.												
21	Flood insurance study	Flooding	People and infrastructure	City of Sparks Engineering Services, City of Sparks Emergency Management Division	Washoe County Emergency Management	RHMP, partner plans and protocols.	General Fund	$50,000	Studying areas lacking flood insurance can pinpoint vulnerable regions and guide policy decisions, enhancing community preparedness and economic resilience. It	5-10 years	1-2 years	Medium

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
									raises awareness about the need for adequate coverage and supports stronger disaster mitigation efforts.			
Description: This study aims to identify gaps in flood insurance coverage in the county by assessing accessibility, awareness, and mitigation efforts. Through data analysis and community engagement, it highlights areas lacking insurance and offers recommendations to improve community resilience against flooding.												
22	Preparedness Education	Avalanche	Residents and visitors	City of Sparks Emergency Management Division	Subject Matter Experts/Agencies for specific hazards (USGS, Fire Agencies, Law Enforcement, NWS/NOAA, etc.)	RHMP	City of Sparks, EMPG, SERC funds	$500.00 + staff time	Increased Community Awareness and Resilience	Lifetime	1-3 years	High

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
Description: Avalanche risk, public education, improving safety protocols for residents and visitors.												
23	Preparedness Education	Landslide	Residents and visitors	City of Sparks Emergency Management Division	Subject Matter Experts/Agencies for specific hazards (USGS, Fire Agencies, Law Enforcement, NWS/NOAA, etc.)	RHMP, Partnerships with local agencies.	City of Sparts, EMPG, SERC funds	$500.00 + staff time	Increased Community Awareness and Resilience	Lifetime	1-3 years	High
Description: Public education for residents and visitors to help them be prepared for a landslide event.												
24	Preparedness Education	Drought	Residents, business owners, visitors.	City of Sparks Emergency Management Division	Subject Matter Experts/Agencies for specific hazards (USGS, Fire Agencies, Law Enforcement, NWS/NOAA, etc.)	RHMP, Partnership with Local Agencies	City of Sparks, EMPG, SERC funds	$500.00 + staff time	Safety, what the residents can do to protect themselves and property through preparedness.	Lifetime	1 – 3 years	High
Description: Provide preparedness education for the residents, business owners, and other affected parties in the event of a drought.												

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
25	Preparedness Education	Extreme Weather (Extreme Heat, Windstorms, Winter Storms)	Residents, business owners, visitors	City of Sparks Emergency Management Division	Subject Matter Experts/Agencies for specific hazards (USGS, Fire Agencies, Law Enforcement, NWS/NOAA, etc.)	RHMP, Local Agencies	City of Sparks, EMPG, SERC funds	$500.00 + staff time	Loss of life, injuries, financial losses, property damage, response	Lifetime	1-3 years	High
Description: Provide education and resources to enable the residents, business owners, and visitors to be prepared in the event of Extreme Weather.												
26	Preparedness Education	Hazardous Materials Incident	Safety of Residents, Businesses, and Visitors	City of Sparks Emergency Management Division	Subject Matter Experts/Agencies for specific hazards (USGS, Fire Agencies, Law Enforcement, Health Agencies, etc.)	RHMP, Partner Agencies	City of Sparks, EMPG, SERC funds	$500.00 + staff time	Loss of life (people, livestock, wildlife) contamination	Lifetime	1-3 years	High
Description: Prepare the populace through education on the who, what, when, where, why, and how should a Hazardous Materials Incident occur.												
27	Preparedness Education	Infectious Disease	Safety of Residents and visitors	City of Sparks Emergency Management Division	Subject Matter Experts/Agencies for specific hazards (USGS,	RHMP, Partner Agencies plans	City of Sparks, EMPG, SERC funds	$500.00 + staff time	Loss of life, contamination and spread	Lifetime	1-3 years	High

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
					Fire Agencies, Law Enforcement, Health Agencies, etc.)							
Description: Prepare the populace through education on the who, what, when, where, why, and how should an infectious disease Incident occur.												
28	Preparedness Education	Radiological Waste Transport	Safety of People and animals	City of Sparks Emergency Management Division	Subject Matter Experts/Agencies for specific hazards (USGS, Fire Agencies, Law Enforcement, Health Agencies	RHMP, Partner Agencies plans and protocols	City of Sparks, EMPG, SERC funds	$500.00 + staff time	Loss of life, contamination and spread	Lifetime	1-3 years	High
Description: Prepare the populace through education on the who, what, when, where, why, and how, should a radiological waste transport Incident occur.												
29	Preparedness Education	Transportation Incident	People, property, wildlife,	City of Sparks Emergency Management Division	Subject Matter Experts, NDOT, Fire Agencies, Law Enforcement	RHMP, NDOT, LE, Fire Agency plans and protocols	City of Sparks, NDOT, EMPG, SERC funds	$500.00 + staff time	Loss of life, property damages, wildlife collision	Lifetime	1-3 years	High
Description: Prepare the populace through education on the who, what, when, where, why, and how, should a Transportation Incident occur.												

Notes: *Includes vulnerable populations; **Through which the action will be implemented.

AQMD = Air Quality Management Division, BRIC = Building Resilient Infrastructure and Communities, DEI = Diversity, Equity, and Inclusion, EAP = Emergency Action Plan, EMPG = Emergency Management Preparedness Grant; FHA = Fire Hazards Analysis, HR = Human Resources, LE = Law Enforcement, NNPH = Northern Nevada Public Health, NOAA = National Oceanic and Atmospheric Administration, NVDEM = Nevada Division of Emergency Management, NWS = National Weather Service, PROTECT = Program for Response Options and Technology Enhancements for Chemical/Biological Terrorism, RHMP = Regional Hazard Mitigation Plan, RTAA = Reno-Tahoe Airport Authority, SERC = State Emergency Response Commission; SME = subject matter expert; TMFPD = Truckee Meadows Fire Protection District, TMDL = Total Maximum Daily Limit, TRFMA = Truckee River Flood Management Authority, USGS = United States Geological Survey, WC = Washoe County, WCEM = Washoe County Emergency Management

Prioritizing Mitigation Actions

The identified mitigation actions were then prioritized, based on the following terms:

- **S – Social:** The public must support the overall mitigation implementation strategy and specific mitigation actions. Consider, will the action disrupt housing or cause the relocation of people? Will the proposed action adversely affect one segment of the population? Is the action compatible with present and future community/agency values?
- **T – Technical:** It is important to determine if the proposed action is technically feasible, will help reduce losses in the long term, and has minimal secondary impacts. How effective is the action in avoiding or reducing future losses? Does the action solve the problem or only a symptom? Will the action create more problems than it solves? Consider the root cause of the issue at hand to determine whether the action is a whole or partial solution, or not a solution at all.
- **A – Administrative:** This category examines the expected staffing, funding, time, and maintenance requirements for the mitigation action to determine if the jurisdiction/special district has the personnel and administrative capabilities to implement the action or whether outside help will be necessary. Consider, a) Staffing (enough staff and training): does the jurisdiction/special district have the capability (staff, technical experts) to implement the action? b) Funding allocated: does the jurisdiction/special district have the funding to implement the action or can it readily be obtained? c) Time: can it be accomplished in a timely manner? d) Maintenance/Operations: can the jurisdiction/special district provide the necessary maintenance? It is important to remember that most federal grants will not provide funding for maintenance.
- **P – Political:** This considers the level of political support for the mitigation action. Is there political support to implement and maintain this action? Have political leaders participated in the planning process so far? Is there a local champion willing to help see the action to completion? Is there enough public support to ensure that the success of the action? Have all stakeholders been offered an opportunity to participate in the planning process?
- **L – Legal:** The jurisdiction/special district must have the legal authority to implement the action or consider what new laws or regulations would be needed to carry out the mitigation action. Evaluate, are the proper laws, ordinances, and resolutions in place to implement the action? Are there any potential legal consequences? Is the action likely to be challenged by stakeholders who may be negatively affected?
- **E – Economic:** Economic considerations must include evaluation of the present economic base and projected growth. Cost-effective mitigation actions that can be funded in current or upcoming budget cycles are more likely to be implemented than actions requiring general obligation bonds or other instruments that would incur long-term debt in a jurisdiction/special district. Consider benefits and costs at a planning level. A detailed benefit-cost analysis will be performed as project-specific funding becomes available. What

financial benefits will the action provide? Does the cost seem reasonable for the size of the problem and the likely benefits? What burden will be placed on the tax base or local economy to implement this action? Does the action contribute to community economic goals, such as capital improvements or economic development? Are there currently sources of funding that can be used to implement the action?

- **E – Environmental:** The impact on the environment is an important consideration because of public desire for sustainable and environmentally healthy communities. Also, statutory considerations, such as the National Environmental Policy Act (NEPA), have to be kept in mind when using federal funds. How will this action impact land/water? Impact on endangered species: how will this action impact endangered species? How will this action impact hazardous materials and waste sites? Is this action consistent with community environmental goals? Is the action consistent with federal laws, such as the National Environmental Policy Act (NEPA)?

The actions were also assigned a prioritization category of low, medium, or high, based on the following definitions:

- **Low:** Based on one to two STAPLEE criteria, the action is feasible and important, with multiple potential challenges. The action should be implemented as funding becomes available.
- **Medium**: Based on three to four STAPLEE criteria, the action is feasible and important, with some potential challenges. Its implementation is not as urgent as a high priority action item and can be implemented over time.
- **High**: Based on five or more STAPLEE criteria, the action is feasible and important, with minimal to no concerns. It is very important to the jurisdiction to implement and may be prioritized in the short term.

The results are in Table 113.

Table 113: Priorities Assigned to the Mitigation Actions of the City of Sparks

Action #	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Total STAPLEE Score	Priority
1	3	4	4	3	3	3	3	23	Medium
2	2	4	4	2	3	2	2	19	Medium
3	4	4	4	4	3	4	4	27	High

Action #	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Total STAPLEE Score	Priority
4	3	4	4	4	3	4	3	25	High
5	3	1	1	3	2	1	1	12	Low
6	3	2	1	2	2	1	2	13	Low
7	2	3	2	2	2	4	4	19	Medium
8	4	4	4	4	4	4	4	28	High
9	1	4	3	4	4	3	3	22	High
10									
11									
12									
13									
14									
15									
16									
17									

References

BTS (U.S. Bureau of Transportation Statistics). 2017c. Hazardous Materials Serious Incidents 1991–2001 (monthly data, not seasonally adjusted). Updated May 2017. https://www.bts.gov/archive/publications/transportation_indicators/october_2001/Safety/Hazardous_Materials_Incidents. Accessed May 7, 2019.

City of Sparks. 2016. Ignite Sparks Comprehensive Plan: The Plan Guiding the City of Sparks to the Year 2030. https://cityofsparks.us/departments/planning-and-zoning/. Accessed June 13, 2019.

Earth Observatory. No date. Great Basin Geology. https://earthobservatory.nasa.gov/images/8497/great-basin-geology. Accessed July 29, 2019.

FEMA (Federal Emergency Management Agency). 2019. OpenFEMA – Declaration Data Set as of: 3/15/19. https://www.fema.gov/media-library/assets/documents/28318. Accessed September 19, 2019.

National Park Service. 2015. Cultural Resources. https://www.nps.gov/acad/learn/management/rm_culturalresources.htm. Accessed July 29, 2019

NV Energy. 2019. Public Safety Outage Management. https://www.nvenergy.com/safety/psom. Accessed September 23, 2019.

Regional Water Planning Commission. 2003. RWPC Regional Floodplain Management Strategy. 2nd Draft, June 2003. http://documents.wrwc.us/files/2368-00036.pdf Accessed August 15, 2019.

U.S. Census Bureau. 2017a. American Community Survey 1-year estimates. Retrieved from Census Reporter Profile page for Sparks, NV: https://censusreporter.org/profiles/16000US3268400-sparks-nv/ Accessed July 25,

U.S. Census Bureau. 2017b. American Community Survey 1-year estimates. Retrieved from Census Reporter Profile page for Nevada: https://censusreporter.org/profiles/04000US32-nevada/. July 25, 2019.

U.S. Census Bureau. 2017c. Age by Disability Status by Health Insurance Coverage Status American Community Survey 1-year estimates. https://censusreporter.org/data/table/?table=B18135&geo_ids=16000US3268400&primary_geo_id=16000US3268400. July 25, 2019.

U.S. Census Bureau. 2017d. Presence of a Computer and Type of Internet Subscription in Household American Community Survey 1-year estimates. Retrieved from

https://censusreporter.org/ data/table/?table=B28003&geo_ids=16000US3268400&primary_geo_id=16000US3268400

U.S. Census Bureau. No date(a). DP-1 Profile of General Population and Housing Characteristics: 2010. 2010 Demographic Profile Data. https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml. Accessed July June 13, 2019.

U.S. Census Bureau. No date(a). S2301 Employment Status, 2017 American Community Survey 1-Year Estimates. Available online: https://factfinder.census.gov/faces/nav/jsf/pages/search-results.xhtml?refresh=t#.

U.S. Climate Data. No date. U.S. Climate Data. https://www.usclimatedata.com/climate/sparks/nevada/united-states/usnv0086. Accessed October 22, 2019.

Washoe County. 2008. Regional Open Space & Natural Resource Management Plan. https://www.washoecounty.us/csd/planning_and_development/master-plan-zoning/files/os_plan_081908.pdf. Accessed July 29, 2019.

Acronyms

AFN	Access and Functional Needs
AQMD	Air Quality Management Division
BRIC	Building Resilient Infrastructure and Communities
CAV	Community Assistance Visit
CSD	Community Services Department
CWPP	Community Wildfire Protection Plan
DEI	Diversity, Equity, and Inclusion
EAP	Emergency Action Plan
FHA	Fire Hazards Analysis
FMAG	Fire Management Assistance Grant Program
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
HR	Human Resources
I-80	Interstate 80
LE	Law Enforcement
MMI	Modified Mercalli Intensity
MPT	Mitigation Planning Team
NCEI	National Center for Environmental Information
NDOT	Nevada Department of Transportation
NNPH	Northern Nevada Public Health
NOAA	National Oceanic and Atmospheric Administration
NRI	National Risk Index
NVDEM	Nevada Division of Emergency Management

NWS	National Weather Service
PG&E	Pacific Gas and Electric Company
PROTECT	Program for Response Options and Technology Enhancements for Chemical/Biological Terrorism
RHMP	Regional Hazard Mitigation Plan
PSOM	Public Safety Outage Management
RSIC	Reno-Sparks Indian Colony
RTAA	Reno-Tahoe Airport Authority
RTC	Regional Transportation Commission
SHMP	State Hazard Mitigation Plan
SME	subject matter expert
Southern Pacific	Southern Pacific Railway Company
TMFPD	Truckee Meadows Fire Protection District
TMWA	Truckee Meadows Water Authority
TMWRF	Truckee Meadows Water Reclamation Facility
TRFMA	Truckee River Flood Management Authority
TROA	Truckee River Operating Agreement
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
WC	Washoe County
WCEM	Washoe County Emergency Management
WCHD	Washoe County Health District
WRP	Water Resource Plan
WSEL	Water Surface Elevation Level
WUI	Wildland–Urban Interface

North Lake Tahoe Fire Protection District Hazard Mitigation Program

The North Lake Tahoe Fire Protection District (NLTFPD) has a fully integrated approach to hazard mitigation planning and program implementation. Throughout the 2025 update process, the following Regional Hazard Mitigation Plan (RHMP) participation roles were recorded:

Name	Position	Department
Ryan Sommers	Fire Chief	North Lake Tahoe Fire Protection District

What's New in the 2025 Update?

With the 2025 RHMP update, Washoe County and its regional partners have recognized changes in planning priorities by emphasizing incorporating actionable strategies in the mitigation implementation plan and moving away from including ongoing coordination activities. Recent disasters and emerging hazards have also influenced planning priorities and the development of mitigation actions for the 2025 RHMP update.

Since the prior plan, several developments have occurred in the North Lake Tahoe Fire Protection District. These developments have included increased efforts to enhance wildfire mitigation and emergency preparedness, focusing on community engagement and education regarding fire risks.

Additionally, there has been an emphasis on creating defensible spaces around homes and properties and improving fire response capabilities. The district has also explored partnerships with local agencies to enhance equipment and resources for fire prevention efforts.

Lastly, ongoing community planning has likely involved zoning and land use changes to create more resilient communities against wildland fire hazards.

The 2025 update of the RHMP includes the following major revisions to the 2020 plan:

- Including additional stakeholders and opportunities for public participation;
- Identifying all hazards which could impact the plan participant;
- Expanding upon the capability assessment, including opportunities to expand and improve capabilities; and
- Identifying plan integration and integration opportunities.

Plan Adoption

44 CFR §201.6(c)(5) requires that an HMP be formally adopted by elected officials from each participating jurisdiction. TMFPD formally adopted the 2025 update of the Washoe County Regional RHMP on September 2, 2025.

This RHMP was approved by FEMA Region IX on September 24, 2025. A copy of the NLTFPD's adoption resolution is included in the Base Plan. Once the plan is approved and signed, a copy of NLTFPD's adoption resolution will be placed in Appendix E of the Base Plan.

District Profile

The NLTFPD provides emergency and non-emergency response services to the communities of Incline Village and Crystal Bay, Nevada, and surrounding back country areas. The mission of the district is to "protect life and property through efficient delivery of quality community services" (NLTFPD n.d.). The district's Fuels Management Division works to reduce the community's wildland fire risk and improve forest health through effective fuel management practices. The Division provides services including fuel reduction, prescribed burns, free curbside chipping for property owners, and defensible space evaluations. The Fire Prevention Division is responsible for reducing fire hazards through public education, inspection, and code enforcement.

Hazard Profiles and Vulnerability Assessments

FEMA	**B1.** Does the Plan include a description of the type, location, and extent of all natural hazards that can affect [the City of Sparks]? (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 Sparks]? (Requirement §201.6(c)(2)(i)) **B3.** Is there 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 CFR 201.6(c)(2)(ii))

This section contains hazard profiles and vulnerability assessments to determine the potential impact of hazards on the people, economy, and built and natural environments of NLTFPD. They have been streamlined to increase the effectiveness and usability of the RHMP. Additional details are in the Base Plan.

General

Washoe County has experienced several disaster declarations that have affected the NLTFPD's planning area. In total, the County has received 48 disaster declarations since 1965, including

15 since the previous HMP update. Table 114 identifies the declarations since 2020 that have affected the NLTFPD.

Table 114: Disaster Declarations in Washoe County since 2020[145]

Disaster Number	Individual Assistance Program Declared	Public Assistance Program Declared	Hazard Mitigation Program Declared	Declaration Date	Title
FM-5602	No	Yes	Yes	8/2/2025	Peavine Fire
FM-5586	No	Yes	Yes	6/10/2025	Marie Fire
FM-5546	No	Yes	Yes	11/11/2024	Callahan Fire
FM-5533	No	Yes	Yes	9/7/2024	Davis Fire
FM-5530	No	Yes	Yes	8/12/2024	Gold Ranch Fire
FM-5495	No	Yes	Yes	6/12/2024	Sullivan Fire
FM-5494	No	Yes	Yes	6/11/2024	Trail Fire
FM-5448	No	Yes	Yes	08/14/2022	Joy Lake Fire
FM-5382	No	Yes	Yes	11/07/2020	Pinehaven Fire
FM-5328	No	Yes	Yes	08/15/2020	Loyalton Fire
FM-5326	No	Yes	Yes	08/03/2020	North Fire
FM-5322	No	Yes	Yes	07/21/2020	Rockfarm Fire
FM-5316	No	Yes	Yes	06/27/2020	Poeville Fire
DR-4523	Yes	No	No	04/04/2020	Biological (COVID-19)
EM-3443	No	No	No	03/13/2020	Biological (COVID-19)

The hazard profiles and vulnerability assessments in this annex represent a considerable amount of work performed by the Mitigation Planning Team (MPT). Planning team members ranked hazards using several key considerations, followed by activities to validate hazard analysis results and identify specific areas of risk. Listed below are the hazards it considered.

- Avalanche and Landslide
- Criminal Acts and Terrorism
- Drought
- Earthquake

[145] FEMA, "Disasters and Other Declarations." Disasters and Other Declarations | FEMA.gov

- Energy Emergency
- Flood
- Hazardous Materials Incident
- Infectious Disease
- Radiological Waste Transport
- Extreme Weather (Winter Storm, Windstorms, Extreme Heat)
- Transportation Incident
- Volcano
- Wildland Fire

Hazard Ranking Methodology

CALCULATED PRIORITY RISK INDEX

A risk assessment result for the entire county does not mean that each municipality is at the same amount of risk for each hazard. Each jurisdiction considered how it is uniquely at risk of the hazards profiled. The Calculated Priority Risk Index assessment (Table 115) resulted in hazard rankings for the NLTFPD.

Table 115: Factors for Calculating Risk

Risk Index Factor	Degree of Risk Level		Criteria	Factor Weight for Degree of Risk Level
Probability *What is the likelihood of the hazard occurring?*	1	Unlikely	Less than 1 percent probability of occurrence in the next year or a recurrence interval of greater than every 100 years.	30%
	2	Occasional	1 to 10 percent probability of occurrence in the next year or a recurrence interval of 11 to 100 years.	
	3	Likely	11 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.	
	4	Highly Likely	91 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.	
Magnitude *What will be the overall impact?*	1	Negligible	Less than 5% of the affected area's critical and non-critical facilities and structures are damaged/destroyed. Only	30%

Risk Index Factor	Degree of Risk Level		Criteria	Factor Weight for Degree of Risk Level
			minor property damage and minimal disruption of life. Temporary shutdown of critical facilities.	
	2	Limited	Greater than 5% and less than 25% of property in the affected area is damaged/destroyed. Complete shutdown of critical facilities for more than one day but less than one week.	
	3	Critical	Greater than 25%, but less than 50% of property in the affected area was damaged/destroyed. Complete shutdown of critical facilities for over a week but less than one month.	
	4	Catastrophic	Over 50% of critical and non-critical facilities and infrastructures in the affected area are damaged/destroyed. Complete shutdown of critical facilities for more than one month.	
Onset *How long will be there be between when it is recognized the hazard is approaching and when the hazard*	1	Self-defined	More than 24 hours	10%
	2	Self-defined	12 to 24 hours.	
	3	Self-defined	6 to 12 hours.	
	4	Self-defined	Less than 6 hours.	

Risk Index Factor	Degree of Risk Level		Criteria	Factor Weight for Degree of Risk Level
will begin affect the community?				
Duration *What is the length of time the hazard will remain active, including how long emergency operations will have to continue after the hazard event?*	1	Brief	Up to 6 hours.	10%
	2	Intermediate	Up to one day.	
	3	Extended	Up to one week.	
	4	Prolonged	More than one week.	
Frequency *How often has this kind of hazard resulted in an emergency or disaster?*	1	Every 10+ years	This hazard is not frequent but may still impact the area.	20%
	2	Every 5–10 years	This hazard is not as frequently occurring but it could occur in the next 10 years.	
	3	Every 1–5 years	This hazard is likely to occur relatively often. It may have occurred more or less frequently recently, but on average, it can be expected every 1–5 years.	
	4	Annually	This hazard is a frequent occurrence which the area actively has to respond to on an approximately annual basis.	

The following is the risk factor equation:

Risk Factor Equation

RF Value = [(Probability x .30) + (Magnitude x .30) + (Onset x .10) + (Duration x .10) + (Frequency x .20)]

Table 116 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 through 4.0 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 116: Overall Risk Scores for the CPRI

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

The Washoe County base plan is comprehensive for regional assessments and effectively addresses the calculated risk indexes. It provides a thorough evaluation that highlights its commitment to risk management and community safety, while the annexes are specific to each jurisdiction. Table 117 displays the CPRI values for the NLTFPD.

Table 117: Calculated Priority Risk Index for the North Lake Tahoe Fire Protection District

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Avalanche and Landslide	2.5	3.0	4.0	3.0	2.0	2.75	High
Criminal Acts and Terrorism	3.0	2.0	4.0	2.0	3.0	2.7	High
Drought	3.0	1.0	1.0	4.0	2.0	2.1	Medium

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Earthquake	4.0	3.0	4.0	3.0	3.0	3.4	High
Energy Emergency	4.0	2.0	4.0	3.0	3.0	3.1	High
Flood	2.5	2.0	2.0	3.0	4.0	2.65	High
Hazardous Materials Incident	3.0	2.0	4.0	2.0	3.0	2.7	High
Infectious Disease	2.0	2.0	1.0	4.0	2.0	2.1	Medium
Radiological Waste Transport	3.0	3.0	4.0	3.0	3.0	3.1	High
Extreme Weather (Winter Storm, Windstorms, Extreme Heat)	4.0	2.0	1.0	4.0	3.0	2.9	High
Transportation Incident	3.0	4.0	4.0	3.0	3.0	3.4	High
Volcano	1.0	3.0	3.0	4.0	1.0	2.1	Medium
Wildland Fire	4.0	4.0	4.0	3.0	3.0	3.7	High

NATIONAL RISK INDEX

The National Risk Index (NRI) is not included in the local jurisdiction annexes as the dataset is developed at a county and census tract level, and it is not aggregated to individual jurisdictional boundaries. While the NRI provides useful context for understanding countywide hazard overall risk data, it does not offer the resolution needed to support jurisdictional specific assessments.

Hazard-Specific Profiles and Risk Assessments

Wildland Fire

A wildland fire is a fire that starts in or moves into areas where there is primarily vegetation and brush and limited structures. Wildland fires can result from natural causes or human activities. The main natural cause of wildland fires is lightning. Human activities that may cause fires include campfires, the use of machinery near dry vegetation, improper disposal of ashes, and arson.

Wildland fires are not confined to forested areas; they can burn wherever vegetation is prevalent, including park areas. The term Wildland–Urban Interface (WUI) is used to describe areas where human development meets or intermixes with vegetation that can fuel fires. Fires in the WUI can cause major losses of property and structures, as well as human casualties.

Wildland fire spreads primarily by the consumption of vegetation, and the rate, area, and extent of consumption depend on three main factors: fuel, topography, and weather. These factors can sustain a wildland fire and predict a given area's fire potential and the associated damage that can occur, affecting the land, infrastructure, and people.

LOCATION

While wildland fire risk is predominantly associated with WUI areas in Washoe County, significant wildland fires can also occur in heavily populated areas. Wildland fires affect grass, forests, brushlands, and structures where there is human access to wildland areas, such as the Carson Range of the Sierra Nevada and the foothills of the Virginia Range. The risk of fire increases because of a greater chance of human carelessness.

Wildfires can vary in size, location, intensity, and duration. They are not confined to any specific geographic location, but they are most likely to occur in open grasslands. The threat to people and property from a wildfire is greater in the fringe areas, where developed areas meet open grasslands.

PREVIOUS OCCURRENCE/HISTORY

- **2021, Caldor Fire** – The fire involved evacuations from California to the Nevada side of Lake Tahoe. Impacts included the closing of Highway 28 and Highway 50

PROBABILITY OF FUTURE EVENTS

The probability of future wildfire events in the North Lake Tahoe Fire Protection District can be considered "likely." Given the high and extreme hazard ratings for certain communities, especially those categorized under high and moderate hazard communities, there is a significant chance of wildfires occurring as conditions continue to be influenced by factors like drought and vegetation fuel hazards.

VULNERABILITY ANALYSIS

Fire is a risk to all development in Washoe County because of the high desert climate and vegetation. The most at-risk type of development for wildland fires is residential subdivisions in or near the WUI, particularly in the more forested areas of the County, such as the Tahoe Basin. Based on economic trends, private land zoned for residential subdivisions in the WUI will continue to be developed, and mitigation, such as creating defensible space and managing fuels, will be required to reduce the risk as much as possible.

ESTIMATED IMPACT AND POTENTIAL LOSSES

The North Lake Tahoe Fire Protection District faces significant impacts and potential losses due to wildfires, particularly in drought conditions. Increased temperatures and dryness elevate the risk of intense and unpredictable fires, complicating suppression efforts and potentially leading to extensive damage to forests, habitats, and properties.

Financially, the costs of firefighting—encompassing personnel, equipment, and resources—can escalate quickly during wildfire events. Additionally, widespread property loss can harm the local economy, especially since tourism is vital to the area. A significant wildfire can deter visitors, leading to long-term economic downturns and reduced recreational opportunities.

Moreover, wildfires can cause ecological harm, resulting in vegetation loss, soil erosion, and impacts on water quality. The recovery process often requires extensive restoration efforts, placing further strain on district resources. Addressing these multifaceted challenges will necessitate comprehensive planning and investment in fire prevention initiatives.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 118 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 118: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 119 provides the Calculated Priority Risk Index (CPRI) for wildland fire impacts in North Lake Tahoe Fire Protection District based on the current plan's hazard risk assessment results. The NLTFPD assigned wildland fire a risk factor value of 3.7, reflecting high probability, high magnitude, and quick onset impacts. This risk factor value falls in the range of 2.5 to 4.0, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 119: Calculated Priority Risk Index for Wildland Fire in North Lake Tahoe Fire Protection District

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Wildland Fire	4	4	4	3	3	3.7	High

VULNERABLE POPULATIONS

In the North Lake Tahoe Fire Protection District, several populations are particularly vulnerable to the risks of wildland fires. These include elderly residents who may have mobility issues, making it difficult for them to evacuate quickly during an emergency. Many seniors reside in areas that are heavily wooded or near wildland interfaces, increasing their risk during fire events.

Another vulnerable group is low-income families and individuals, as they may lack the resources or means to prepare for wildfires. This could include the inability to create defensible space around their homes, access fire-resistant materials, or even evacuate swiftly when needed. Additionally, those with disabilities may face challenges during evacuation due to physical limitations or a lack of transportation options.

Another population at risk includes seasonal residents and tourists who may not be familiar with the area's fire risks and evacuation routes. They may not receive timely information about wildfires or the necessary precautions to take, putting them at greater danger during fire incidents.

Furthermore, children are also a vulnerable group, as they depend on adults for guidance and safety measures. Educational initiatives that focus on fire safety can help mitigate some of the risks faced by these younger populations.

Lastly, communities located in the Wildland-Urban Interface (WUI) are inherently at higher risk due to their proximity to dense vegetation and potential ignition sources. These areas require heightened awareness, preparation, and community resources to ensure the safety of all residents during high-risk fire seasons.

Energy Emergency

An energy emergency is defined as an abrupt interruption in the availability of utility services. A utility failure represents any occurrence in which vital utilities or services are rendered inoperable. Electrical blackouts, equipment malfunctions or damage, or an unexpected surge in demand may cause a utility failure.

A utility failure may impact any of the following services:

- Power to homes and businesses
- Drinking water
- Wastewater or stormwater
- Telecom and information technology

Moreover, interruptions in energy services may also be planned for system repairs or maintenance. In 2019, NV Energy and the Pacific Gas and Electric Company (PG&E) began implementing extensive public safety outage management programs in areas with extreme fire risks. The planning area includes parts of the Lake Tahoe basin in Washoe County. To prevent downed power lines and damaged equipment from causing fires, these electricity providers 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.[146] Planned outages can affect fuel availability for Washoe County. Outages affecting PG&E's system would cut power to the equipment that controls the operation of the fuel pipeline serving the region.

LOCATION

Energy emergencies can affect any portion of the planning area. Rural and populated areas alike are known to experience power outages during winter and windstorms that can last from several hours to several weeks. The overall effects of a widespread energy emergency would be concentrated in population centers, but the condition is likely to be present throughout the planning area. The electric utility provider for the planning area is NV Energy (formerly Sierra

[146] NV Energy, 2019, Power Safe NV, Power Safe NV | NV Energy

Pacific Power Company). NV Energy owns and operates no facilities that are rated Critical per the Department of Homeland Security criteria for National Critical Facilities.

PREVIOUS OCCURRENCE/HISTORY

- **2022, Sierra Cement Snowstorm** –The NLTFPD experienced 90,000 power outages for four days.

PROBABILITY OF FUTURE EVENTS

The probability of future energy emergency events in the North Lake Tahoe Fire Protection District can be classified as likely. Given the increasing risks associated with climate change, including drought conditions and their impacts on energy infrastructure, it is reasonable to anticipate potential energy emergencies in the region. Factors such as extreme weather events, rising demand for electricity, and the strain on resources further support this likelihood.

VULNERABILITY ANALYSIS

Prolonged power outages can cause health emergencies and increased demand for emergency medical services, especially in Nevada, where vulnerable people may be exposed to extreme summer or winter weather conditions. Power outages can also disrupt utilities or damage infrastructure, such as frozen pipes, with economic impacts because of the loss of perishable food and other items. Depending on the cause, a power outage or other energy emergency can cause cascading impacts—most significantly, wildland fires—if a downed line or other physical damage causes an outage.

ESTIMATED IMPACT AND POTENTIAL LOSSES

The North Lake Tahoe Fire Protection District could face significant challenges during an energy emergency, primarily due to reduced response capability. Power outages may disrupt communication systems and the operation of fire engines, hindering the district's ability to respond effectively to emergencies and threatening public safety.

Additionally, energy emergencies can increase the risk of wildfires from downed power lines or malfunctioning systems, creating further hazards that demand immediate attention from the fire services. This heightened risk and the potential for rapid escalation can put substantial strain on resources.

Economic losses are a critical concern as businesses and property owners affected by energy disruptions may struggle financially, leading to decreased funding for the fire district. This, coupled with potential damage costs from wildfires or emergencies, can strain the district’s budget.

Finally, prolonged energy emergencies can destabilize community life, creating anxiety and necessitating additional support from the fire protection district. In summary, the impacts of an

energy emergency on the North Lake Tahoe Fire Protection District are significant, underscoring the need for effective planning and preparedness.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 120 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 120: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 121 provides the Calculated Priority Risk Index (CPRI) for energy emergency impacts in North Lake Tahoe Fire Protection District based on the current plan's hazard risk assessment results. The NLTFPD assigned energy emergency a risk factor value of 3.1, reflecting high probability and quick onset impacts. This risk factor value falls in the range of 2.5 to 4.0, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 121: Calculated Priority Risk Index for Energy Emergency in North Lake Tahoe Fire Protection District

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Energy Emergency	4	2	4	3	3	3.1	High

VULNERABLE POPULATIONS

In the North Lake Tahoe Fire Protection District, several populations are particularly vulnerable to energy emergencies. One of the most affected groups is the elderly population. Older adults often rely on electricity to power essential medical devices, heating, and cooling systems.

During energy outages, the lack of these critical services can significantly impact their health and overall well-being, making access to reliable information and resources paramount.

Another vulnerable group includes individuals with disabilities. Many of these individuals depend on powered equipment—such as wheelchairs, oxygen machines, or refrigeration for medication. Interruptions to electrical service can severely disrupt their daily lives and pose serious health risks. Ensuring that this demographic has access to emergency support and backup power solutions is vital for their safety.

Low-income families also face unique challenges during energy emergencies. Economic constraints may prevent them from obtaining alternative power sources like generators, or from affording necessary supplies to cope during an outage. Consequently, these families can find themselves at increased risk, particularly when power outages occur during extreme weather conditions.

Seasonal residents and tourists represent another vulnerable segment of the population. The influx of visitors during peak seasons can lead to confusion regarding local emergency protocols, leaving these individuals ill-prepared. Many may not have adequate means for heating or cooling in rental properties, making them particularly susceptible to the effects of prolonged energy shortages.

Children and infants are also groups of concern during energy emergencies. Families with young children often require stable conditions for safe food storage and comfortable living environments. Disruptions in power can pose serious challenges for caregivers, who must ensure the health and safety of their little ones.

Finally, underserved communities may experience systemic inequities that hinder their ability to respond effectively to energy crises. These neighborhoods might lack access to critical resources, emergency preparedness education, and timely information, leaving residents vulnerable.

Earthquake

An earthquake is a sudden motion or trembling of the ground caused by shifting tectonic plates. It is potentially catastrophic and can cause multiple fatalities and major structural and infrastructure damage, including the disruption of utilities, communications, and transportation systems. Secondary effects can include landslides, seiches, liquefaction, fires, and dam failure.

Earthquakes occur abruptly, with little or no warning time. However, seismic monitoring can, in certain cases, detect increases in geologic and seismic activity that precede an earthquake event. Earthquakes can last from a few seconds to a few minutes. Aftershocks can recur over hours, weeks, or months, usually with diminishing frequency and intensity.

LOCATION

According to the U.S. Geological Service (USGS), earthquakes can happen anywhere in the United States, but they occur more frequently in some places than others.

The State of Nevada is the third most seismically active state in the United States, and Washoe County is in one of the most seismically active areas in Nevada. Its likelihood of damaging shaking is 75%–95%, so any area of the County is susceptible to noticeable effects of earthquakes. The most hazardous fault zones in Washoe County are the Mount Rose fault zone, the West Tahoe fault, and the Pyramid Lake fault. Moreover, dozens of smaller faults are in developed areas throughout the County. Fault zones in the Earth's crust result from sheer motion between tectonic plates, and they are the causal locations of most earthquakes.

PREVIOUS OCCURRENCE/HISTORY

The NLTFPD has not experienced any past earthquakes.

PROBABILITY OF FUTURE EVENTS

The probability of future earthquake events in the North Lake Tahoe Fire Protection District is generally considered to be likely. This region is situated in a seismically active area, and while specific predictions for timing and magnitude are difficult to make, historical data indicates a reasonable expectation for future seismic activity. Factors such as the geological makeup and tectonic activity in the surrounding areas contribute to this assessment.

VULNERABILITY ANALYSIS

The 2023 Enhanced SHMP states that earthquakes are responsible for forming the Nevada mountain ranges, which continue to develop. Seismicity, earthquake faults, and geodetically measured deformation indicate that future large earthquakes can occur anywhere in the state. Personal preparedness, emergency response, and community recovery planning are critical in the short term. In the long term, constructing seismically resilient buildings, planning future development around earthquake faults, and developing early warning systems will help reduce injuries and damage from future earthquakes.

ESTIMATED IMPACT AND POTENTIAL LOSSES

The North Lake Tahoe Fire Protection District (NLTFPD) faces significant earthquake risks that could impact its operations and community safety. Structural damage to fire stations and emergency response vehicles could hinder the district's ability to respond effectively in emergencies.

Additionally, earthquakes may damage water supply and distribution systems, compromising firefighting efforts during critical periods, especially in the fire season. The psychological impact

on residents can also lead to concerns about safety and preparedness, which in turn affect community engagement in fire safety programs.

Furthermore, economic losses from property damage could strain budgets, diverting funds from essential fire prevention initiatives. Overall, the potential impacts of earthquakes underscore the need for comprehensive preparedness measures within the NLTFPD's fire protection and emergency response strategy.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 122 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 122: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 123 provides the Calculated Priority Risk Index (CPRI) for earthquake impacts in North Lake Tahoe Fire Protection District based on the current plan's hazard risk assessment results. The NLTFPD assigned earthquake a risk factor value of 3.4, reflecting high probability and quick onset impacts. This risk factor value falls in the range of 2.5 to 4.0, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 123: Calculated Priority Risk Index for Earthquake in North Lake Tahoe Fire Protection District

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Earthquake	4	3	4	3	3	3.4	High

VULNERABLE POPULATIONS

In the North Lake Tahoe Fire Protection District, several populations are particularly vulnerable to earthquakes. Elderly residents often face mobility issues and health challenges that hinder their evacuation during seismic events, putting them at greater risk. Similarly, children and youth may lack the awareness and experience to respond effectively during an earthquake, making school preparedness essential.

Individuals with disabilities may encounter barriers to evacuation due to physical, sensory, or cognitive challenges, emphasizing the need for accessible emergency planning. Low-income families are also at risk, as limited resources can hinder their ability to prepare adequately for earthquakes or evacuate when necessary.

Tourists and temporary residents face unique vulnerabilities as they may be unfamiliar with local emergency procedures and lack support networks. Additionally, communities located in high-risk areas near fault lines may experience significant damage during earthquakes.

Flooding

Floods are among the most frequent and costly natural disasters in terms of human hardship and economic loss. They can cause substantial damage to structures, landscapes, and utilities and jeopardize life safety. Specific health hazards are also expected in flooding events. Standing water and wet materials in structures can become breeding grounds for microorganisms, such as bacteria, mold, and viruses. When flooding occurs in populated areas, warnings and evacuation can reduce impacts on life and safety**.**

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 and southern Sparks. The Truckee River headwaters lie in the Lake Tahoe Basin. The river drains part of the high Sierra Nevada and empties into Pyramid Lake, the sole outlet of Lake Tahoe

PREVIOUS OCCURRENCE/HISTORY

The NLTFPD has not experienced any past flooding events.

PROBABILITY OF FUTURE EVENTS

The probability of future flooding events in the North Lake Tahoe Fire Protection District can vary based on several factors, including weather patterns, rainfall amounts, and geographic features of the area. Given the challenges posed by climate change and increased precipitation in certain seasons, one could assess that flooding events might be considered "likely" in specific circumstances, especially during periods of heavy rainfall or rapid snowmelt.

VULNERABILITY ANALYSIS

The magnitude and potential severity of impacts of flooding is considered High in Washoe County. Severe floods may cause serious injuries and deaths and damage public facilities and private property. The river's height can determine the extent of flooding flows compared with flooding stages determined by USGS stream gauges throughout the area. It can also be measured by comparing water elevations to past flooding damage. Major floods may disrupt services for weeks, and response requires state and, potentially, federal support. In closed basins, flooding conditions may be present over an extended period, ranging from months to years, because of the lack of natural drainage.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 124 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 124: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 125 provides the Calculated Priority Risk Index (CPRI) for flooding impacts in North Lake Tahoe Fire Protection District based on the current plan's hazard risk assessment results. The NLTFPD assigned flooding a risk factor value of 2.65, reflecting high frequency and medium duration impacts. This risk factor value falls in the range of 2.5 to 4.0, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 125: Calculated Priority Risk Index for Flooding in North Lake Tahoe Fire Protection District

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Flooding	2.5	2	2	3	4	2.65	High

VULNERABLE POPULATIONS

In the North Lake Tahoe Fire Protection District, several populations are particularly vulnerable to flooding. Residents in low-lying areas are at heightened risk due to their proximity to floodplains and bodies of water, which can lead to significant property damage and safety concerns.

Elderly residents often face mobility challenges during floods, making quick evacuation difficult. Similarly, low-income families often lack the necessary resources for flood preparedness or recovery, leaving them particularly vulnerable.

Tourists and seasonal residents may not be familiar with local flood risks or evacuation routes, increasing their risk during emergencies. Individuals with disabilities who require assistance or specialized equipment also face additional obstacles in these situations.

Lastly, families with children may struggle to evacuate quickly, adding another layer of vulnerability.

Extreme Weather (Winter Storm, Windstorms, Extreme Heat)

Winter storms can bring heavy rain or snow, high winds, extreme cold, and ice storms. In Nevada, winter storms begin with cyclonic weather systems in the North Pacific Ocean or the Aleutian Islands, which can cause massive low-pressure storm systems to sweep across the western states. Winter storms plunge southward from arctic 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. Lake-effect snow is possible near large bodies of water, such as Lake Tahoe. This is produced when a cold air mass moves across warmer lake water, which can produce narrow but intense bands of heavy snowfall.

A windstorm is a severe weather condition that is sometimes indicated by high winds with little or no rain. High winds can also accompany thunderstorms and can cause significant property and crop damage, threaten public safety, and have adverse economic impacts from business

closures and power loss. Winds greater than 40–60 miles per hour (mph) are considered high. Winds that exceed 100 mph can overturn mobile homes, tear roofs off houses, topple trees, snap power lines, shatter windows, and sandblast paint from cars. Other associated hazards include utility outages, arcing power lines, and debris blocking streets. Windstorms can cause dust storms and can often increase the risk of wildland fires.

An emerging hazard for Washoe County is extreme heat. Extreme heat occurs when summertime temperatures are much hotter and/or more humid than average. Historically, the seasonal maximum heat index is 90.17°F, but it is expected to increase to over 96°F by mid-century.[147] Extreme heat conditions are determined by comparing temperature and humidity to average conditions for the affected location at that time of year.[148] Extreme heat can have negative health impacts, particularly on populations with underlying health risks. Extreme heat can also increase the negative impacts of drought and the probability of wildfire.

LOCATION

High elevations in the western portion of Washoe County experience the effects of winter storms, often snowstorms, with greater frequency than the rest of the County. Locations that are often affected by snowstorms include Mt. Rose Highway, Incline Village, Mt. Peavine, and I-80 near the County's border with California.[149]

Extreme wind events are experienced in every region of the United States. Windstorms may occur anywhere in Washoe County. Properties with above-ground infrastructure, utilities, and tree stands may be more damaged during windstorms.

Extreme heat also may occur anywhere in Washoe County. However, urban areas are more likely to experience extreme heat conditions because of the heat island effect, in which the impervious surfaces concentrated in cities increase the surrounding area's temperature higher than the temperatures in more rural areas.[150]

PREVIOUS OCCURRENCE/HISTORY

- **2022, Sierra Cement Snowstorm** The NLTFPD district area experienced 90,000 power outages for four days.

[147] ClimRR Climate Projection Report, Washoe County. https://climrr.anl.gov/climateprojections
[148] Center for Disease Control and Prevention, 2024, About Extreme Heat | Natural Disasters and Severe Weather | CDC
[149] National Operational Hydrologic Remote Sensing Center, NOHRSC Interactive Snow Information (noaa.gov)
[150] United States Environmental Protection Agency, "Heat Island Effect." https://www.epa.gov/heatislands#:~:text=Heat%20islands%20are%20urbanized%20areas,as%20forests%20and%20water%20bodies.

PROBABILITY OF FUTURE EVENTS

The probability of future severe winter storm events in the North Lake Tahoe Fire Protection District can be considered as "likely." The region typically experiences significant snowfall during the winter months, and as climate patterns shift, intense winter storms may become more frequent. This assessment is based on historical weather data and trends in severe winter weather events in the area.

VULNERABILITY ANALYSIS

The County's primary vulnerability from extreme weather is from power outages and impairment of transportation. Because nearly all social and economic activities depend 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 weather events. Buildings and roofs can be damaged if large amounts of heavy snow accumulate. If prolonged low temperatures accompany a winter storm, pipes can freeze and burst.

Winter storms can lead to health concerns for unhoused populations who do not have insulated clothing or dry living conditions and are at increased risk of hypothermia. Populations who may not have sufficient heating or who lose heat due to a power outage may seek alternative heating sources. Carbon monoxide poisoning can occur if proper ventilation is not used. Home fires also occur more frequently in the winter because of inadequate safety precautions from using alternative heat sources. Exhaustion and heart attacks brought on by overexertion are two other common causes of death related to winter storms. Shoveling snow, pushing a vehicle, or even walking in heavy snow can lead to heart attacks, particularly in older individuals or those not used to high physical activity levels. Slick or icy conditions following heavy snow may lead to injuries from falls.

Most vulnerabilities to windstorms occur in the built environment. Buildings, utilities, and transportation systems are vulnerable to wind damage. Old or poorly constructed buildings or insufficiently anchored manufactured homes are more susceptible to strong winds and can be heavily damaged. Uprooted and fallen trees can damage above-ground power and other utility lines and block roads, railways, or other transportation networks. Windstorms can also generate storm-related debris that can be costly and time consuming to clear. Building damage and service interruptions also cause economic losses from business interruptions.

Falling trees or blowing debris can cause injuries or death. Power outages and transportation disruptions can also negatively impact populations.

Extreme heat is associated with more fatalities than any other severe weather event in the United States. During extreme heat events, a person's body temperature may rise faster than it can cool itself, leading to heat-related illnesses, such as heat exhaustion and heat stroke. Older adults, young children, pregnant women, and individuals with chronic diseases, such as cardiovascular or respiratory conditions, are at the highest risk. Outdoor workers and unhoused populations are also particularly vulnerable. People who live in social isolation, including linguistic isolation or those living alone with few social relationships, also are at higher risk. Social factors, including race and ethnicity, income, and educational attainment, are correlated with many health outcomes, including heat-related illness. Lower-income individuals who do not live in air-conditioned housing may be at risk. Those living and working near urban heat islands may be more vulnerable.

IMPACT ON COUNTY ASSETS

The impacts of winter storms, extreme heat, and windstorms on the community assets in the North Lake Fire Protection District can be significant and far-reaching. Winter storms, characterized by heavy snowfall and ice, can lead to road closures, falling trees, and power outages. These conditions disrupt essential services, making it challenging for emergency responders to reach affected areas. In contrast, extreme heat creates its own set of challenges. Prolonged high temperatures can stress road surfaces, leading to cracks and increased maintenance needs, while also straining power systems and increasing the likelihood of outages. Windstorms can damage roofs, down power lines, and create debris that obstructs roadways, resulting in hazardous conditions that further endanger residents.

Public safety is a serious concern during these weather events. Winter storms often result in slippery roads and low visibility, increasing the risk of accidents and delaying emergency response times. Extreme heat, on the other hand, can cause heat-related illnesses to spike, particularly among vulnerable populations like the elderly, necessitating a robust response from local health services. Windstorms introduce additional risks, as high winds can send debris flying, posing dangers to both residents and emergency personnel trying to manage the situation.

Community health can also be adversely affected. Winter storms can exacerbate health concerns, particularly for individuals lacking proper heating, and isolation from snow can limit access to necessary medical care. In conditions of extreme heat, the increased occurrence of heat strokes and dehydration can overwhelm local medical facilities. Windstorms may worsen respiratory issues due to dust and debris, and the disruption of healthcare services during these events can create significant challenges for affected residents.

Economic impacts are another important aspect to consider. Winter storms can damage local businesses, leading to temporary closures and loss of income, while the costs associated with repairs can strain community budgets. Extreme heat can result in higher energy costs and reduced outdoor activity, affecting local tourism and related industries. Similarly, windstorms

can cause substantial property damage, resulting in economic losses that can hinder local recovery efforts and place additional stress on community resources.

Natural resources are similarly influenced by these weather events. Heavy snowfall in winter storms can disrupt ecosystems and wildlife habitats, and the subsequent melting can lead to flooding and soil erosion. Extreme heat can foster drought conditions, stressing local water supplies and affecting agriculture as well as natural vegetation. Windstorms may cause significant tree damage, leading to habitat loss for various species and increased soil erosion due to the loss of protective canopy cover.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 126 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 126: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 127 provides the Calculated Priority Risk Index (CPRI) for extreme weather impacts in North Lake Tahoe Fire Protection District based on the current plan's hazard risk assessment results. The NLTFPD assigned extreme weather a risk factor value of 2.9, reflecting high probability and long duration impacts. This risk factor value falls in the range of 2.5 to 4.0, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 127: Calculated Priority Risk Index for Extreme Weather in North Lake Tahoe Fire Protection District

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Extreme Weather	4	2	1	4	3	2.9	High

VULNERABLE POPULATIONS

In the North Lake Tahoe Fire Protection District, several populations are particularly vulnerable to extreme winter storms. Elderly residents often face mobility challenges and health issues, making it difficult for them to prepare or respond effectively during severe weather. They may require assistance for basic needs, putting them at greater risk.

Individuals with disabilities also struggle during these events. Those with mobility impairments may find navigating hazardous conditions challenging, while those with mental health issues may have a harder time coping with the stress of storms. Limited access to information and resources can exacerbate their vulnerability.

Low-income families may lack the financial means to adequately prepare for winter storms, impacting their ability to secure necessary supplies and heating. In contrast, tourists and seasonal residents might be unprepared for local winter conditions, increasing their risk during sudden storms.

Rural and isolated residents face additional challenges due to limited access to emergency services. When severe weather strikes, they may find themselves cut off from help. Lastly, homeless individuals without stable housing are especially at risk during winter storms, lacking access to shelter and warmth.

Criminal Acts and Terrorism

An act of violence is any situation that presents an immediate and ongoing danger to the safety of the people in the community. Besides individuals using firearms, other types of weapons and erratic behavior can create active threat situations. An active assailant scenario may include mass casualty incidents and workplace violence.

Domestic terrorism is perpetrated by individuals and/or groups inspired by or associated with primarily U.S.-based movements that espouse extremist ideologies of a political, religious, social, racial, or environmental nature. One example cited by the Federal Bureau of Investigation on its domestic terrorism website is a shooting in Las Vegas on June 8, 2014. Two

police officers inside a restaurant were killed in an ambush-style attack by a married couple who held anti-government views and intended to use the shooting to start a revolution.

LOCATION

Criminal acts of terrorism can impact any populated area, including shopping structures, clinics and hospitals, schools, and government offices and buildings.

PREVIOUS OCCURRENCE/HISTORY

The NLTFPD did not report any previous occurrence in the area.

PROBABILITY OF FUTURE EVENTS

In the North Lake Tahoe Fire Protection District, the probability of criminal activity and terrorism events can generally be assessed as "unlikely." The area is typically characterized by its natural beauty and relatively low crime rates compared to urban regions.

VULNERABILITY ANALYSIS

No estimates are available to determine the potential losses associated with criminal acts and terrorism. However, if an active threat were directed at the County, schools, government buildings, other public gathering places, and social events would be top targets. Active threats could have an impact on the community in the following ways: loss of human life; damage to buildings and structures; temporary displacement during the danger and/or investigation; stress on medical, emergency response, and security services; declines in economic activity and hospitality business after the event; psychological and emotional trauma; and an increased need for emergency services and funding.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 128 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 128: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**

Risk Factor Value	Overall Risk
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 129 provides the Calculated Priority Risk Index (CPRI) for criminal acts and terrorism impacts in North Lake Tahoe Fire Protection District based on the current plan's hazard risk assessment results. The NLTFPD assigned criminal acts and terrorism a risk factor value of 2.7, reflecting medium probability, medium frequency, and quick onset impacts. This risk factor value falls in the range of 2.5 to 4.0, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 129: Calculated Priority Risk Index for Criminal Acts and Terrorism in North Lake Tahoe Fire Protection District

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Criminal Acts and Terrorism	3	2	4	2	3	2.7	High

VULNERABLE POPULATIONS

In the North Lake Tahoe Fire Protection District, several populations are particularly vulnerable to criminal acts and terrorism. Elderly residents often face risks due to physical limitations and isolation, making them targets for scams and theft. Low-income families may struggle with limited resources for safety, increasing their susceptibility to crime.

Tourists and seasonal residents are also at higher risk, as their unfamiliarity with the area can expose them to criminal activities. Additionally, children and teens can be vulnerable to exploitation, especially when unsupervised, while individuals with disabilities may find themselves at greater risk due to specific challenges they face.

Homeless individuals often experience higher rates of violence and exploitation, lacking stable housing and community support. Finally, new residents may not yet have a strong understanding of local safety issues.

Avalanche and Landslide

An avalanche is a natural disaster caused when a mass of snow, ice, or rock suddenly slides down a mountainside or slope. Different snow avalanches include slab avalanches, loose snow avalanches, gliding avalanches, powder avalanches, and wet snow avalanches.[151]

Landslides, also known as mass movements, are complex phenomena that occur due to a combination of geological, climatological, and human factors. They are defined as the downward movement of a mass of rock, debris, or earth along a slope or cliff. Heavy rainfall, snowmelt, earthquakes, volcanic activity, and human activities, such as mining or construction, can trigger landslides. The type of slope, the nature of the soil and rock, and the presence of vegetation all play a role in determining the likelihood of landslide occurrence. There are five modes of slope movement: falls, topples, slides, spreads, and flows. These are further categorized based on the type of geological material and type of movement: bedrock, debris, or earth. Movements include rotational, translational, block, rockfall, topple, debris flow, debris avalanche, earthflow, and creep. Landslides may be small or very large, and they can move at slow to very high speeds. They can be initiated by storms, earthquakes, fires, volcanic eruptions, and human modifications of the land that lead to slope instability.

LOCATION

Avalanche risk is highest in the steep, mountainous areas of the Carson Range of the Sierra Nevada in southwestern Washoe County. Incline Village and Crystal Bay are under avalanche advisories several times each winter.

PREVIOUS OCCURRENCE/HISTORY

The NLTFPD has reported no previous occurrence of avalanches or landslides.

PROBABILITY OF FUTURE EVENTS

The probability of future avalanche and landslide events in the North Lake Tahoe Fire Protection District can be considered "likely." This assessment takes into account the area's geography, snowfall patterns, and historical data on avalanches and landslides. Various factors, such as heavy snowfall, rapid melting, or geological instability, can contribute to these risks in the region.

[151] WSL Institute for Snow and Avalanche Research, “Avalanche Types.” https://www.slf.ch/en/avalanches/avalanche-science-and-prevention/avalanche-types/#:~:text=Slab%20avalanches%20are%20the%20most,and%20caught%20in%20the%20avalanche.

VULNERABILITY ANALYSIS

Mountain communities in the Lake Tahoe Basin, including Incline Village and Crystal Bay, are vulnerable to the effects of avalanches. When avalanche conditions are present, risks are highest for recreational users and others in backcountry areas who may trigger avalanches or be injured or killed by an avalanche. Besides injuries and deaths, avalanches can damage or destroy property and utilities and cover roadways in snow. Transportation disruptions caused by avalanches or area closures because avalanche risks can have economic impacts on ski resorts and other businesses in the Lake Tahoe Basin over a period of days to a week or more.

ESTIMATED IMPACT AND POTENTIAL LOSSES

The potential impacts and losses to the North Lake Tahoe Fire Protection District from avalanches and landslides are significant. One major concern is property damage, with repair costs ranging from thousands to millions of dollars for homes and infrastructure, which can strain community resources. Emergency response costs can also escalate quickly, including expenses related to search and rescue operations and medical care for the injured, placing a financial burden on local agencies.

Economically, the area relies heavily on tourism, and disruptions from avalanches or landslides can deter visitors, leading to lost revenue for local businesses and potentially jeopardizing jobs. Infrastructure, such as roads and bridges, may require costly repairs, which could delay emergency responses and further strain budgets.

Environmental impacts are also critical, as these events can disrupt local ecosystems and water quality. The ongoing threat to public safety necessitates increased measures, requiring additional funding and resources from the Fire Protection District. Finally, investing in long-term mitigation strategies, like improved drainage and controlled avalanche release systems, is essential but may entail significant upfront costs, highlighting the need for proactive management to mitigate these risks effectively.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 130 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 130: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 131 provides the Calculated Priority Risk Index (CPRI) for avalanche and landslide impacts in North Lake Tahoe Fire Protection District based on the current plan's hazard risk assessment results. The NLTFPD assigned avalanche and landslide a risk factor value of 2.75, reflecting medium duration, medium magnitude, and quick onset impacts. This risk factor value falls in the range of 2.5 to 4.0, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 131: Calculated Priority Risk Index for Avalanche and Landslide in North Lake Tahoe Fire Protection District

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Avalanche and Landslide	2.5	3	4	3	2	2.75	High

VULNERABLE POPULATIONS

In the North Lake Tahoe Fire Protection District, several populations are particularly vulnerable to avalanches and landslides. Residents in high-risk areas, especially those near steep terrain with a history of such events, face significant danger, particularly during winter months when the risk increases.

Tourists and visitors, often unfamiliar with the local geography, may unknowingly place themselves in hazardous situations while engaging in outdoor activities like skiing or hiking. This lack of awareness heightens the chances of accidents.

Elderly individuals and those with disabilities may struggle to evacuate swiftly during emergencies, increasing their risk. Additionally, low-income families often have limited resources, making it difficult to access vital information or evacuate safely. Children, particularly those involved in winter sports, may not grasp the dangers, necessitating closer supervision.

Drought

Nevada is the driest state in the nation, and the planning area has experienced multiple droughts. Drought cycles consisting of successive years of low precipitation are a normal,

recurrent phenomenon across the Great Basin. Drought differs from most other natural hazard events due to its slow onset, gradual impact, and duration. With no defined starting period and limited long-range predictability, drought is a “creeping hazard” that may be recognized only after it is well underway. The onset of drought involves many factors, but in Washoe County, it is generally caused by successive years of inadequate winter precipitation, resulting in insufficient natural supplies to meet local demand. It is critical to note that the region depends almost exclusively on winter snowpack and rainfall for its water supply. Rains from summer thunderstorms do little to recharge reservoirs and raise groundwater tables.

LOCATION

Drought affects broad regions and can include any portion of Washoe County. Historically, the southern section of the County has had less frequent droughts than the central and northern sections because of extensive stored water in reservoirs in the Truckee River basin. However, low snowpack in the Truckee River basin can cause droughts of a greater magnitude in the southern section of the County, as was experienced between 2012 and 2017. With the implementation of the Truckee River Operating Agreement, the Truckee Meadow Water Authority can store credit water in the Boca Reservoir. The reservoir is currently operated for wintertime flood control based on the 1985 US Army Corps of Engineers’ (USACE) Water Control Manual, which requires minimum specific flood space in the reservoir and prohibits the capture of springtime runoff before April. Stakeholders in the Truckee River Basin recognize that the system can be better operated for both flood control and water supply.

PREVIOUS OCCURRENCE/HISTORY

The NLTFPD has reported no previous occurrence of drought.

PROBABILITY OF FUTURE EVENTS

The probability of future drought events in the North Lake Tahoe Fire Protection District is likely. Given the current trends in climate and the assessments of community hazards, drought conditions could become more frequent, impacting the area's fire risk and overall water availability. This assessment considers the various environmental factors and ongoing changes that contribute to drought likelihood in the region.

VULNERABILITY ANALYSIS

Drought can impact surface water and groundwater availability and have direct, disastrous effects on human populations. The indirect consequences of drought, such as unemployment, reduced tax revenues, increased food prices, reduced outdoor recreation opportunities, higher energy costs as water levels in reservoirs decrease and consumption increases, and water rationing, are not often fully known. This complex web of impacts can affect people and economies well beyond the area physically experiencing the drought.

ESTIMATED IMPACT AND POTENTIAL LOSSES

The North Lake Tahoe Fire Protection District faces significant impacts and potential losses due to drought, which can exacerbate the risk of wildfires and affect local ecosystems. As drought conditions persist, vegetation dries out, making it highly susceptible to ignition from natural occurrences like lightning strikes or human activities. The likelihood of wildfires increases dramatically during prolonged dry spells, potentially leading to devastating losses in property, natural habitats, and the local economy.

Drought not only heightens fire risk but also stresses water resources vital for firefighting efforts. Insufficient water supply can hinder response strategies during wildfire incidents, resulting in larger, more uncontrollable fires that threaten residential areas, commercial properties, and infrastructure within the district. As the frequency and severity of droughts rise due to climate change, the potential for catastrophic wildfire events escalates, which may also lead to increased insurance costs and property value declines.

Additionally, the ecological impacts of drought can disrupt local wildlife and plant communities, affecting biodiversity and ecosystem resilience. These changes can have long-term implications for both the environment and the community, such as reduced recreational opportunities, diminished air and water quality, and a decline in tourism, which is vital for the region's economy. Consequently, the North Lake Tahoe Fire Protection District must prioritize drought preparedness and resilience strategies to mitigate these potential losses and safeguard the community's future.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 132 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 132: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 133 provides the Calculated Priority Risk Index (CPRI) for drought impacts in North Lake Tahoe Fire Protection District based on the current plan's hazard risk assessment results. The NLTFPD assigned drought a risk factor value of 2.1, reflecting medium probability and long duration impacts. This risk factor value falls in the range of 2.0 to 2.4, which is considered a medium-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 133: Calculated Priority Risk Index for Drought in North Lake Tahoe Fire Protection District

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Drought	3	1	1	4	2	2.1	Medium

VULNERABLE POPULATIONS

In the North Lake Tahoe Fire Protection District, several populations are particularly vulnerable to drought. Elderly residents may struggle with limited mobility and access to resources, making it harder for them to manage water shortages that affect their health and wellbeing.

Low-income families face significant challenges as increased water costs can strain their already limited resources, exacerbating financial stress. Outdoor workers in construction and landscaping also experience risks due to heightened heat and reduced water availability, which can impact their health and job security.

Additionally, tourism-dependent businesses may suffer from decreased visitor numbers during droughts, affecting the local economy. Lastly, residents in wildland-urban interface areas are at greater risk for wildfires, posing dangers to life and property.

Hazardous Materials Incident

A hazardous material is any item or agent (biological, chemical, or physical) that can cause harm to humans, animals, or the environment, either by itself or through interaction with other factors. Hazardous materials can be present in the form of gas, solid, or liquid. Environmental or atmospheric conditions can influence hazardous materials if they are not contained.

LOCATION

The potential for contact with hazardous materials is present throughout Washoe County.

PREVIOUS OCCURRENCE/HISTORY

The NLTFPD had three incidents in which semi-trailer fuel tanks were breached and fuel flowed through the creek to Lake Tahoe.

- 2024, Barrels on highway
- 2023, Mercury spills
- 2020, Semi-trailer crash

PROBABILITY OF FUTURE EVENTS

The probability of future hazardous materials events in the North Lake Tahoe Fire Protection District is generally considered to be unlikely. This assessment is based on existing safety measures, regulations, and the nature of the surrounding environment, which may limit the occurrence of such events.

VULNERABILITY ANALYSIS

Hazardous materials incidents can be caused by a number of factors, including technological failures, natural hazards, such as earthquakes or floods, and 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 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 the I-80 and/or I-580 highway. Many of the critical facilities and valuable assets are near I-80 and I-580, particularly in the Reno/Sparks corridor. Hazardous materials may be transported through the Reno-Tahoe International Airport. In addition, power plants, water and wastewater treatment plants, hospitals, fire stations, and other critical facilities in Washoe County may store hazardous materials on site.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 134 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 134: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 135 provides the Calculated Priority Risk Index (CPRI) for hazardous materials incidents impacts in North Lake Tahoe Fire Protection District based on the current plan's hazard risk assessment results. The NLTFPD assigned hazardous materials incidents a risk factor value of 2.7, reflecting medium probability, medium frequency, and quick onset impacts. This risk factor value falls in the range of 2.5 to 4.0, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 135: Calculated Priority Risk Index for Hazardous Materials Incidents in North Lake Tahoe Fire Protection District

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Hazardous Materials Incident	3	2	4	2	3	2.7	High

VULNERABLE POPULATIONS

The North Lake Tahoe Fire Protection District has several populations that are particularly vulnerable to hazardous materials incidents.

Elderly residents often face mobility challenges and health issues that complicate evacuation. Children in families may require additional support during emergencies, as they are more sensitive to toxic exposure.

Individuals with disabilities also encounter unique challenges, as they may have difficulties with communication and evacuation procedures. Low-income populations are at risk due to limited resources, making it harder for them to prepare for and respond to emergencies.

Seasonal residents and tourists may lack familiarity with emergency protocols and evacuation routes, heightening their vulnerability. Additionally, those living near industrial sites may need specific safety plans due to the risk of exposure.

Infectious Disease

While chronic disease has placed a lasting strain on the nation's healthcare system, acute infectious disease poses a greater immediate and severe threat to its capacity. These diseases, caused by pathogenic bacteria, viruses, fungi, or parasites, are often marked by debilitating symptoms, such as fever, diarrhea, fatigue, muscle aches, coughing, respiratory issues, and rashes.[152] An outbreak of infectious diseases can bring socioeconomic activity and critical government functions to a standstill.

LOCATION

Infectious diseases spread by humans, and vector-borne infectious diseases can occur in both urban and non-urban areas throughout the County. Areas in the county that are more susceptible to infectious diseases are typically those with higher population density, such as Reno and Sparks, and areas with poor sanitation and limited access to healthcare services. On the other hand, areas more susceptible to vector-borne diseases are often those with standing water or extensive vegetation, providing suitable habitats for disease-carrying vectors, such as mosquitoes and ticks. These are more prevalent in non-urban areas.

PREVIOUS OCCURRENCE/HISTORY

- 2020–2022, COVID-19 pandemic

PROBABILITY OF FUTURE EVENTS

The probability of future infectious disease events in the North Lake Tahoe Fire Protection District can be considered as "unlikely." This is due to the area's relatively low population density, along with the existing health measures and environmental factors that might reduce the spread of infectious diseases.

VULNERABILITY ANALYSIS

Infectious diseases have been known to spread quickly through communities. Many spread through close contact, meaning that highly populated areas like Reno and Sparks are more prone to widespread outbreaks. Public gathering places where people may be together in close quarters, such as schools and childcare facilities, offices, and transportation terminals, provide more opportunities for diseases to pass from one person to another.

Land use changes can have a major impact on infectious disease numbers. This is done by changing the rate of contact between individuals and disease hosts, whether animal, insect, or

[152] Mayo Clinic, "Infectious Disease." https://www.mayoclinic.org/diseases-conditions/infectious-diseases/symptoms-causes/syc-20351173

fungal. Along with this change in contact rate, land use changes can also alter the composition of local species, potentially allowing vector species to become the dominant species.

Outbreaks of infectious diseases most often affect vulnerable populations. However, a worst-case scenario could overwhelm local hospitals and medical facilities and require a surge response.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 136 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 136: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 137 provides the Calculated Priority Risk Index (CPRI) for infectious disease impacts in North Lake Tahoe Fire Protection District based on the current plan's hazard risk assessment results. The NLTFPD assigned infectious disease a risk factor value of 2.1, reflecting high duration and slow onset impacts. This risk factor value falls in the range of 2.0 to 2.4, which is considered a medium-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 137: Calculated Priority Risk Index for Infectious Disease in North Lake Tahoe Fire Protection District

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Infectious Disease	2	2	1	4	2	2.1	Medium

Radiological Waste Transport

The transportation of radiological waste and other types of radiological materials is a common practice in Washoe County. Washoe County roadways, railways, and airways ship different forms of radiological materials daily. The transportation of radioactive materials through Nevada must follow the hazardous materials regulations of the U.S. Department of Transportation. Most shipments do not require prior notification and do not follow restricted routes. If the type or quantity of radiation exceeds a “Quantity of Concern,” the shipper must notify the state of the planned time and route. Shipments of Radioactive Material in Quantities of Concern are not restricted and are not required to wait for approval. A more restricted category is Highway Route Controlled Quantity, which requires prior notification, and pursuant to a Governor’s directive, the shipment and transportation vehicle are inspected and then escorted by the Nevada Highway Patrol. These shipments occur about once every three years through Washoe County.

LOCATION

Radiological waste could be transported along rail systems, major airports, and highway corridors in Washoe County. The zones of potential impact would extend beyond these transportation facilities. The sizes and shapes of those zones are affected by the material released and atmospheric and environmental effects, such as wind speed and water flow.

PREVIOUS OCCURRENCE/HISTORY

The NLTFPD has reported no radiological waste transport incidents in its area.

PROBABILITY OF FUTURE EVENTS

The probability of future radiological waste transport events in the North Lake Tahoe Fire Protection District would likely be considered "unlikely." This assessment is based on the specific regulations and guidelines surrounding the transport of hazardous materials, which generally prioritize safety and restrict transport through populated areas.

VULNERABILITY ANALYSIS

The MPT determined that hazards from transporting radiological waste have a low probability of occurring. However, the vulnerability of the public, continuity of operations, and infrastructure to radiological waste transport are assessed below. A radiological incident on a transportation corridor could cause a fire or explosion, dispersing radiological particles that contaminate people and property. Depending on several factors, communities in the immediate vicinity of the event would be the most vulnerable. Moreover, if radioactive materials are not effectively contained, they can spread through the air, soil, and/or water. In the immediate aftermath of a radiological incident on a roadway, the materials pose a substantial risk to first responders and other emergency personnel. Due to the infrequent occurrence of these

accidents, emergency personnel may not be sufficiently trained in appropriate response protocols.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 138 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 138: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 139 provides the Calculated Priority Risk Index (CPRI) for radiological waste transport impacts in North Lake Tahoe Fire Protection District based on the current plan's hazard risk assessment results. The NLTFPD assigned radiological waste transport a risk factor value of 3.1, reflecting medium probability, medium magnitude, and quick onset impacts. This risk factor value falls in the range of 2.5 to 4.0, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 139: Calculated Priority Risk Index for Radiological Waste Transport in North Lake Tahoe Fire Protection District

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Radiological Waste Transport	3	3	4	3	3	3.1	High

VULNERABLE POPULATIONS

Populations in the North Lake Tahoe Fire Protection District vulnerable to radiological waste transport incidents include several groups. High-density residential communities near transport

routes face significant risks. Elderly individuals may have reduced mobility and require extra assistance during emergencies.

Children in schools and daycare facilities located close to these transport routes are also at risk and need protective measures. Additionally, tourists, unfamiliar with local emergency protocols, could be vulnerable during such incidents.

Individuals with disabilities may encounter challenges due to mobility constraints or special medical needs. Finally, low-income communities often lack access to timely information and resources, complicating evacuation efforts.

Transportation Incident (Aircraft Crash)

An aircraft crash may occur for many reasons, including mechanical failure, poor weather conditions, or criminal activity. Aircraft of varying sizes are subject to this hazard, from small single-engine aircraft and gliders to helicopters and commercial airliners. The damage from an aircraft crash depends on the location of the accident (densely versus sparsely populated area) and the potential for releasing hazardous materials.

LOCATION

Washoe County has four publicly operated airports: the Reno–Tahoe International Airport (RNO), the Reno-Stead Airport (RTS), the Spanish Springs Airport (N86) in Reno, and the Empire Airport (1A8) in Empire. Several privately operated airports in the County serve commercial, non-commercial, private commuter, and recreational aircraft. The greatest volume of commercial aircraft service passes through Reno–Tahoe International Airport. Federal agencies, such as the Bureau of Land Management, also operate and lease airports in Nevada.

PREVIOUS OCCURRENCE/HISTORY

- **2023 and 2024 Reno Air Races**: Crashes occur almost annually during this event.

PROBABILITY OF FUTURE EVENTS

The probability of future air transportation incidents in the North Lake Tahoe Fire Protection District can be viewed as unlikely. While air transportation carries inherent risks, strict regulations, pilot training, and technological advancements generally contribute to safe operation. However, factors like weather conditions and the area's mountainous terrain can influence safety. Overall, while not impossible, significant incidents would be considered unlikely in this context.

VULNERABILITY ANALYSIS

Public airports that have accepted federal assistance, including the Reno–Tahoe International Airport, must designate runway protection zones (RPZs) at each end of their runways to protect

people and property on the ground if an aircraft lands or crashes beyond the runway. Reno–Tahoe International Airport owns most of the land in its RPZs in Reno.[153] Aircraft crashes are more likely to occur in mixed commercial, residential, and commercial–industrial development in the RPZs.

Reno–Stead Airport has designated airport-critical areas at the ends of its runways. These trapezoidal areas help ensure that land use is compatible with airport operations to reduce risks to people and property on the ground. The airport critical areas at either end of Runway 8/26 or the south end of Runway 14/32 extend beyond airport property. Residential areas in the County and industrial and recreational areas in Reno near the airport are critical areas where aircraft crashes are more likely to occur.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 140 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 140: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 141 provides the Calculated Priority Risk Index (CPRI) for transportation incidents impacts in North Lake Tahoe Fire Protection District based on the current plan's hazard risk assessment results. The NLTFPD assigned transportation incidents a risk factor value of 3.4, reflecting high magnitude and quick onset impacts. This risk factor value falls in the range of 2.5 to 4.0, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

[153] Reno-Tahoe Regional Airport, "RNO.C3_Facility Requirements_Final.docx." https://www.renoairport.com/wp-content/uploads/2022/08/RNO-MP-2018_Facility-Requirements.pdf

Table 141: Calculated Priority Risk Index for Transportation Incident in North Lake Tahoe Fire Protection District

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Transportation Incident	3	4	4	3	3	3.4	High

VULNERABLE POPULATIONS

In the North Lake Tahoe Fire Protection District, certain populations are particularly vulnerable to transportation incidents, including aircraft-related events. Elderly residents often have mobility limitations and rely on public transportation, making them at risk during emergencies that require quick evacuations.

Tourists and visitors are another vulnerable group. Many come to the area during peak seasons and may not be familiar with local safety procedures, complicating their response during incidents. Children and students, housed in schools and daycare facilities, also require special assistance, making their safety a priority in emergencies.

Low-income communities may struggle with access to reliable transportation, hindering their ability to evacuate efficiently. Individuals with disabilities face additional challenges, as mobility issues can make evacuating difficult. Seasonal workers, staying in temporary housing, might be less aware of local safety protocols, further heightening their risk.

Lastly, residents living near airports or major transportation routes are at increased risk due to the likelihood of incidents occurring in those areas.

Volcano

A volcano is an opening or rupture of the Earth's surface that allows ash, gases, and/or molten rock under tremendous pressure to emerge from below the surface. Volcanic activity over long periods can either form mountains, as molten rock is gradually extruded, or rapidly obliterate mountains during explosive eruptions.

LOCATION

No active volcanoes are in Washoe County.

PREVIOUS OCCURRENCE/HISTORY

There has been no previous volcanic activity in the NLTFPD area.

PROBABILITY OF FUTURE EVENTS

The probability of future volcanic events in the North Lake Tahoe Fire Protection District is considered unlikely. This area is not known for volcanic activity, as it is primarily characterized by its lake and mountainous terrain.

VULNERABILITY ANALYSIS

Volcanic hazards, particularly ashfall, have a very low probability of occurring. However, the vulnerability of the public, continuity of operations, infrastructure, and the environment to volcanic hazards.

ESTIMATED IMPACT AND POTENTIAL LOSSES

The North Lake Tahoe Fire Protection District faces several risks from volcanic activity, even though it is not near an active volcano. An eruption in a nearby area could lead to ashfall, reducing air quality and posing health risks to residents and responders, which could strain emergency resources.

If lava flows or pyroclastic flows were to reach the district, they could cause significant property damage, disrupt habitats, and complicate fire prevention efforts. The local tourism industry, crucial for the economy, might also suffer due to evacuations and damage, leading to decreased revenue for businesses and reduced funding for the fire protection district.

In summary, while not directly in a volcanic zone, a nearby eruption could have far-reaching impacts on air quality, public health, property values, and the economy, ultimately affecting the district's ability to manage emergencies effectively.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 142 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 142: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**

Risk Factor Value	Overall Risk
0 – 1.9	**Low**

Table 143 provides the Calculated Priority Risk Index (CPRI) for volcano impacts in North Lake Tahoe Fire Protection District based on the current plan's hazard risk assessment results. The NLTFPD assigned volcano a risk factor value of 2.1, reflecting medium probability, long duration, and medium onset impacts. This risk factor value falls in the range of 2.0 to 2.4, which is considered a medium-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 143: Calculated Priority Risk Index for Volcano in North Lake Tahoe Fire Protection District

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Volcano	1	3	3	4	1	2.1	Medium

VULNERABLE POPULATIONS

In the North Lake Tahoe Fire Protection District, certain populations are particularly vulnerable to volcanic activity. Residents living near volcanic features are at risk from ash fall and lava flows, requiring timely evacuation assistance.

Tourists and visitors may lack awareness of emergency protocols, which can hinder their response in a crisis. Additionally, the elderly can face mobility challenges during evacuations, making them a vulnerable group that needs special consideration in emergency planning.

Low-income households may also struggle to evacuate quickly due to limited resources and transportation options. Individuals with respiratory health issues are particularly susceptible to the harmful effects of volcanic ash and gases.

Lastly, children require extra support during evacuations, as they might need guidance from caregivers to ensure their safety.

Vulnerability Assessment

JURISDICTION-SPECIFIC VULNERABILITIES

Table 144: Vulnerable Assets in the North Lake Tahoe Fire Protection District

Vulnerable Assets	What makes this group/asset vulnerable during hazards? Have there ever been issues with recovery after an event?
People (residents, workers, visiting populations, and socially vulnerable populations like seniors, individuals with disabilities, lower-income individuals, etc.)	
	Full capacity is not uncommon in the Tahoe Area during peak season.
	More development is the planning phases for the two-lane highways out of Incline Village/Crystal Bay,
	Incline Village/Crystal Bay is becoming more of a senior or retirement community.
Structures (residential, commercial, industrial, government-owned, planned capital improvement, etc.)	
	Community is 100% in the Wildfire Urban Interface surrounded by U.S. Forest Service (USFS) land. The USFS has too many restrictions on fuel management, which hinders the ability to lower the wildfire threat. Most structures are private homes; there are few commercial structures. Power is supplied from two main transmission lines, with no backup for the community. Some large commercial structures are in the construction phase.
Economic Assets (major employers, primary economic sectors, key infrastructure like telecommunications networks, etc.)	
	N/A
Natural, Historic, and Cultural Resources (areas of conservation, beaches, parks, critical habitats, community centers, historic places, etc.)	
	Tahoe Basin is full of natural, historic and cultural resources. Most resources are on federal land.
Critical Facilities and Infrastructure (hospitals, law enforcement, water, power, transportation systems, etc.)	
	One hospital, local general improvement district supplies water and sewer services.
	There is only one water intake for the entire community.
Community Activities (major local events, such as festivals, or economic events, like farming or fishing)	

Vulnerable Assets	What makes this group/asset vulnerable during hazards? Have there ever been issues with recovery after an event?
	Very seasonal area that draws many tourists.
Are there any other assets that you can think to include?	

REPETITIVE LOSS PROPERTIES

No repetitive loss properties currently exist in the NLTFPD area.

EXPOSURE ASSESSMENT

Table 145 summarizes the exposure of critical facilities in the NLTFPD to hazards that can be mapped.

Table 145: Exposure Assessment of the North Lake Tahoe Fire Protection District

Type	Name	Address	Special Hazards District	Flood Zone	Wildland Fire Hazard Potential
Hospital	Incline Village Community Hospital	N/A	NLTFPD	500-year Flood zone	1
School	Sierra Nevada College	N/A	NLTFPD	–	1
School	Incline Middle School	N/A	NLTFPD	–	1
School	Incline Elementary School 3rd–5th School	N/A	NLTFPD	–	1
School	Incline High School	N/A	NLTFPD	–	1
School	Incline Elementary K-2nd School	N/A	NLTFPD	–	1
School	Lake Tahoe School	N/A	NLTFPD	–	1
Transfer Station	Incline Transfer Station	1076 Tahoe Boulevard	NLTFPD	–	1
Dam	Mill Creek No 2	N/A	NLTFPD	–	1
Dam	Mill Creek No 1	N/A	NLTFPD	–	1

Type	Name	Address	Special Hazards District	Flood Zone	Wildland Fire Hazard Potential
Fire Station	North Lake Tahoe Fire Protection District Station 11	875 Tanager Street	NLTFPD	–	1
Fire Station	North lake Tahoe Fire Protection District Station 12	14 Calneva Drive	NLTFPD	–	1
Fire Station	North lake Tahoe Fire Protection District Station 13	965 Mount Rose Highway	NLTFPD	–	1

Land Use and Development Trends

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

Table 146: Recent Development Trends for the North Lake Tahoe Fire Protection District

Type of Hazard Event	Changes in Land Use	Changes in Population	Changes in Conditions (e.g., climate change)	Overall Vulnerability
Avalanche and Landslide	No Changes	No Changes	No Changes	No Changes
Criminal Acts and Terrorism	No Changes	No Changes	No Changes	No Changes
Drought	No Changes	No Changes	No Changes	No Changes
Earthquake	No Changes	No Changes	No Changes	No Changes
Energy Emergency	No Changes	No Changes	No Changes	No Changes
Flood	No Changes	No Changes	No Changes	No Changes
Hazardous Materials Incident	No Changes	No Changes	No Changes	No Changes
Infectious Disease	No Changes	No Changes	No Changes	No Changes

Type of Hazard Event	Changes in Land Use	Changes in Population	Changes in Conditions (e.g., climate change)	Overall Vulnerability
Radiological Waste Transport	No Changes	No Changes	No Changes	No Changes
Extreme Weather (Winter Storm, Windstorms, Extreme Heat)	No Changes	No Changes	No Changes	No Changes
Transportation Incident	No Changes	No Changes	No Changes	No Changes
Volcano	No Changes	No Changes	No Changes	No Changes
Wildland Fire	No Changes	No Changes	No Changes	No Changes

Capability Assessment

FEMA	**C1.** Does the plan document [the NLFPD'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))

Planning and Regulatory Capabilities

Planning and regulatory capabilities are the plans, policies, codes, and ordinances that prevent and reduce the impacts of hazards.

Table 147: Planning Capabilities of the North Lake Tahoe Fire Protection District

Plan	Do you have this? (Y/N)	Does the plan address hazards? (Y/N)	How can the plan be used to implement mitigation actions?	When was it last updated? When will it be updated next?
General Plan				
Capital Improvement Plan	Yes	Yes	Need further investigation	Annually
Climate Change Adaptation Plan	No	N/A	N/A	N/A
Community Wildfire Protection Plan	Yes	Yes	The Plan is written as such for the entire Basin	2020; Being Updated now for 2024 release
Economic Development Plan	No	N/A	N/A	N/A
Land Use Plan	No	N/A	N/A	N/A
Local Emergency Operations Plan	Yes	Yes	Written as such	Continually
Stormwater Management Plan	No	N/A	N/A	N/A
Transportation Plan	No	N/A	N/A	N/A

Plan	Do you have this? (Y/N)	Does the plan address hazards? (Y/N)	How can the plan be used to implement mitigation actions?	When was it last updated? When will it be updated next?
Substantial Damage Plan	No	N/A	N/A	N/A
Other? (Describe)	Washoe County has a Damage Assessment Plan that serves the same intent and covers all jurisdictions.			

Table 148: Regulations and Ordinances of the North Lake Tahoe Fire Protection District

Plan	Does this regulation/ordinance effectively reduce hazard impacts?	Is it adequately administered and enforced?	When was it last updated? When will it be updated next?
Building Code	Yes	Yes	2018 Updated July 2025
Flood Insurance Rate Maps	No	No	N/A
Floodplain Ordinance	No	No	N/A
Subdivision Ordinance	No	No	N/A
Zoning Ordinance	No	N/A	N/A

Plan	Does this regulation/ordinance effectively reduce hazard impacts?	Is it adequately administered and enforced?	When was it last updated? When will it be updated next?
Natural Hazard Specific Ordinance (Stormwater, Steep Slope, Wildfire)	Yes	Yes	2018; Updated 2025
Acquisition of Land for Open Space and Public Recreation Use	No	N/A	N/A
Prohibition of Building in At-Risk Areas	No	No	N/A

Administrative and Technical Capabilities

Administrative and technical capabilities include staff and their skills. They also include tools that can help you carry out mitigation actions. Consider how state and regional partners can help if you do not have local staff.

Table 149: Administrative Capabilities of the North Lake Tahoe Fire Protection District

Administrative Capability	Do you have this? (Y/N)	Is staffing adequate?	Is staff trained on hazards and mitigation?	Is coordination between agencies and staff effective?
Chief Building Official	N	N/A	N/A	N/A
Civil Engineer	N	N/A	N/A	N/A
Community Planner	N	N/A	N/A	N/A

Administrative Capability	Do you have this? (Y/N)	Is staffing adequate?	Is staff trained on hazards and mitigation?	Is coordination between agencies and staff effective?
Emergency Manager	N	N/A	N/A	N/A
Floodplain Administrator	N	N/A	N/A	N/A
Geographic Information System (GIS) Coordinator	N	N/A	N/A	N/A
Planning Commission	N	N/A	N/A	N/A
Fire Safe Council	N	N/A	N/A	N/A
CERT (Community Emergency Response Team)	N	N/A	N/A	N/A
Active VOAD (Voluntary Agencies Active in Disasters)	N	N/A	N/A	N/A
Other? (Please describe.)				

Table 150: Technical Capabilities of the North Lake Tahoe Fire Protection District

Technical Capability	Do you have this? (Y/N)	How has the capability been used to assess/ mitigate risk in the past? (Answer or N/A)	How can the capability be used to assess/mitigate risk in the future?
Mitigation Grant Writing	Y	Fuels Reduction	Same, Fuels Reduction
Hazard Data and Information	N	N/A	N/A
GIS	N	N/A	N/A
Mutual Aid Agreements	Y	Yes	Same
Other? (Please describe.)			

Financial Capabilities

Financial capabilities are the resources to fund mitigation actions. Talking about funding and financial capabilities is important to determine what kinds of projects are feasible given their cost. Mitigation actions like outreach programs are lower cost and often use staff time and existing budgets. Other actions, such as earthquake retrofits, could require substantial funding from local, state, and federal partners. Partnerships, including partners willing to donate land, supplies, or an in-kind match and cash, can be included.

Table 151: Financial Capabilities of the North Lake Tahoe Fire Protection District

Funding Resource	Do you have this?	Has this funding resource been used in the past and for what types of activities?	Could this resource be used to fund future mitigation actions?	Can this be used as the local cost match for a federal grant?
Capital Improvement Project Funding	N	N/A	N/A	N/A

Funding Resource	Do you have this?	Has this funding resource been used in the past and for what types of activities?	Could this resource be used to fund future mitigation actions?	Can this be used as the local cost match for a federal grant?
General Fund	N	N/A	N/A	N/A
Hazard Mitigation Grant Program (HMGP/404)	N	N/A	N/A	N/A
Building Resilient Infrastructure & Communities (BRIC)	N	N/A	N/A	N/A
Flood Mitigation Assistance (FMA)	N	N/A	N/A	N/A
Public Assistance Mitigation (PA Mitigation/406)	N	N/A	N/A	N/A
Community Development Block Grant (CDBG)	N	N/A	N/A	N/A
Natural Resources Conservation Services (NRCS) Programs	N	N/A	N/A	N/A
U.S. Army Corps (USACE) Programs	N	N/A	N/A	N/A

Funding Resource	Do you have this?	Has this funding resource been used in the past and for what types of activities?	Could this resource be used to fund future mitigation actions?	Can this be used as the local cost match for a federal grant?
Property, Sales, Income, or Special Purpose Taxes	Y	Fuels Program	Yes	Yes
Stormwater Utility Fee	N	N/A	N/A	N/A
Fees for Water, Sewer, Gas, or Electric Services	N	N/A	N/A	N/A
Impact Fees from New Development and Redevelopment	N	N/A	N/A	N/A
General Obligation or Special Purpose Bonds	N	N/A	N/A	N/A
Federal-funded Programs (Please describe)	N	N/A	N/A	N/A
Other State-funded Programs (Please describe)	Y	Fuels Reduction	Yes	No

Funding Resource	Do you have this?	Has this funding resource been used in the past and for what types of activities?	Could this resource be used to fund future mitigation actions?	Can this be used as the local cost match for a federal grant?
Private Sector or Nonprofit Programs	Y	Fuels Reduction	Yes	No
Other?				

*Note: FMAG = Fire Management Assistance Grant Program, RTC = Regional Transportation Commission

Education and Outreach Capabilities

Education and outreach capabilities are programs and methods that could communicate about and encourage risk reduction. A participant or a community-based partner may run these programs. Partners, especially those who work with underserved communities, can help identify additional education and outreach capabilities.

Table 152: Education and Outreach Capabilities of the North Lake Tahoe Fire Protection District

Education and Outreach Capability	Do you have this? (Y/N)	Does this resource currently incorporate hazard mitigation?	Notes
Community Newsletter(s)	N	N/A	N/A
Hazard Awareness Campaigns (such as Firewise, Storm Ready, Severe Weather Awareness Week, School Programs)	Y	Yes	
Public Meetings/Events (Please Describe)	Y	Y	

Education and Outreach Capability	Do you have this? (Y/N)	Does this resource currently incorporate hazard mitigation?	Notes
Emergency Management Listserv	N	N/A	N/A
Local News	N	N/A	N/A
Distributing Hard Copies of Notices (e.g., public libraries, door-to-door outreach)	Y	N	
Insurance Disclosures/Outreach	Y	We try, but insurance does not listen	None
Organizations that Represent, Advocate for, or Interact with Underserved and Vulnerable Communities (Please Describe)	N	N/A	N/A
Social Media (Please Describe)	Y (Facebook, Instagram)		
Other? (Please Describe)			

National Flood Insurance Program Participation

FEMA	**C2.** Does the Plan address participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3))

The National Flood Insurance Program (NFIP) is a Federal Emergency Management Agency (FEMA) program that provides flood insurance to millions of policyholders across the country. The plan must describe participation in the NFIP for each participant, as applicable, in accordance with NFIP regulatory requirements. Special districts are not eligible to participate in the NFIP, but they may support floodplain management and exist in communities that participate in the NFIP.

Table 153: Floodplain Management, Mapping, and Insurance for the North Lake Tahoe Fire Protection District

Question	Notes
What communities does your special district operate in? Are you aware of any flood concerns in these communities?	Incline Village/Crystal Bay
Which of your assets are at-risk of flooding? List any of your structures in the high-risk flood zone if known, or list addresses and the IEM team will check on https://msc.fema.gov/portal/home.	Homes along our creeks
Is your organization involved in floodplain management? If so, how?	No

Opportunities to Expand and/or Improve Capabilities

Table 154: The North Lake Tahoe Fire Protection District's Opportunities to Develop Capabilities

Capability Type	Opportunity to Expand and/or Improve
Planning and Regulations	Need a better avenue to work within the regulations of the USFS on their property to mitigation the threat of wildfire
Administrative and Technical	Staffing key positions to administer the overall plan.
Financial	Partner with neighboring agencies and jurisdictions to develop funding mechanisms for wildland fire and flood mitigation projects.
Education and Outreach	Create a District Specific program within the Community Wildfire Protection Plan.

Plan Integration

FEMA	**C6.** Does the Plan describe a process by which it will incorporate the requirements of the mitigation plan into other planning mechanism, such as comprehensive or capital improvement plans, when appropriate?

An updated plan must explain how the plan participants incorporated the previous mitigation plan, when appropriate, into other planning mechanisms over the last 5 years. This demonstrates progress in local mitigation efforts. Planning mechanisms refer to the governance structures used to manage local land use development and community decision making, such as budgets, comprehensive plans, capital improvement plans, or other long-range plans, codes, and ordinances. If the plan was integrated into another planning mechanism, list them and note how hazard mitigation was integrated. This discussion could include the following:

- The integration of the hazards to which the community is vulnerable;
- The data and analysis presented in the risk assessment;
- The goals of the mitigation plan; and
- Potential projects or actions to carry out in the future.

Table 155: Previous Plan Integration by the North Lake Tahoe Fire Protection District

Plan Name (or "none," if applicable)	Description
None	N/A

The plan must also identify the planning mechanisms for integrating the updated hazard mitigation information/actions.

Table 156: Future Plan Integration Opportunities for the North Lake Tahoe Fire Protection District

Plan Name	Description
The North Lake Tahoe Fire Protection District has no active planning mechanisms to integrate concepts from the RHMP. However, the District will monitor for future opportunities to integrate ideas from the RHMP into new planning mechanisms such as general plans, emergency operations plans, and others.	N/A

Mitigation Strategy

FEMA

C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure?

Review of 2020 Hazard Mitigation Actions

As part of the mitigation strategy update, all mitigation actions identified in the 2020 plan were evaluated to determine the status of the action and whether any ongoing or incomplete actions should be included as actions in the 2025 plan update.

Table 157: Status of Previous Mitigation Actions by the North Lake Tahoe Fire Protection District

ID	Mitigation Action	Lead Department	Status For Plan Update	Should this action be retained in the plan update? (Yes/No)
MH-11	Identify facilities in Lake Tahoe to serve as evacuation centers and potential cooling centers, harden against wildland fires and power outages, and provide back-up power (North Lake Tahoe Fire Protection District [NLTFPD])	NLTFPD	Completed – does not have to be included in the plan update.	No
MH-12	Install a regional notification system for the Tahoe Basin that would handle all hazard notifications and traffic control. System would be operated from the regional traffic control center (NLTFPD).	NLTFPD	Completed – Perimeter Mapping and Notification	No
MH-13	Construct regional dispatch center for the Tahoe Basin (NLTFPD)	NLTFPD	This was pursued and is no longer needed per NLTFPD Sommers. Will not be included in plan update.	No
MH-14	Upgrade power system at Incline High School to allow for an emergency generator to be installed, so the high school can be used as a community evacuation center and potential cooling center (NLTFPD)	NLTFPD	Oh Hold – WCSD* states that the building is too old for such a system.	No
WF-13	Adopt 2018 wildland fire code County-wide (All Partners)	Regional Fire Protection Districts	Completed – Now looking to adopt 2025 building codes	No
WF-16	Review and update (as needed) evacuation plans for communities in wildland fire-prone areas and hold	Regional Fire Protection Districts	Ongoing – with the help of WC EM and staff	No

ID	Mitigation Action	Lead Department	Status For Plan Update	Should this action be retained in the plan update? (Yes/No)
	evacuation drills at least once every two years (All Partners)			
WF-18	Harden older residential structures in the Incline Village and Crystal Bay areas against wildland fire (NLTFPD)	NLTFPD	Ongoing	No
WF-19	Maintain and improve the local fuels management program for Lake Tahoe by maintaining the fuels management area around Crystal Bay (NLTFPD)	NLTFPD	Ongoing. Conducting 3 and 4 "re-entry" into areas.	Yes
WF-20	Hire more inspectors for the NLTFPD defensible space program to conduct outreach to the community (NLTFPD)	NLTFPD	Ongoing – Have 2 DSE seasonal employees, supported by grant funds	No
WF-21	Work with NV Energy to develop a CWPP for the utility and develop a community plan for response to planned power outages (NLTFPD)	NLTFPD	Ongoing	No
WF-22	Improve fire monitoring by installing fire cameras and working with Drone America to monitor high risk areas after lightning storms (NLTFPD)	NLTFPD	Not applicable. No word from Drone America on this project	No
EQ-11	Incorporate seiche warning system into the Tahoe Basin traffic control center (NLTFPD)	NLTFPD	Ongoing. Looking to WCEM for such a system.	No
EQ-14	Harden Fire Station 13 or relocate this station to mitigate earthquake risks (NLTFPD)	NLTFPD	Ongoing. Working through budget issues	Yes

ID	Mitigation Action	Lead Department	Status For Plan Update	Should this action be retained in the plan update? (Yes/No)
SS-1	Purchase additional equipment needed to quickly access emergency water supplies during severe winter storms (NLTFPD)	NLTFPD	Ongoing. Looking at grant funds	Yes

* Note: CWPP = Community Wildfire Protection Plan, DSE = Defensible Space Education, NLTFPD = North Lake Tahoe Fire Protection District, WCEM = Washoe County Emergency Management, WCSD = Washoe County School District

Considered Mitigation Actions

There are four main types of mitigation actions:

- Local plans and regulations
- Structure and infrastructure projects
- Natural systems protection
- Education and awareness programs

Table 158: Considered Mitigation Actions of the North Lake Tahoe Fire Protection District

Mitigation Action	Type of Action	Selected? (Y/N)	If not selected, why not?
Create a District Specific program within the Community Wildfire Protection Plan.	Educational Awareness Program	Y	
Develop awareness programs to reach absentee homeowners on mitigation plan and projects status.	Educational Awareness Programs	Y	

2025–2029 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 (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 District. The implementation plan includes both short-term strategies that focus on planning and assessment activities and long-term strategies that will cause ongoing capability or structural projects to reduce vulnerability to hazards.

After careful consideration, NLTFPD selected to pursue the actions in Table 159.

THIS PAGE INTENTIONALLY LEFT BLANK

Table 159: 2025–2029 Mitigation Implementation Plan for the North Lake Tahoe Fire Protection District

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
1	Fuels	Wildfire	Townships of IV* and CB	NLTFPD, USFS, NV State Lands	Same	MOUs and agreements with partners	LRA, USFS, NV State Lands, SNPLMA	$16M	Improve Forest Health	5–7 Yrs.	1-3 years	High
Description: Reduction of vegetation, Maintain and improve the local fuels management program for Lake Tahoe by maintaining the fuels management area around Crystal Bay (NLTFPD)												
2	Building Code	Earthquake	People and property	NLTFPD	WC Building	2018 WUI Code	NLTFPD existing budget	$2M	Safer structures	Life of structure	1-3 years	High
Description: New Construction Residential/ Commercial Buildings, Harden Fire Station 13 or relocate this station to mitigate earthquake risks (NLTFPD)												
3	Avalanche Fence	Avalanche	People and property	NLTFPD, USFS	Same	WC	HMGP	$4M	Structures and Lives	Life of the fence	1-3 years	Medium
Description: Ridge-tops 3rd Creek, Crystal Bay												
4	Hazardous Materials Training	Hazardous Materials, Radiological Waste	People and property	NLTFPD, WCHD, WCEM, USFS, NDOT	Same	Response Plan and Policies	NLTFPD existing budget	$500K	Safe Drinking water and environmental concerns	5 years	1-3 years	Medium
Description: Chemicals in creeks or lake for Lake Tahoe (drinking water supply)												

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
5	Extreme Weather Emergency Suppression Water Hydrant Accessibility study.	Winter Storms	People and property	NLTFPD, WCEM, WCSO	Same	Policies and Plans	NLTFPD existing budget	$100,000	Life and Property	Need further investigation	1-3 years	Medium
Description: A study is needed to put forward, fund, and execute the best solutions for accessing emergency water supplies during severe winter storms (NLTFPD, Incline Village/Crystal Bay areas.												
6	Create a District Specific program within the Community Wildfire Protection Plan.	Wildfire	People and property	NLTFPD, WCHD, WCEM, USFS, NDOT	Same	Awareness and Education	NLTFPD existing budget	$100,000	Life and Property, Forest Health	10 years	1 Year	Medium
Description: Purchase additional equipment needed to quickly access emergency water supplies during severe winter storms (NLTFPD) IV/CB Area												
7	Develop awareness programs for wildfire and flood hazards	Wildfire and flood	Absentee homeowners	NLTFPD	Local Insurance Carriers	Need further investigation	EM General funds, EMPG, SERC funds	$100,000	Life and Property	10 years	5-7 years	High
Description: Develop awareness programs to reach absentee homeowners on mitigation plan and projects status.												

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
8	Special Events Working Group	Criminal Acts and Terrorism	Residents and visitors; First responders; Event promoters/ organizers	NLTFPD	None	None	NLTFPD existing operating budget	$100,000	Previous plan had some considerations for safety. Now need to add verbiage for building an events working group to stand up and staff EOC during events in the region	Immediate and continuously	Short term	High
Description: Develop a targeted initiative that educates and engages the public through tailored content and interactive strategies to drive understanding and positive action.												
9	Preparedness Education	Drought	People and infrastructure	NLTFPD	None	None	NLTFPD General operating funds, EMPG, SERC funds	$500.00 + staff time	Protection of people and property	5 years	Short Term	Medium
Description: Develop an educational initiative that engages the public through tailored content to help them be better prepared for incidences of drought.												
10	Develop awareness programs for energy emergencies	Energy emergencies	People and infrastructure	NLTFPD	None	None	General operating funds, EMPG, SERC funds	$100,000	Protection of people and property	5 years	1 Year	Medium
Description: Develop a targeted initiative that educates and engages the public through tailored content and interactive strategies to drive understanding and positive action.												

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
11	Develop awareness programs for Infectious Diseases	Infectious Disease	People and infrastructure	NLTFPD	None	None	General operating funds, EMPG, SERC funds	$100,000	Protection of people and property	5 years	1 Year	Medium
Description: Develop a targeted initiative that educates and engages the public through tailored content and interactive strategies to drive understanding and positive action.												
12	Develop awareness programs for Aircraft transportation incidents	Aircraft transportation incident	People and infrastructure	NLTFPD	None	None	General operating funds, EMPG, SERC funds	$100,000	Protection of people and property	5 years	1 Year	Medium
Description: Develop a targeted initiative that educates and engages the public through tailored content and interactive strategies to drive understanding and positive action.												
13	Develop awareness programs for Volcano	Volcano	People and infrastructure	NLTFPD	None	None	General operating funds, EMPG, SERC funds	$100,000	Protection of people and property	5 years	1 Year	Medium
Description: Develop a targeted initiative that educates and engages the public through tailored content and interactive strategies to drive understanding and positive action.												
14	Evacuation Routes in the area – study	All Hazards requiring persons to leave the area	Residents and visitors; LE, Fire, etc.	NLTFPD	None	None	NLTFPD existing project budget	$135K – cost of completed study in Nevada	Loss of life, property, time spent by responders	Immediate and continuous. There are always	Medium. Hire a contractor to complete	Medium

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
								County tor a starting point	guiding persons out of area	additional persons due to tourism and general residents. Also, there is never not a time when evacuation might be necessary.	the study, then decide based on findings	
Description: Study of evacuation routes												
15	Identify Flood Hazards Study	Flooding	People and infrastructure	NLTFPD	WCEM	Needs further investigation	FMA Grant, HMGP grant	$50,000	Studying areas that pose the highest degree of impacts from flooding can lead to viable mitigation actions. Know the problem, fix the problem, save lives and property.	5-10 years	1-2 Years	Medium
Description: This study aims to identify flood hazards and the impacts on the community within the District, in order to find viable mitigation actions.												

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
16	Themed Months/ Days per Hazard (including proclamations)	Extreme Heat	Residents and visitors	NLTFPD	Subject matter experts (USGS, fire agencies, LE, NWS, NOAA)	RHMP	WCEM funded, EMPG, SERC funds	$500.00 + staff time	Increased community awareness and resilience	Life of the plan	1-2 years	High
Description: Public awareness campaign												
17	Tree Maintenance and Management	Wind	Residents and visitors	NLTFPD	Cities of Reno and Sparks, NDF, Keep Truckee Meadows Beautiful, Living with Fire.	Unsure	Operating budget	Staff time	Decreased property damage	Life of plan	1-2 years	Medium
Description: Regularly prune trees and remove dead or weakened branches to reduce the risk of falling debris during severe wind events. Consider replacing high-risk trees with more wind-resistant species, and ensure trees are planted at appropriate distances from structures.												
18	Preparedness Education	Landslides	People, Property	NLTFPD	Washoe County Emergency Management	RHMP, WCEM and NDOT plans and protocols	Federal grants (FEMA), Local government funding, EMPG, SERC funds	$500.00 + staff time	Avalanche and Landslide protection, enhanced safety, infrastructure protection, long-term cost efficiency, habitat	Life of Plan	5+	Medium

#	Project Title	Hazard(s) Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
									preservation, controlled water drainage			
Description: Education to prepare the population and educate themselves on how to identify triggers for landslides/avalanches, securing their property to be prepared in case of an incident.												

Notes: *Includes vulnerable populations; **Through which the action will be implemented. CB = Crystal Bay, IV = Incline Village, EMPG = Emergency Management Preparedness Grant; LRA = Local Responsible Area MOU = Memorandum of Understanding, NDOT = Nevada Department of Transportation, NLTFPD = North Lake Tahoe Fire Protection District, SERC = State Emergency Response Commission; SNPLMA = The Southern Nevada Public Land Management Act of 1998, USFS = U.S. Forest Service, WC = Washoe County, WCEM = Washoe County Emergency Management, WCHD = Washoe County Health District, WCSO = Washoe County Sheriff's Office, WUI = Wildland–Urban Interface.

THIS PAGE INTENTIONALLY LEFT BLANK

Prioritizing Mitigation Actions

The identified mitigation actions were then prioritized, based on the following terms:

- **S – Social:** The public must support the overall mitigation implementation strategy and specific mitigation actions. Consider: Will the action disrupt housing or cause the relocation of people? Will the proposed action adversely affect one segment of the population? Is the action compatible with present and future community/agency values?
- **T – Technical:** It is important to determine if the proposed action is technically feasible, will help reduce losses in the long term, and has minimal secondary impacts. How effective is the action in avoiding or reducing future losses? Does the action solve the problem or only a symptom? Will the action create more problems than it solves? Consider the root cause of the issue at hand to determine whether the action is a whole or partial solution, or not a solution at all.
- **A – Administrative:** This category examines the expected staffing, funding, time, and maintenance requirements for the mitigation action to determine if the jurisdiction/special district has the personnel and administrative capabilities to implement the action or whether outside help will be necessary. Consider, a) Staffing (enough staff and training): Does the jurisdiction/special district have the capability (staff, technical experts) to implement the action? b) Funding allocated: does the jurisdiction/special district have the funding to implement the action or can it readily be obtained? c) Time: can it be accomplished in a timely manner? d) Maintenance/Operations: can the jurisdiction/special district provide the necessary maintenance? It is important to remember that most federal grants will not provide funding for maintenance.
- **P – Political:** This considers the level of political support for the mitigation action. Is there political support to implement and maintain this action? Have political leaders participated in the planning process so far? Is there a local champion willing to help see the action to completion? Is there enough public support to ensure the success of the action? Have all stakeholders been offered an opportunity to participate in the planning process?
- **L – Legal:** The jurisdiction/special district must have the legal authority to implement the action or consider what new laws or regulations would be needed to carry out the mitigation action. Evaluate, are the proper laws, ordinances, and resolutions in place to implement the action? Are there any potential legal consequences? Is the action likely to be challenged by stakeholders who may be negatively affected?
- **E – Economic:** Economic considerations must include an evaluation of the present economic base and projected growth. Cost-effective mitigation actions that can be funded in current or upcoming budget cycles are more likely to be implemented than actions requiring general obligation bonds or other instruments that would incur long-term debt in a jurisdiction/special district. Consider benefits and costs at the planning level. A detailed benefit–cost analysis will be performed as project-specific funding becomes available. What

financial benefits will the action provide? Does the cost seem reasonable for the size of the problem and the likely benefits? What burden will be placed on the tax base or local economy to implement this action? Does the action contribute to community economic goals, such as capital improvements or economic development? Are there currently sources of funding that can be used to implement the action?

- **E – Environmental:** The impact on the environment is an important consideration because of public desire for sustainable and environmentally healthy communities. Also, statutory considerations, such as the National Environmental Policy Act (NEPA), must be kept in mind when using federal funds. How will this action impact land/water? Impact on endangered species: How will this action impact endangered species? How will this action impact hazardous materials and waste sites? Is this action consistent with community environmental goals? Is the action consistent with federal laws, such as NEPA?

The actions were also assigned a prioritization category of low, medium, or high, based on the following definitions:

- **Low:** Based on one to two STAPLEE criteria, the action is feasible and important, with multiple potential challenges. The action should be implemented as funding becomes available.
- **Medium**: Based on three to four STAPLEE criteria, the action is feasible and important, with some potential challenges. Its implementation is not as urgent as a high-priority action item and can be implemented over time.
- **High**: Based on five or more STAPLEE criteria, the action is feasible and important, with minimal to no concerns. It is very important to the jurisdiction to implement and may be prioritized in the short term.

The results are shown in Table 160.

Table 160: Priorities Assigned to the Mitigation Actions of the North Lake Tahoe Fire Protection District

Action #	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Priority
1	4	4	4	4	4	4	4	High
2	4	4	4	4	4	4	4	High
3	4	4	4	2	2	4	4	Medium

Action #	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Priority
4	4	4	4	4	4	4	4	High
5	4	4	4	4	4	2	4	Medium
6	4	4	4	4	4	2	4	Medium
7	4	4	2	2	4	2	4	High

Pyramid Lake Paiute Reservation Hazard Mitigation Program

The Pyramid Lake Paiute Tribe (PLPT or Tribe) has a fully integrated approach to hazard mitigation planning and program implementation. Throughout the 2025 update process, the following Hazard Mitigation Plan (HMP) participation roles were recorded:

Name	Position	Department
Don Pelt	Fire Chief	Pyramid Lake Paiute Tribe Fire Department

What's New in the 2025 Update?

With the 2025 RHMP update, Washoe County and its regional partners have recognized changes in planning priorities by emphasizing incorporating actionable strategies in the mitigation implementation plan and moving away from including ongoing coordination activities. Recent disasters and emerging hazards have also influenced planning priorities and the development of mitigation actions for the 2025 RHMP update.

In the years since the release of the 2020 HMP, the Tribe has undergone a near-constant change. With a growing population, some vulnerabilities have increased while others have been effectively mitigated to an acceptable level. New developments have included infrastructure improvements, environmental projects, and efforts to enhance tourism and economic opportunities. Specific projects involve enhancing recreational facilities, promoting cultural events, and initiatives aimed at preserving the natural environment around Pyramid Lake.

The 2025 update of the HMP includes the following major revisions to the 2020 plan:

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

Plan Adoption

44 CFR §201.6(c)(5) requires that the HMP be formally adopted by elected officials from each participating jurisdiction. The Tribal Council formally adopted the 2025 update of the Washoe County Regional HMP on October 17, 2025.

This HMP was approved by FEMA Region IX on September 24, 2025 A copy of the Tribe's adoption resolution is included in Appendix E of the Base Plan.

The tribal government will comply with all applicable Federal statutes and regulations in effect with respect to the periods for which it receives grant funding, including 2 CFR Parts 200 and 3002, and will amend its plan whenever necessary to reflect changes in tribal or Federal laws and statutes? [44 CFR § 201.7(c)(6)]

Continued Public Involvement

FEMA	D1. Is there discussion of how each community will continue public participation in the plan maintenance process? (Requirement 44 CFR § 201.6(c)(4)(iii))

Public involvement is a key component of the plan implementation and update process. For this plan update, the term "public" for tribal definition refers to individuals who either live with the tribe, work with the tribe, or identify as a member of the tribe. As part of this plan update, an ArcGIS StoryMap website has been developed to inform the public about the hazard mitigation plan update and their local risks. The StoryMap will be made available once the plan goes out for public comment in December. This user-friendly website is intended to make the hazard mitigation plan more accessible to the general public. This website also informs the public how to leave comments on the draft plan and continue participating in the plan maintenance process. The IEM Project Manager for the Washoe County RHMP update will collect, disseminate, and integrate any public comments received, as appropriate.

Following the annual review of the RHMP, the County will prepare and make available via the Internet an Annual Mitigation Status Report providing an update on the implementation of the current mitigation plan. This report, along with specific reports for each mitigation measure being implemented and all stakeholder comments received, will be assessed to make improvements in the plan update released every five years.

In addition to the ongoing input collected and compiled during the implementation of the previous plan, the MPT, as mentioned above, will review aspects of the draft update plan. Comments received from the public will also be considered and incorporated, where appropriate, into updates of the plan.

The County and its partners, The Cities of Reno and Sparks, North Lake Tahoe Fire Protection District, Pyramid Lake Paiute Reservation, Reno-Sparks Indian Colony, Truckee Meadows Fire Protection District, and Truckee River Flood Management Authority, will also engage community members on an ongoing basis through outreach at local events and meetings to ensure that public participation is incorporated outside the five-year plan update process. The County and its partners maintain public engagement and awareness programs focused on

increasing the community's awareness of hazards and promoting actions to reduce individuals' and families' exposure to hazard risks. Recognizing that these are ongoing programs, the

The County and its partners will continue to implement the following programs during this five-year planning period:

- Seasonal Multi-Hazard Public Awareness Program;
- Annual weather safety activities to maintain the County's StormReady Community accreditation;
- Community Wildfire Protection Plan preparation;
- Community evacuation plan preparation and evacuation drills;
- Community Emergency Response Team (CERT) academy training sessions;
- Washoe County Emergency Preparedness Program;
- Green waste collection events;
- Food Truck Fridays in Reno;
- Meetings with homeowners' associations and other community groups; and
- Outreach through social media.

Community Profile

Tribal Sovereignty and Governance

The following governance information is provided from the Tribe's website and in the Constitution and By-Laws of the Pyramid Lake Paiute Tribe.[154]

The Pyramid Lake Paiute Tribe is governed by 10 Tribal Council members who are elected biannually in December and on staggered two-year terms. The Tribe operates under the Indian Reorganization Act Constitution and By-Laws approved on January 26, 1936, by the Department of Interior.

The Pyramid Lake Paiute Tribe has a government-to-government relationship with the Federal Government. Therefore, the Tribe contracts with or receives grants directly from Federal Agencies or the State of Nevada to provide services to the Tribal members and residents of the

[154] Pyramid Lake Paiute Tribe, "Pyramid Lake Paiute Tribe Ordinances." https://ake2fb.p3cdn1.secureserver.net/wp-content/uploads/2023/06/Consitution-ByLaws.pdf

Reservation. The revenue generated by the Tribe is used to support local Tribal government activities and to supplement the programs that provide direct services to Tribal members or residents.

Geography and Climate

The Pyramid Lake Reservation is located 35 miles northeast of Reno in a remote desert area. The reservation contains about 475,000 acres, of which approximately 112,000 acres cover the surface of a terminal desert lake, Pyramid Lake. This lake is the geographic sink of the basin of the Truckee River and is located 40 miles northeast of Reno. It is one of the most valuable assets of the Tribe and is entirely enclosed within the boundaries of the reservation. Pyramid Lake, one of the largest natural lakes in the state of Nevada, is approximately 15 miles long and 11 miles wide. The lake measures 350 feet at its deepest point.

Based on data from 1967 to 2016 from the Western Regional Climate Center, the average precipitation based on Sutcliffe, Nevada—located on the shore of Pyramid Lake—is 7.3 inches per year, and an average of 5.5 inches of snowfall annually. Temperatures average the upper 80s and lower 60s (degrees Fahrenheit [°F]) in July and August and reach an average high and low of mid-40s (°F) and upper 20s/lower 30s (°F) in January and February.

Population and Demographics

The 2018–2022 American Community Survey 5-year estimates report a population of 1,935[155] in the Pyramid Lake County Subdivision (CCD), encompassing approximately 714 acres of land, including reservation land in Washoe County. As of February 2017, 1,300 people lived on the reservation. Approximately 10% of the reservation's population lived in Sutcliffe, 33% in Nixon, and 57% in Wadsworth. The PLPT has approximately 3,014 enrolled members.[156] The membership statistic is an approximate number, as these totals change from month to month based on membership approvals and other actions taken by the 10-member Tribal Council. Most enrolled Tribal members reside on the reservation; approximately 12% of this membership resides in other areas throughout the Western United States. Most of the reservation's resident population is over the age of 35, with 729 individuals under 35 and 823 over 35. The median age was 37.4 years.[157]

[155] United States Census Bureau, "P1|Race." https://data.census.gov/table?q=Pyramid%20Lake%20CCD,%20NV%20population
[156] Pyramid Lake Paiute Tribe, "About Us." https://plpt.nsn.us/about-us/#:~:text=The%20Pyramid%20Lake%20Paiute%20Tribe%20has%20approximately%203%2C014,of%20May%202024)%20enrolled%20members. .
[157] United States Census Bureau, "SO101|Age and Sex." https://data.census.gov/table?q=Pyramid%20Lake%20CCD,%20NV%20age

The 2018-2022 American Community Survey 5-year estimates that approximately 57.8% of the population over 16 years old in the Pyramid Lake CCD was employed, and the unemployment rate in the CCD was approximately 8.7%. Per capita income in the Pyramid Lake CCD was approximately $23,350[158] which is about half of Washoe County's per capita income, $44,448.[159] Approximately 28.7% of people living in the CCD live below the poverty level.[160]

Tribal Enterprises

Much of the economy of the Pyramid Lake Reservation is centered on fishing and recreational activities at Pyramid Lake. The lake is fed primarily by the Truckee River and was named one of the best fisheries in the world by the *Fly Fishing and Tying Journal* in 2010. Besides permit fees for fishing, day use, and overnight camping, the Tribe also receives lease and tax revenue. Several Tribal members belong to the Pyramid Lake Cattleman's Cooperative Association, which uses the reservation's desert open range to operate and manage the individual cattle herds.

Per its website, the Tribal Council is advancing the implementation of the Tribe's Economic Development Plan and accessing the Pyramid Lake Paiute Economic Development Fund created by Public Law 101-618, signed into law under President George H. W. Bush in 1990. The $40,000,000 fund was created when Congress passed the Truckee-Carson-Pyramid Lake Water Rights Settlement Act (PL 101-618) to address legal disputes over the waters of the Truckee River and Pyramid Lake (which were significantly impacted by the construction of the Derby Dam in 1905). The Tribe's economic development plan implementation process is a long-term effort that has involved the adoption of a 2-volume Pyramid Lake Economic Development Plan (approved in 2011), coordination with the federal government, many opportunities for Tribal education and input into the process, and results in economic stimulus payments distributed directly to Tribal members.

In 2018, the Bureau of Indian Affairs approved the Tribe withdrawing 50% of its interest in the Pyramid Lake Paiute Economic Development Fund. A press release issued by Tribal Chairman Vinton Hawley in April 2018 stated that per the Economic Development Plan, Vol. 2, all living members are entitled to equal economic stimulus payment from the withdrawal, which equated to 1,875 adults and 1,042 minors.

The lump sum payment to adults from the fund is intended to stimulate Tribal enterprise over time, as referenced in the Economic Development Plan: "The purpose of the plan is to use the Pyramid Lake Paiute Economic Development Fund created by Public Law 101-618 to create

[158] United States Census Bureau, "DP03|Selected Economic Characteristics." https://data.census.gov/table?q=Pyramid%20Lake%20CCD,%20NV%20employment
[159] United States Census Bureau, "Quick Facts Washoe County, Nevada." https://www.census.gov/quickfacts/fact/table/washoecountynevada/BPS030222
[160] United States Census Bureau, "S1701|Poverty Status in the Past 12 Months." https://data.census.gov/table?q=Pyramid%20Lake%20CCD,%20NV%20poverty

long-term profit-making opportunities, to create optimum employment opportunities, and to establish a high-quality recreation area at Pyramid Lake for the Tribe and its members."

In 2018, the Tribe received funds from the U.S. Environmental Protection Agency for investment in environmental programs. Per the EPA, "The Pyramid Lake Paiute Tribe will use $203,200 to model and evaluate the impact of Truckee River nutrient loads on Pyramid Lake's water quality, ecology, and trophic status. Funds will also support the cleanup and closure of three illegal dump sites and assess the operations of several transfer stations to reduce illegal dumping."

Per a 2016 profile on the website's economic development page, 274 kilowatts of solar facilities have been installed on the reservation, and the Tribe is working with the University of Nevada, Reno, and the Desert Research Institute to develop a utility-scale geothermal project. The Tribe was also awarded a $9.5 million American Recovery and Reinvestment Act stimulus grant to build a fiber optic cable line to bring broadband internet to households and businesses.

In June 2022, the tribe received $234,881 to further develop its ability to protect Pyramid Lake and the Truckee River, safeguard endangered cui-ui sucker fish and threatened Lahontan cutthroat trout, and preserve the tribe's people from water pollution and its effects.[161]

In March 2024, the Tribe received $29,756,400 in grant funding from the U.S. Department of Transportation to develop new outdoor recreation opportunities around Pyramid Lake and connect the Sutcliffe, Nixon, and Wadsworth communities. The funding will help turn an old railroad into a safe path for biking and walking. This path will connect the communities of Sutcliffe and Nixon at Pyramid Lake and Wadsworth. It will offer opportunities for outdoor activities and help the local economy.[162]

Tourism is an important source of revenue for the Tribe; in 2015, the Tribe estimated that over 200,000 visitors visited Pyramid Lake. Much of the economy of the Pyramid Lake Reservation is centered on fishing and recreational activities at Pyramid Lake. On the left in Figure 70 is the I-80 Smokeshop Campground, and on the right is a Lahontan cutthroat trout caught in Pyramid Lake. The Paiute Tribe also operates the Big Bend RV Park.

[161] United States Environmental Protection Agency, "EPA Awards Over $700,000 to Support Wetlands Restoration in Nevada." https://www.epa.gov/newsreleases/epa-awards-over-700000-support-wetlands-restoration-nevada

[162] Catherine Cortez Masto, "Cortez Masto Announces Funding to Support Pyramid Lake Paiute Tribe Outdoor Recreation Project." https://www.cortezmasto.senate.gov/news/press-releases/cortez-masto-announces-funding-to-support-pyramid-lake-paiute-tribe-outdoor-recreation-project/



Photo credit: U.S. Fish and Wildlife Service via the Associated Press.

Figure 70: Recreational Photographs from Pyramid Lake

Tribal Lands and Ownership Trends

The reservation land was first set aside for the Northern Paiute by the request of the Bureau of Indian Affairs in 1859. The reservation was not surveyed until 1865. The status of the reservation was very uncertain until President Ulysses S. Grant affirmed its existence by Executive Order on March 23, 1874. At that time, the creation of reservations by the executive branch was novel—most previous reservations were created by treaty or congressional legislation. Subsequent court decisions have affirmed the validity of reservations created by the executive branch and set the establishment date for the Pyramid Lake Reservation in 1859, not 1874. This earlier date is important regarding the priority of Tribal water rights and the status of non-tribal claims to land in the reservation. The Tribe has fought a long series of legal battles on both of these issues.

With the passage of the Nevada Native Nations Land Act in 2016, 6,357 acres of land managed by the Bureau of Land Management were transferred to be held in trust for the Pyramid Lake Paiute Tribe. This expanded upon the nearly half-million acres already contained in the Pyramid Lake Reservation, intending to further incorporate the watershed of Pyramid Lake into Tribe ownership and for potential economic development opportunities.

Natural Resources

The Tribe's connection to its natural resources is expressed on its website. "Deeply grounded in their environment, the Paiutes believed that power (pooha) could reside in any natural object, including animals, plants, stones, water, and geographical features."

Pyramid Lake features riparian ecosystems, agricultural lands, rangelands, and wetlands. Numerous species of willows, tule, chokecherry, and elderberries grow in canyons with perennial streams and springs. Pine nuts are a traditional harvest food.

The reservation encompasses five major land resource areas and over 80 different ecological sites. The Tribe's Pyramid Lake Natural Resources Department aims to "preserve, protect, enhance, and restore land, air, and water resources, and environmental health for the longer

term sustainability of the natural resources of the Pyramid Lake Indian Reservation" through "sound administration, ecological, cultural, socioeconomic, and educational methods to ensure that our future generations can continue to enjoy the benefits of those places that are of significant historical, cultural, and of environmental importance."[163]

The Natural Resource Department runs programs related to water resources, water quality, brownfields response, air quality, and invasive species. Invasive species include saltcedar, tall whitetop, and Russian olive, displacing native cottonwoods, willows, and other riparian vegetation along the lower Truckee River.

According to the website, Pyramid Lake itself is known as North America's most beautiful desert lake. "Pyramid Lake was designated as the first National Scenic Byway entirely on an Indian reservation and has recently been named Nevada's first Preserve America Tribal Community. The lake occupies 112,000 surface acres inside the reservation boundary and has a shoreline of approximately 125 miles. The lake has no outlet and is a residual body remaining from the prehistoric Great Lake Lahontan water body that covered most of Northwestern Nevada thousands of years ago."



Figure 71: Endangered Cui-ui Fish

The lake is also home to the Anaho Island National Wildlife Refuge, which supports one of the largest breeding colonies of American white pelicans in North America. In addition, Pyramid Lake and Truckee River provide habitat for the endemic and endangered Cui-ui (in Figure 71) and threatened Lahontan Cutthroat Trout.

Pyramid Lake is home to five different species of fish: Lahontan cutthroat trout, cui-ui, Tahoe sucker, tui chub, and Sacramento perch. Pyramid Lake is the only place on earth where cui-ui can be found. In 2010, Pyramid Lake Fisheries replanted over 700,000 fish in the lake. Since 2006, Desert Terminus Lake Program funds have been used to remodel the Numana, Dunn, and Big Bend fish hatcheries. Pyramid Lake Fisheries microtagged over 120,000 fish for research in 2010. Wildlife includes jackrabbits, which were traditionally netted for food and clothing.

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).

[163] Pyramid Lake Paiute Tribe, "Natural Resources." https://plpt.nsn.us/natural-resources/#:~:text=The%20goal%20of%20the%20Pyramid,the%20Pyramid%20Lake%20Indian%20Reservation.

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 artifacts that may be found at these sites. The region was part of the territory of the Northern Paiutes, who inhabited and moved between various habitats.

Historic buildings in the city that are older than 50 years and eligible for listing in the National Register of Historic Places are also considered cultural resources and important contributors to the city's character.

Most cultural sites in the city have not been mapped or surveyed, which can lead to the degradation of these sites if they are developed. Private development can degrade archaeological sites because federal and state regulations do not require the protection of cultural resources on private property. Unregulated use of off-road vehicles, mountain bikes, or hiking can also damage archaeological sites.

Hazard Profiles and Vulnerability Assessments

FEMA	**B1.** Does the Plan include a description of the type, location, and extent of all natural hazards that can affect [the City of Sparks]? (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 Sparks]? (Requirement §201.6(c)(2)(i)) **B3.** Is there 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 CFR 201.6(c)(2)(ii))

This section presents hazard profiles and vulnerability assessments to determine the potential impact of hazards on the PLPT's people, economy, and built and natural environments. The profiles have been streamlined to increase the HMP's effectiveness and usability. Additional details are in the Base Plan.

General

Washoe County has experienced several disaster declarations that might have affected the PLPT. The County has received 48 disaster declarations since 1965, including 15 since the previous HMP update. Table 161 identifies the declarations since 2020 that have affected the Tribe.

Table 161: Disaster Declarations in Washoe County since 2020[164]

Disaster Number	Individual Assistance Program Declared	Public Assistance Program Declared	Hazard Mitigation Program Declared	Declaration Date	Title
FM-5602	No	Yes	Yes	8/2/2025	Peavine Fire
FM-5586	No	Yes	Yes	6/10/2025	Marie Fire
FM-5546	No	Yes	Yes	11/11/2024	Callahan Fire
FM-5533	No	Yes	Yes	9/7/2024	Davis Fire
FM-5530	No	Yes	Yes	8/12/2024	Gold Ranch Fire
FM-5495	No	Yes	Yes	6/12/2024	Sullivan Fire
FM-5494	No	Yes	Yes	6/11/2024	Trail Fire
FM-5448	No	Yes	Yes	08/14/2022	Joy Lake Fire
FM-5382	No	Yes	Yes	11/07/2020	Pinehaven Fire
FM-5328	No	Yes	Yes	08/15/2020	Loyalton Fire
FM-5326	No	Yes	Yes	08/03/2020	North Fire
FM-5322	No	Yes	Yes	07/21/2020	Rockfarm Fire
FM-5316	No	Yes	Yes	06/27/2020	Poeville Fire
DR-4523	Yes	No	No	04/04/2020	Biological (COVID-19)
EM-3443	No	No	No	03/13/2020	Biological (COVID-19)

The hazard profiles and vulnerability assessments contained in this annex represent a considerable amount of work performed by the Mitigation Planning Team (MPT). MPT members ranked hazards using several key considerations, followed by activities to validate hazard analysis results and identify specific risk areas. The Tribal representatives to the MPT identified the following hazards for further assessment. (Refer to the HMP Base Plan for regional risk assessments for moderate- and low-priority hazard profiles.)

- Avalanche and Landslide
- Criminal Acts and Terrorism
- Drought
- Earthquake

[164] FEMA, ""Disasters and Other Declarations." Disasters and Other Declarations | FEMA.gov

- Energy Emergency
- Flood
- Hazardous Materials Incident
- Infectious Disease
- Radiological Waste Transport
- Extreme Weather (Winter Storm, Windstorms, Extreme Heat)
- Transportation Incident
- Volcano
- Wildland Fire

Hazard Ranking Methodology

CALCULATED PRIORITY RISK INDEX

A risk assessment result for the entire county does not mean that each municipality is at the same amount of risk for each hazard. Each jurisdiction considered how it is uniquely at risk of the hazards profiled. The Calculated Priority Risk Index (Table 162) assessment resulted in hazard rankings for the PLPT.

Table 162: Factors for Calculating Risk

Risk Index Factor	Degree of Risk Level		Criteria	Factor Weight for Degree of Risk Level
Probability *What is the likelihood of the hazard occurring?*	1	Unlikely	Less than 1 percent probability of occurrence in the next year or a recurrence interval of greater than every 100 years.	30%
	2	Occasional	1 to 10 percent probability of occurrence in the next year or a recurrence interval of 11 to 100 years.	
	3	Likely	11 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.	

Risk Index Factor	Degree of Risk Level		Criteria	Factor Weight for Degree of Risk Level
	4	Highly Likely	91 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.	
Magnitude *What will be the overall impact?*	1	Negligible	Less than 5% of the affected area's critical and non-critical facilities and structures are damaged/destroyed. Only minor property damage and minimal disruption of life. Temporary shutdown of critical facilities.	30%
	2	Limited	Greater than 5% and less than 25% of property in the affected area is damaged/destroyed. Complete shutdown of critical facilities for more than one day but less than one week.	
	3	Critical	Greater than 25%, but less than 50% of property in the affected area was damaged/destroyed. Complete shutdown of critical facilities for over a week but less than one month.	
	4	Catastrophic	Over 50% of critical and non-critical facilities and infrastructures in the affected area are	

Risk Index Factor	Degree of Risk Level		Criteria	Factor Weight for Degree of Risk Level
			damaged/destroyed. Complete shutdown of critical facilities for more than one month.	
Onset *How long will be there be between when it is recognized the hazard is approaching and when the hazard will begin affect the community?*	1	Self-defined	More than 24 hours	10%
	2	Self-defined	12 to 24 hours.	
	3	Self-defined	6 to 12 hours.	
	4	Self-defined	Less than 6 hours.	
Duration *What is the length of time the hazard will remain active, including how long emergency operations will have to continue after the hazard event?*	1	Brief	Up to 6 hours.	10%
	2	Intermediate	Up to one day.	
	3	Extended	Up to one week.	
	4	Prolonged	More than one week.	
Frequency *How often has this kind of hazard resulted in an emergency or disaster?*	1	Every 10+ years	This hazard is not frequent but may still impact the area.	20%
	2	Every 5–10 years	This hazard is not as frequently occurring but it could occur in the next 10 years.	

Risk Index Factor	Degree of Risk Level		Criteria	Factor Weight for Degree of Risk Level
	3	Every 1–5 years	This hazard is likely to occur relatively often. It may have occurred more or less frequently recently, but on average, it can be expected every 1–5 years.	
	4	Annually	This hazard is a frequent occurrence which the area actively has to respond to on an approximately annual basis.	

The following is the risk factor equation:

Risk Factor Equation

RF Value = [(Probability x .30) + (Magnitude x .30) + (Onset x .10) + (Duration x .10) + (Frequency x .20)]

Table 163 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 through 4.0 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 163: Overall Risk Scores for the CPRI

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

The Washoe County base plan is comprehensive for regional assessments and effectively addresses the calculated risk indexes. It provides a thorough evaluation that highlights its

commitment to risk management and community safety, while the annexes are specific to each jurisdiction. Table 164 displays the CPRI values for the PLPT.

Table 164: Calculated Priority Risk Index for the Pyramid Lake Paiute Reservation

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Avalanche and Landslide	0.8	1.6	3.2	4	0.8	1.6	Low
Criminal Acts and Terrorism	1.6	1.6	4	0.8	3.2	2.08	Medium
Drought	3.2	0.8	0.8	4	3.2	2.32	Medium
Earthquake	3.2	2.4	4	4	0.8	2.64	High
Energy Emergency	1.6	0.8	4	2.4	4	2.16	Medium
Flood	3.2	2.4	2.4	4	2.4	2.8	High
Hazardous Materials Incident	1.6	0.8	4	4	0.8	1.68	Low
Infectious Disease	1.6	1.6	2.4	3.2	2.4	2	Medium
Radiological Waste Transport	2.4	1.6	2.4	3.2	0.8	1.92	Low
Extreme Weather (Winter Storm)	1.6	0.8	2.4	2.4	4	2	Medium

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Transportation Incident	2.4	1.6	1.6	2.4	2.4	2.08	Medium
Volcano	2.4	1.6	2.4	3.2	0.8	1.92	Low
Wildland Fire	4	2.4	4	3.2	4	3.44	High
Extreme Weather (Windstorm)	1.6	0.8	2.4	1.6	3.2	1.76	Low
Extreme Heat	1.6	0.8	2.4	1.6	3.2	1.76	Low

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 the basic plan. Avalanche and Landslide (Avalanche) and Transportation Incident (Aircraft Crash) were not identified as hazards for the Tribe.

NATIONAL RISK INDEX

The National Risk Index (NRI) is not included in the local jurisdiction annexes as the dataset is developed at a county and census tract level, and it is not aggregated to individual jurisdictional boundaries. While the NRI provides useful context for understanding countywide hazard overall risk data, it does not offer the resolution needed to support jurisdictional specific assessments.

Hazard-Specific Profiles and Risk Assessments

Wildland Fire

LOCATION

The Tribe's three communities, Sutcliffe, Nixon, and Wadsworth, are in or near areas of moderate to very high wildland fire potential. The fire risk of Sutcliffe is a concern for the Tribe because Sutcliffe is in the Wildland–Urban Interface (WUI). The growth of cheatgrass in burn scars on the ridges west of Sutcliffe also increases the risk of fire in this community. Cheatgrass is highly flammable, and "densely growing populations [of cheatgrass] provide ample, fine-textured fuels that increase fire intensity and often decrease the intervals between fires." The

topography of the ridges west of Sutcliffe also increases the risk of fire to the community; a wildland fire that starts west of Sutcliffe is likely to run down the ridge into the community. The PLPT pre-stages fire trucks at Sutcliffe during the fire season in response to this risk.

Wildland fire potential ranges from moderate to very high along the ridges east and west of Pyramid Lake, and wildland fires can impact recreation at the lake, an important source of revenue for the Tribe, if closures are necessary to protect public safety or if visitors choose not to come to the lake due to smoke or other conditions.

PREVIOUS OCCURRENCES/HISTORY

Two wildland fires affected the Pyramid Lake Reservation between 2019 and 2024:

- **06/11/2024:** A contained fire grew out of control due to a wind shift. The fire briefly closed a portion of SR 447. Power was shut off to the Nixon area, temporarily closing the tribal administration building.[165]
- **07/13/2019:** A lightning-sparked wildfire near Nixon burned 750 acres and closed highways in the area. Firefighters from multiple agencies helped control the fire.[166]

EXTENT

The Pyramid Lake Reservation is primarily rural, with small population centers and ranchlands and farm fields near the WUI. Wildland fires can directly affect Tribal communities, destroying structures and resulting in injuries or deaths. Wildland fires on or near the reservation can also cause economic impacts if the response to incidents requires the Tribe to close the lake to fishing and recreation or if visitation declines.

Wildland fires are frequent and inevitable. In the region, most wildland fires burn from May to October. The PLPT representative to the MPT rated wildland fires as the highest probability fire likely to affect the Tribe, and the Tribe generally experiences the effects of wildland fire every one to three years.

PROBABILITY OF FUTURE OCCURRENCES

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

---

[165] 2 News Nevada, "Firefighters Work to Contain Prescribed Burn off SR-447, Power Restored in Nixon Area." https://www.2news.com/news/firefighters-work-to-contain-prescribed-burn-off-sr-447-power-restored-in-nixon-area/article_484b5420-2758-11ef-98df-8f541554f9b6.html

[166] Reno Gazette Journal, "Firefighters Contain 40% of the 7850-acre Wildfire Burning Near Nixon." https://www.rgj.com/story/news/2019/07/13/wildfire-near-nixon-40-contained-750-acres/1723807001/

The Washoe County Fire Plan[167] identified 41 communities included in the risk/hazard assessment for Washoe County. Nearly half of these areas have high and extreme fuel hazard conditions within one mile of the community boundary. In some cases, hazardous fuel conditions occur within the community boundaries. Many of the areas classified as moderate fuel hazards have a large component of cheatgrass. These areas can escalate into high fuel hazard conditions during years with above-normal precipitation and abundant growth of cheatgrass, perennial grass, and annual forbs.

VULNERABILITY

Tribal members and their assets are generally in or near the WUI. The challenges the Tribe faces mitigating wildland fires include residential and commercial properties near vegetation that provide fuel for wildland fires and large burn scars on and near the reservation that highly flammable invasive species like cheatgrass have taken over.

PROPERTY

Six identified critical facilities on the Pyramid Lake Reservation are in areas with very low wildland fire hazard potential.

ESTIMATED IMPACT AND POTENTIAL LOSSES

The estimated impacts and potential losses to the Pyramid Lake Paiute Reservation due to wildland fires can be significant and multifaceted. Wildland fires can lead to immediate destruction of land and resources that are critical to the community, including traditional hunting and gathering areas. The loss of wildlife habitats can disrupt the ecosystem, leading to long-term ecological changes that affect food sources and cultural practices tied to the land.

In addition to ecological impacts, wildfires can cause economic losses for the Pyramid Lake Paiute Tribe. These losses may stem from damages to infrastructure, such as community buildings and access roads, which can hinder emergency response efforts, tourism, and local business operations. The costs associated with firefighting efforts, rebuilding, and recovery can place a significant financial burden on the tribe.

The cultural significance of the land cannot be understated. Many areas within the reservation hold historical and spiritual importance for the Pyramid Lake Paiute people. Wildland fires that destroy these areas can also harm the community's cultural heritage and identity. The repercussions of such losses extend beyond economics and ecology, as they can affect the community's social cohesion and mental health, creating a ripple effect of challenges that may persist long after the fires are extinguished.

[167] Washoe County Fire Plan, 2004 Executive Summary – Washoe County Fire Plan – Nevada Community Wildfire Risk/Hazard Assessment – RCI (rci-nv.com)

VULNERABLE POPULATIONS

The Climate and Economic Justice Screening Tool from the U.S. Climate Resilience Toolkit was used to determine what vulnerabilities impacted Washoe County. According to this Tool, which uses 2020 U.S. Census data, Pyramid Lake in Washoe County is identified as one of 27 disadvantaged populations identified by census tract, depending on the portion of the County, because it meets the threshold for more than one of the following categories: climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development. According to the Climate and Economic Justice Screening Tool.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 165 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 165: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 166 provides the Calculated Priority Risk Index (CPRI) for wildland fire impacts in Pyramid Lake Paiute Tribe (PLPT) based on the current plan's hazard risk assessment results. The PLPT assigned wildland fire a risk factor value of 3.44, reflecting high probability, high frequency, and quick onset impacts. This risk factor value falls in the range of 2.5 to 4.0, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 166: Calculated Priority Risk Index for Wildland Fire in Pyramid Lake Paiute Reservation

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Wildland Fire	4	2.4	4	3.2	4	3.44	High

EXISTING MITIGATION CASE STUDY

In burn scars in the Virginia mountain range, the Tribe installed landslide detection and warning devices to address the potential cascading effects of previous fires. The Tribe also educates residents about maintaining defensible space on their properties.

During April 2022, Pyramid Lake Fire Rescue EMS and the Nevada Department of Transportation conducted fuel mitigation burns to burn off heavy fuels along a two-mile stretch of SR-447 south of Nixon in an effort to prevent future wildfires. The burn area was on SR-447 between Dead Ox at mile marker 10 and Little Nixon Road at mile marker 12.

PROPERTY

Six identified critical facilities on the Pyramid Lake Reservation are in areas with very low wildland fire hazard potential.

RECENT DEVELOPMENT TRENDS

- **Economic:** Pyramid Lake Paiute Tribe will receive $29,756,400 in grant funding from the U.S. Department of Transportation to create new outdoor recreation opportunities around Pyramid Lake. The grant funding will help transform an abandoned railroad bed into a safe, sustainable multimodal recreation path for residents and visitors traveling between the tribal communities of Sutcliffe and Nixon at Pyramid Lake and Wadsworth (Increased Vulnerability).
- **Land Use:** Ridge areas south and east of Pyramid Lake, which are part of the 6,357 acres of land transferred to be held in trust for the Tribe under the Nevada Native Nations Land Act of 2016, continue to have moderate to very high potential for wildland fire (Increased Vulnerability).
- **Future Land Use**: No new development is planned in moderate to high fire-risk areas.

See the Base Plan for a complete Risk Exposure.

Energy Emergency

LOCATION

The Pyramid Lake Reservation is in a fringe area of the regional electrical grid. All Tribal properties that rely on the grid for power are vulnerable to power outages. Electrical power from the grid is supplied to the Tribe via one transmission line between the Tracy Clark and Sutcliffe communities.

PREVIOUS 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 and may last as short as hours or as long as weeks. In 2015, the single transmission line running over the mountains from the community of Clark to supply power to Sutcliffe and the rest of the reservation (the Tribe's "extension cord") went down during a winter storm. The power outage caused by the storm lasted for about four days and affected the entire reservation. The outage occurred at an isolated and difficult-to-access point along the mountain transmission line route. The power provider used snowcats to access this point, which had difficulty passing muddy parts of the access road. These access issues delayed the repair of the line and contributed to the length of the power outage.

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 can affect fuel availability for the Tribe. Outages affecting PG&E's system would cut power to the equipment that controls the operation of the fuel pipeline serving the region.

EXTENT

It is difficult to predict the impacts of future energy emergencies, but they can impact all Tribal government and business operations, cause extensive economic losses, and increase the need for emergency medical care, among other impacts. Due to the sporadic nature of power outages and other energy emergencies, it is also difficult to estimate how frequently these emergencies will occur or their duration. The Tribe generally deals with power outages multiple times per year, with many of them only lasting a matter of hours. A large power outage is experienced every several years, primarily due to winter storms.

PROBABILITY OF FUTURE OCCURRENCES

The Tribe is not planning significant areas of new development and has been working to install solar arrays on the reservation to reduce its vulnerability to power outages. A transfer switch will have to be installed to ensure that the Tribe's solar arrays can continue to provide power if the transmission line to the reservation goes down. Based on these factors, a transfer switch may decrease the reservation's probability of longer power outages.

VULNERABILITY

A lack of redundancy in the power system presents a clear risk to Tribal members, businesses, and government operations due to the Tribe's reliance on a single transmission line that traverses remote, difficult terrain. An outage along this line affects the entire reservation, including the Tribal office, clinic, and emergency services, which have to shut down fully or partially during outages. There are few backup power generators on the installation, so Tribal elders and those dependent on medical equipment are especially vulnerable to power outages. The Tribe is taking measures to address this vulnerability through the mitigation actions outlined in Chapter 5.

ESTIMATED IMPACT AND POTENTIAL LOSSES

The estimated impacts and potential losses to the Pyramid Lake Paiute Reservation due to energy emergencies can be significant and multifaceted. Energy emergencies, such as fluctuations in power supply, extreme weather events affecting energy infrastructure, or disruptions in fuel supply lines, can lead to essential services being compromised. This could affect heating, cooling, and power for homes, healthcare facilities, and community centers.

In addition to immediate health and safety risks, energy disruptions could have broader economic consequences for the reservation. Many businesses rely on a stable energy supply to operate, and interruptions could lead to lost revenue and potential job losses. Traditional practices, such as fishing and hunting, could also be impacted if energy shortages affect water management or environmental conditions.

Furthermore, the cultural and social fabric of the community could be strained during energy emergencies. Access to information and communication systems may be disrupted, leading to challenges in coordination and response efforts. The reliance on modern energy systems for education, community activities, and cultural events further underscores the potential for long-lasting negative consequences.

VULNERABLE POPULATIONS

On the Pyramid Lake Paiute Reservation, certain populations are particularly vulnerable to energy emergencies due to various factors. Elderly residents often face significant challenges during power outages, as many rely on electricity for medical equipment, heating, and cooling. This demographic may also have limited mobility, making it more difficult for them to seek alternative resources during emergencies.

Low-income families are another group at risk. When energy emergencies occur, these households may struggle to absorb the financial shock, as they often have tight budgets and limited access to backup power sources. The inability to afford alternative heating options during cold spells or the extra costs associated with restoring power can create severe challenges for them.

Individuals with disabilities represent a significant vulnerable population as well. Many depend on electricity for essential medical devices, mobility aids, and adaptive technologies. Energy disruptions can severely impact their quality of life and may even pose health risks. Likewise, households with children may face heightened stress during energy emergencies, as young children are more susceptible to health risks associated with extreme temperatures and lack of basic services.

Single-parent households also encounter unique challenges in energy emergencies. Managing children and household responsibilities can become overwhelming when faced with power outages, especially without additional support from family or community resources. Furthermore, outdoor workers who depend on electricity for their jobs may experience both health risks and economic hardships during these emergencies, as their livelihood can be directly affected.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 167 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 167: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 168 provides the Calculated Priority Risk Index (CPRI) for energy emergency impacts in Pyramid Lake Paiute Tribe (PLPT) based on the current plan's hazard risk assessment results. The PLPT assigned energy emergency a risk factor value of 2.16, reflecting high frequency and quick onset impacts. This risk factor value falls in the range of 2.0 to 2.4, which is considered a medium-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 168: Calculated Priority Risk Index for Energy Emergency in Pyramid Lake Paiute Reservation

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Energy Emergency	1.6	0.8	4	2.4	4	2.16	Medium

RECENT DEVELOPMENT TRENDS

- **Economic:** The Tribe has outlined mitigation actions to address electricity redundancy and decrease reliance on surrounding utilities (Decreased Vulnerability).
- **Land Use:** Construction of the planned community center will increase the overall demand for electric power (Increased Vulnerability).
- **Future Land Use:** The Tribe will continue to invest in renewable energy projects as resources become available to reduce its vulnerability to power outages.

Extreme Weather (Windstorm)

LOCATION

Extreme wind events are experienced in every region of the United States. A useful tool for determining the location of the extreme wind hazard area in a jurisdiction is depicted in Figure 72. This map of design windspeeds was developed by the American Society of Civil Engineers. It divides the United States into four wind zones, geographically representing the frequency and magnitude of potential extreme wind events. The figure shows that Washoe County and its jurisdictions are in Zone I, with a design windspeed for shelters of 130 miles per hour. Windstorms may occur anywhere in Washoe County. Properties with above-ground infrastructure, utilities, and tree stands may be more damaged during windstorms.

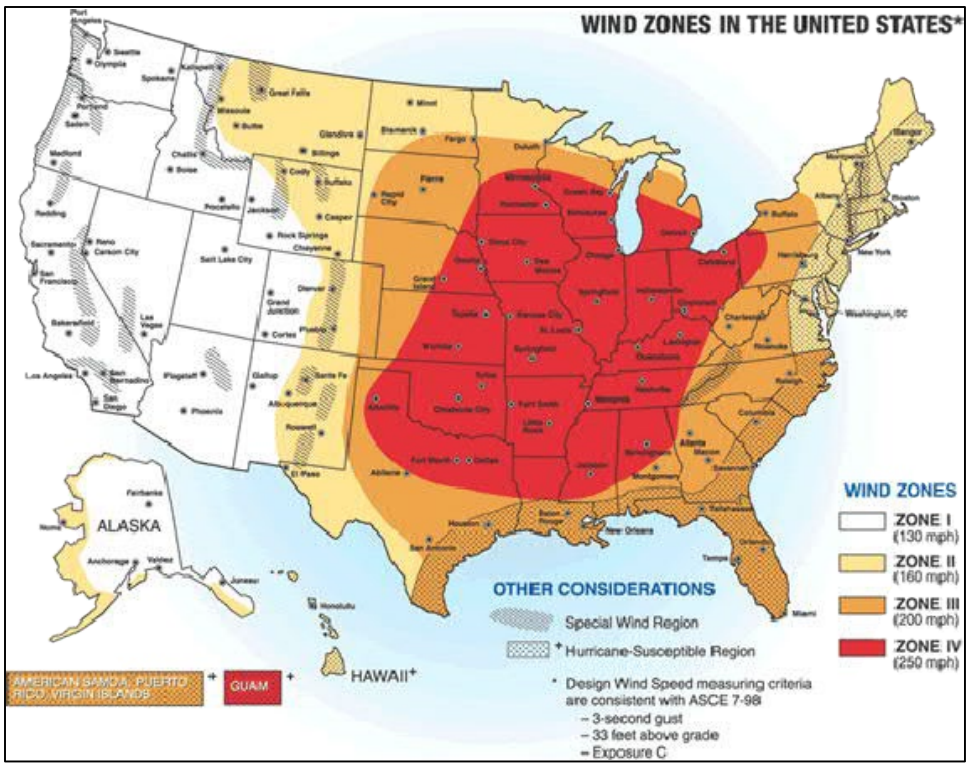


Figure 72: Wind Zones in the United States[168]

Windspeeds in Washoe County can reach high levels. In 2016, Reno was ranked as the second windiest city in the United States, and Reno has reported record-high wind gusts exceeding 80 mph.[169] Daily wind speeds were obtained from NOAA's online climate database for Washoe County from 2015 through 2018.[170] The data suggest that the windiest months in Washoe County are April through June. Average daily wind speeds from 2015 to 2018 for the months of April through June ranged from 6.09 to 7.50 mph.

PREVIOUS OCCURRENCES/HISTORY

NOAA's NCEI Storm Events Database records 170 events of high wind, strong wind, and thunderstorm wind in Washoe County between 2019 and 2023. No deaths, no injuries, $5K in property damage, and $250 in crop damage were identified in the database.

The 2018 State of Nevada Enhanced HMP complied weather-related incidents and reported deaths or damage from 1995 to 2016 using data from the National Weather Service. During this

[168] Resilient Action Fund, FEMA, 2022, "Wind Zones in the United States." U.S. Wind Zones Map Resilience Action Fund (buildingresilient.com)
[169] Reno Gazette Journal, "Reno Second-Windiest City in the U.S. in 2016." https://www.rgj.com/story/news/2017/01/17/reno-second-windiest-city-us-2016/96675108/
[170] Washoe County, "Regional-HMP-2020.pdf." https://www.washoecounty.gov/em/files/Regional-HMP-2020.pdf

period, there were over 500 incidents of high wind that accompanied winter storms, resulting in two deaths and over $7 million in damage. In addition, there were 25 reported incidents of dust storms and an associated hazard of windstorms, which led to 19 injuries and $240,000 in damage. Figure 73 illustrates how damaging high winds can be.

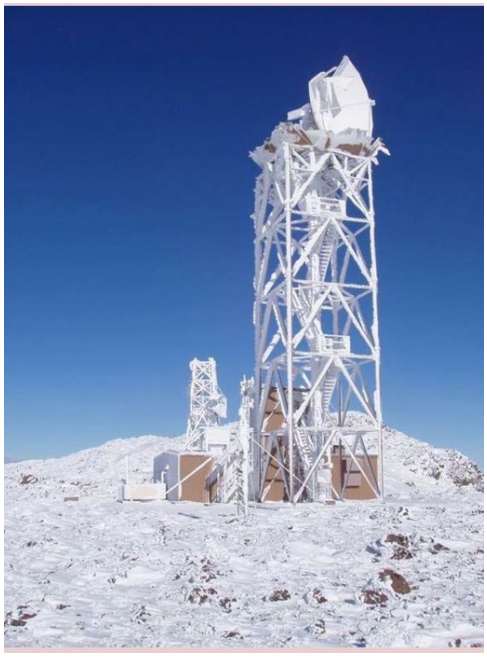


Figure 73: NWS Reno Radar Damage from Wind, December 2008[171]

EXTENT

Extreme wind can occur alone, such as during straight-line wind events and derechos, or it can accompany other natural hazards, including snowstorms, blizzards, and severe thunderstorms. Severe wind threatens lives, property, and vital utilities, primarily because of the effects of flying debris or downed trees and power lines. Severe wind will typically cause the greatest damage to the structures of light construction, particularly manufactured homes. Table 169 shows is the Beaufort scale of severe wind hazards and represents one measure of the magnitude or severity of the wind hazard.

[171]2020 Washoe County Regional HMP, National Weather Service-Reno, Chris Smallcomb, "NWS Reno December 2008 Radar Damage from Wind."

Table 169: Beaufort Scale of Severe Wind Hazard[172]

Beaufort Number	Wind Speed (miles per hour)	Description	Wind Effects on Land
0	<1	Calm	Calm, smoke rises vertically.
1	1–3	Light Air	Wind motion visible in smoke.
2	4–7	Light Breeze	Wind felt on exposed skin. Leaves rustle.
3	8–12	Gentle Breeze	Leaves and smaller twigs in constant motion.
4	13–18	Moderate Breeze	Dust and loose paper are raised. Small branches begin to move.
5	19–24	Fresh Breeze	Small trees begin to sway.
6	25–31	Strong Breeze	Large branches are in motion. Whistling is heard in overhead wires. Umbrella use is difficult.
7	32–38	Near Gale	Whole trees in motion. Some difficulty experienced walking into the wind.
8	39–46	Gale	Twigs and small branches break from trees. Cars veer on the road.
9	47–54	Strong Gale	Larger branches break from trees. Light structural damage.
10	55–63	Storm	Trees broken and uprooted. Considerable structural damage.
11	64-72	Violent Storm	Widespread damage to structures and vegetation.
12	>73	Hurricane	Considerable and widespread damage to structures and vegetation. Violence.

PROBABILITY OF FUTURE OCCURRENCES

The probability of windstorms is High, based on the number of occurrences recorded in NCEI. There is no reliable data on whether Nevada windstorms will increase or decrease in frequency and intensity in the coming decades due to climate change.

VULNERABILITY

Most vulnerabilities to windstorms occur in the built environment. Buildings, utilities, and transportation systems are vulnerable to wind damage. Old or poorly constructed buildings or

[172] NOAA, 2024, "Beaufort Scale of Severe Wind Hazard." Beaufort Wind Scale (weather.gov)

insufficiently anchored manufactured homes are more vulnerable to strong winds and can be heavily damaged. Uprooted and fallen trees can damage above-ground power and other utility lines and can block roads, railways, or other transportation networks. Windstorms can also generate storm-related debris that can be costly and time-consuming to clear. Building damage and service interruptions also cause economic losses from business interruptions.

Falling trees or blowing debris can cause injuries or death. Power outages and transportation disruptions can also negatively impact populations.

ESTIMATED IMPACT AND POTENTIAL LOSSES

Windstorms can have significant impacts on the Pyramid Lake Paiute Reservation, affecting both the environment and local communities. One of the primary concerns is the damage to infrastructure, such as roads, buildings, and utility lines. High winds can lead to fallen trees and debris, which can obstruct access roads and disrupt power and communication services. The costs associated with repairing this infrastructure can be substantial, straining the reservation's financial resources.

Additionally, windstorms can impact the local ecosystem. Strong winds can exacerbate soil erosion, especially in areas that are already vulnerable. This erosion can lead to the loss of arable land, affecting agricultural activities and food security for the community. Moreover, windstorms can disturb wildlife habitats, leading to a decline in local biodiversity, which is vital for maintaining the ecological balance of the region.

The economic implications of windstorms are also concerning. Damage to homes and businesses can result in financial losses for residents, while a potential decline in tourism—especially if natural attractions are affected—can compromise the economic stability of the reservation. Overall, the cumulative effects of windstorms can lead to long-term challenges for the Pyramid Lake Paiute Reservation, impacting both its infrastructure and the well-being of its community.

VULNERABLE POPULATIONS

On the Pyramid Lake Paiute Reservation in Nevada, several populations are particularly vulnerable to severe windstorms. Among these, elderly residents may face the greatest risks. Many older adults experience mobility challenges and health-related issues, making it difficult for them to seek shelter or evacuate quickly during sudden storms. Their reliance on assistance from family or community members can also leave them exposed if support is not readily available.

Children represent another vulnerable group during severe windstorms. Those who are young and may not have adult supervision can find themselves in precarious situations if they are unable to understand the dangers or take appropriate safety measures.

Low-income families can also be at heightened risk, as they may live in housing that is not adequately prepared to withstand severe weather. Limited resources can prevent these households from making necessary home improvements or evacuating to safer locations during a storm, leaving them more exposed to the elements. Likewise, individuals with disabilities may require specialized support during emergencies, making them particularly vulnerable if help is not accessible.

Additionally, homeless individuals face significant dangers during windstorms, as they lack stable housing and safe shelter options. They may be unable to protect themselves from high winds and debris, which poses serious health risks. Finally, tourists and visitors to the reservation may not be familiar with the area or the potential severity of windstorms, making them vulnerable as they may not know where to seek safety.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 170 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 170: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 171 provides the Calculated Priority Risk Index (CPRI) for windstorm impacts in Pyramid Lake Paiute Tribe (PLPT) based on the current plan's hazard risk assessment results. The PLPT assigned windstorm a risk factor value of 1.76, reflecting high frequency and medium onset impacts. This risk factor value falls in the range of 0 to 1.9, which is considered a low-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 171: Calculated Priority Risk Index for Windstorm in Pyramid Lake Paiute Reservation

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Windstorm	1.6	0.8	2.4	1.6	3.2	1.76	Low

RECENT DEVELOPMENT TRENDS

- **Economic:** Increased regional economic development continues to increase the potential for disruptions during and after severe weather 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:** Future development in more remote areas of the County may increase the cost of responding to snowstorms and increase the risk to residents, particularly the elderly or those with medical conditions.

Earthquake

LOCATION

The Pyramid Lake Reservation overlies a major fault, the Pyramid Lake Fault Zone, and multiple smaller faults, one of which runs beneath the lake. Another fault lies below the community of Nixon.

During an earthquake, the developed areas of the reservation may experience severe seismic ground motion hazards. These hazards are summarized below for different areas of the reservation:

- Areas of the reservation north and east of Pyramid Lake – May experience peak ground acceleration with a 2% probability of exceedance in 50 years of between 32% and 48% gravity, which would be experienced as very strong to severe shaking capable of causing moderate to heavy damage.
- Areas of the reservation west of Pyramid Lake between Sutcliffe and Wizard Cove, the western half of Sutcliffe, Nixon, and Wadsworth – 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.
- The eastern half of Sutcliffe and most of the lake's eastern shoreline south of Sutcliffe – May experience peak ground acceleration with a 2% probability of exceedance in 50 years of

over 64% gravity, which would be experienced as violent shaking with the potential to cause heavy damage.

During an earthquake, the developed areas of the reservation may experience severe seismic ground motion hazards. These hazards are summarized below for different regions of the reservation:

- Areas of the reservation north and east of Pyramid Lake – May experience peak ground acceleration with a 2% probability of exceedance in 50 years of between 32% and 48% gravity, which would be experienced as very strong to severe shaking capable of causing moderate to heavy damage.
- Areas of the reservation west of Pyramid Lake between Sutcliffe and Wizard Cove, the western half of Sutcliffe, Nixon, and Wadsworth – 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.
- The eastern half of Sutcliffe and most of the lake's eastern shoreline south of Sutcliffe – May experience peak ground acceleration with a 2% probability of exceedance in 50 years of over 64% gravity, which would be experienced as violent shaking with the potential to cause heavy damage.

Seismic ground motion hazards on the reservation are shown in the Base Plan.

PREVIOUS OCCURRENCES/HISTORY

The Base Plan includes information on previous major earthquakes in Washoe County with magnitudes greater than five on the Modified Mercalli Intensity Scale. Shaking from these earthquakes would have been felt on the Pyramid Lake Reservation and might have caused structural damage.

Members of the PLPT planning team reported multiple small earthquakes, magnitude 2 or less, on the fault running below Pyramid Lake in the past year.

While buildings survived the shock well overall, reports indicated that the violent rocking caused some structural damage, such as cracked paint and plaster along drywall seams, wall and ceiling corners, and doors and entryways.

EXTENT

A major earthquake can cause widespread and significant damage to structures on the Pyramid Lake Reservation, injuries, and deaths. Because of their potential to damage structures, roads, and utilities, earthquakes may disrupt government operations and the local economy for days to weeks, require evacuations, or create increased demand for emergency medical services. Response to and recovery from an earthquake may require federal support. In the last 150 years, 17 earthquakes with a magnitude greater than five on the Modified Mercalli Intensity Scale have occurred in Washoe County.

PROBABILITY OF FUTURE OCCURRENCES

Seventeen earthquakes with a magnitude greater than five on the Modified Mercalli Intensity Scale have occurred in Washoe County in the last 150 years. The probability of occurrence can be estimated at 10%, meaning 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. While the Tribe is not planning significant areas for new development, the increasing age of Tribal buildings increases the probability that future earthquakes will damage structures, roads, and utilities.

VULNERABILITY

None of the Tribal buildings or residences on the reservation have been retrofitted to meet seismic standards. Because of their age, it would be more cost-effective for the Tribe to demolish them and construct new facilities to meet seismic standards.

A large earthquake centered below Pyramid Lake could cause a seiche. No studies have been completed to determine which areas of the reservation may be impacted by a seiche, so the Tribe's level of vulnerability to this hazard is unknown.

The Paiute Pipeline, which carries gasoline, diesel, and jet fuel, runs through Dodge Flats and crosses the southern part of the reservation to meet Interstate 80. An earthquake centered on or near the reservation could damage the pipeline and cause additional impacts on the reservation.

ESTIMATED IMPACT AND POTENTIAL LOSSES

The estimated impacts and potential losses to the Pyramid Lake Paiute Reservation due to earthquakes can be significant, given the area's geological characteristics. Located in northwestern Nevada, the region is susceptible to seismic activity, which poses risks to both infrastructure and the community. Potential impacts include damage to buildings, roads, and utilities, which could disrupt essential services like water supply and electricity.

Additionally, the economic consequences could be substantial. Damage to local businesses and homes may lead to loss of income and increased repair costs. The reservation's cultural sites may also face risks from earthquakes, potentially leading to loss of heritage and community identity. Emergency response and recovery efforts could strain limited resources, highlighting the importance of preparedness and mitigation strategies to safeguard the community and its assets.

On a broader scale, the psychological impacts on residents, including stress and anxiety related to seismic threats, could further affect the community's well-being. Implementing early warning systems and conducting regular safety drills could help minimize these impacts and enhance resilience against future earthquakes.

VULNERABLE POPULATIONS

On the Pyramid Lake Paiute Reservation, several populations may be particularly vulnerable to the impacts of earthquakes. One of the most at-risk groups includes elderly individuals. They often face mobility issues and health conditions that could be exacerbated during such an emergency. The presence of limited mobility can hinder their ability to evacuate quickly or seek assistance when needed, making them more susceptible to harm.

Children constitute another vulnerable population. Their reliance on adults for supervision and support means that during an earthquake, their safety can be compromised if caregivers are unprepared. Ensuring a safe environment for children during emergencies is crucial, as they may not fully understand the dangers or have the capacity to respond appropriately.

Individuals with disabilities are also at high risk. Individuals with physical or cognitive disabilities may face significant challenges during evacuations or in the chaos that often accompanies an earthquake. This population requires tailored emergency procedures to ensure their safety and well-being during such events.

Low-income families on the reservation may also face additional vulnerabilities. Economic constraints can limit access to safe housing and resources for emergency preparedness, leaving these families at heightened risk during natural disasters. Without effective means of safeguarding their homes, they may not be as prepared for an earthquake when it strikes.

Lastly, tourists and visitors to the reservation are often unfamiliar with the area and its emergency protocols, which can put them in a precarious situation during an earthquake. Their lack of knowledge about evacuation routes and safety measures can heighten their vulnerability.

PROPERTY

- Four critical facilities on the reservation, including the Pyramid Health Center, two schools, and one dam, are in areas vulnerable to seismic ground motion hazards, with a 2% probability of being exceeded in 50 years of between 48% and 64% gravity. This level of ground shaking would be experienced as severe shaking, with the potential to cause moderate to heavy damage.
- Two schools on the reservation are in areas vulnerable to seismic ground motion hazards, with a 2% probability of being exceeded in 50 years of greater than 64% gravity. This level of shaking would be experienced as violent shaking, with the potential to cause heavy damage.
- All of the identified critical facilities on the reservation are in areas vulnerable to seismic ground motion hazards, with a 10% probability of being exceeded in 50 years of 32% to 48% gravity. This level of shaking would be experienced as very strong to severe, capable of producing moderate to heavy damage.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 172 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 172: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 173 provides the Calculated Priority Risk Index (CPRI) for earthquake impacts in Pyramid Lake Paiute Tribe (PLPT) based on the current plan's hazard risk assessment results. The PLPT assigned earthquake a risk factor value of 2.64, reflecting high probability, long duration, and quick onset impacts. This risk factor value falls in the range of 2.5 to 4.0, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 173: Calculated Priority Risk Index for Earthquake in Pyramid Lake Paiute Reservation

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Earthquake	3.2	2.4	4	4	0.8	2.64	High

RECENT DEVELOPMENT TRENDS

- **Economic:** Limited economic development has occurred in the past five years (Unchanged Vulnerability).
- **Land Use:** Construction of the proposed community center outside Wadsworth may increase the Tribe's vulnerability to earthquakes if this facility is not constructed to current seismic standards (Increased Vulnerability).

- **Future Land Use:** Future development on the reservation would be vulnerable to damage from earthquakes and secondary hazards, such as seiches.

Flood

LOCATION

The final segment of the lower Truckee River Basin lies below Wadsworth and includes a 25-mile-long broad alluvial valley stretching to Pyramid Lake. Floodplains in the Pyramid Lake Reservation have not been mapped; however, the PLPT is at risk of riverine flooding in low-lying areas along the Truckee River and the immediate shoreline of the lake. The Tribe also experiences the effects of localized flooding caused by heavy rains that flood irrigation canals and creeks or cause sheet flows across burn scars from recent wildland fires or other areas with little vegetation. Creeks impacted by recent wildland fires, including Rodero Creek, Hardscrabble Creek, Anderson Creek, and Mullens Creek, are particularly at risk of flash flooding. An alluvial fan south of Sutcliffe is also prone to flooding, and flooding in this area can cut off access to Sutcliffe from the south due to debris or damage to Highway 446.

In 2019, the water level in Pyramid Lake rose by about 3 feet. While there is room for water levels to increase further before the Tribe experiences any impacts, higher water levels are eroding a section of the shoreline near Sutcliffe RV Park and a fish hatchery—two of the Tribe's economic enterprises. Continued erosion near Sutcliffe is a concern for the Tribe. Flooding in Pyramid Lake can also destroy docks and other infrastructure on the water that supports recreational use of the lake, resulting in economic impacts on the Tribe.

PREVIOUS OCCURRENCES/HISTORY

The PLPT planning team contributed the following information on recent floods affecting the reservation. This serves as additional information on past flooding that might have affected the Pyramid Lake Reservation, listed in the Base Plan.

There has been no additional flooding since the previous plan.

In 2017, the Truckee River and streams flowing into Pyramid Lake flooded. Flows in the Truckee River reached several feet above flood stage, affecting areas of Wadsworth and Nixon south of Pyramid Lake. The Tribe avoided some impacts by sandbagging around areas expected to flood; however, several residential areas needed to be evacuated, and ranchlands and farm fields were inundated. The affected agricultural regions were out of use for a long time, which resulted in an extended economic impact on Tribal farmers and ranchers.

Creeks on the lake's western side "turned into rivers" during the flooding. Homes in Sutcliffe that sit on Hardscrabble Creek had to be evacuated, and the alluvial fan south of Sutcliffe flooded, which caused power and water service outages and washed out Highway 446 from its junction with Highway 445 south to Popcorn Rock, cutting off access to Sutcliffe from

reservation communities to the south at times. For a week, Tribal staff transported water from nearby water systems to Sutcliffe for residents' use while temporary repairs were being completed. The Tribe's Emergency Services/Fire Department also pre-positioned a mobile clinic to help homebound patients in Sutcliffe while roads were impassible.

The 2017 flooding significantly affected roads throughout the reservation. As noted above, a portion of Highway 446 was washed out, and the community of Sutcliffe could only be accessed from Wadsworth and Nixon by detouring south on Highway 447, then taking Interstate 80 to Reno and Highway 445 north to Sutcliffe. The highway was shut down for about a year, isolating this part of the reservation and affecting truck traffic through Washoe County. Two families on County land (Big Canyon and Raven Ranch) north of Sutcliffe were also cut off when Highway 446 was washed out and had to be evacuated by helicopter.

The 2017 flooding resulted in economic impacts on the Tribe that are still being felt two years later. As a result of the flooding, the Tribe had to shut down recreational use of the lake during the prime fishing season, which affected revenues from fishing permits. Flooding washed out roads, beaches, and docks along the lake, affecting recreational access, and areas of the shoreline are still closed where access has been blocked by boulders. The Tribe does not have funding to restore access to these areas. Two docks in Sutcliffe and on the lake's southern end have also not been replaced.

In 2018, flash floods occurred along the lake's western shoreline and temporarily covered Highway 445 with mud and debris. Surface flow flooding from the burn scar from the Perry fire, which burned 51,386 acres in the Pah Rah range, also affected Tribal lands in 2018.

EXTENT

Severe floods may cause serious injuries and deaths and damage public facilities and private property. The river's height can determine the extent of flooding flows compared with flood stages determined by U.S. Geological Survey stream gauges throughout the area. Past damage from flooding can also be measured.

PROBABILITY OF FUTURE OCCURRENCES

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

VULNERABILITY

Most flooding near Tribal properties results in the washout or flooding of roadways and infrastructure in the floodway, such as culverts or docks. Following a flood, damage to infrastructure can severely disrupt the Tribe by damaging utilities, impacting the recreational use of Pyramid Lake, or cutting communities off from one another. For example, Sutcliffe was isolated from Nixon and Wadsworth following the 2017 floods. Vulnerable members of the

Tribe, such as the elderly and those with medical conditions, are at an increased risk if roadways are closed following a flood and access to emergency medical services is restricted. In addition, homes and businesses on the reservation, particularly in Sutcliffe, are at risk of flood damage.

None of the identified critical facilities on the Pyramid Lake Reservation are in the 100-year or 500-year flood zones.

ESTIMATED IMPACT AND POTENTIAL LOSSES

The estimated impacts and potential losses to the Pyramid Lake Paiute Reservation due to floods can be significant and multifaceted. Flooding can cause damage to infrastructure, including roads, buildings, and utilities, disrupting daily life and essential services for the community. The reservation's economic activities, particularly those reliant on natural resources like fishing and tourism, could suffer detrimental effects. Flooding can lead to erosion, water quality degradation, and habitat destruction, impacting the local wildlife and the cultural practices tied to these resources.

Additionally, the financial burden of recovery and rebuilding after a flood can be substantial. Emergency response costs, repairs, and potential loss of revenue from tourism or other activities can strain the limited resources of the reservation. Furthermore, the psychological impacts on residents, including stress and displacement, can affect overall well-being and community cohesion. Long-term strategies for flood management and climate adaptation may be required to mitigate these impacts and protect the reservation's future.

VULNERABLE POPULATIONS

Vulnerable members of the Tribe, such as the elderly and those with medical conditions, are at an increased risk if roadways are closed following a flood and access to emergency medical services is restricted. In addition, homes and businesses on the reservation, particularly those in Sutcliffe, are at risk of flood damage.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 174 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 174: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 175 provides the Calculated Priority Risk Index (CPRI) for flood impacts in Pyramid Lake Paiute Tribe (PLPT) based on the current plan's hazard risk assessment results. The PLPT assigned flood a risk factor value of 2.8, reflecting high probability and long duration impacts. This risk factor value falls in the range of 2.5 to 4.0, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 175: Calculated Priority Risk Index for Flood in Pyramid Lake Paiute Reservation

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Flood	3.2	2.4	2.4	4	2.4	2.8	High

EXISTING MITIGATION CASE STUDY

The 2017 flood events and 2018 high Truckee River flows exposed several streambanks to erosion. The Tribe received FEMA grant funding to conduct preliminary engineering reports (PERs) for 13 high-priority streambanks identified in 2017 and 2018. CP Construction and JUB Engineering are currently completing the PERs. Once the PERs are completed, the Tribe will seek funding to complete the streambank protection construction according to the design specifications contained in the PERs.[173]

TRUCKEE RIVER FLOOD MANAGEMENT MITIGATION STUDY GRANT

The Truckee River Flood Management Authority (TRFMA), an organization created by a 2011 interlocal agreement among the Cities of Reno and Sparks and Washoe County, Nevada, is proposing to develop the Truckee River Flood Management Project in Reno and Sparks, which project can increase flood flows in the lower Truckee River, including on and in the Pyramid Lake Paiute Indian Reservation.

The Truckee River Flood Management Project, which will impact the Tribe and the Reservation, has agreed to award the Tribe a grant of up to $90,000 for the Tribe to undertake a hydrologic

[173] PLPT, 2024, Natural Resources – Pyramid Lake Paiute Tribe (plpt.nsn.us)

study and other studies to determine necessary mitigation projects on the Reservation ("TRFMA Mitigation Study Grant Agreement"). The Tribe will use information from these studies to negotiate a Mitigation Fund from TRFMA to pay for Truckee Riverbank restoration and other flood mitigation projects at the sole discretion and direction of the Tribe.

RECENT DEVELOPMENT TRENDS

- **Economic**: The Truckee River Flood Management Authority, a joint powers authority created under an Interlocal Cooperative Agreement among Washoe County, the City of Reno, and the City of Sparks, is continuing to implement the Truckee River Flood Management Project by constructing, maintaining, and operating infrastructure designed to reduce flooding risks. However, this mitigation action has caused downstream flooding on Pyramid Lake, the PLPT reservation, and the fisheries (Increased Vulnerability).
- **Land Use**: Areas targeted for new development are generally outside mapped floodplains. The County requires the potential impacts of new floodplain development to be mitigated to avoid downstream flooding impacts (Increased Vulnerability).

  Lands transferred to be held in trust for the Pyramid Lake Paiute Tribe under the Nevada Native Nations Land Act are not at a significant risk of riverine flooding. However, these parcels may be at risk of sheet flow or flash flooding, especially following wildland fires (Increased Vulnerability).
- **Future Land Use:** The Tribe's planned community center would not be in known floodplains.

Extreme Weather (Winter Storm)

LOCATION

High elevations in the western portion of Washoe County experience the effects of winter storms, often snowstorms, with greater frequency than the rest of the County. Locations often affected by snowstorms include Mt. Rose Highway, Incline Village, Mt. Peavine, and I-80 near the County's border with California.[174] The National Gridded Snowfall Analysis estimates snowfall through several remote observation networks. Figure 74 Shows the seasonal snow accumulation as of March 28, 2023, a boom year for snow in the Sierra Nevada.

[174] National Operational Hydrologic Remote Sensing Center, NOHRSC Interactive Snow Information (noaa.gov)

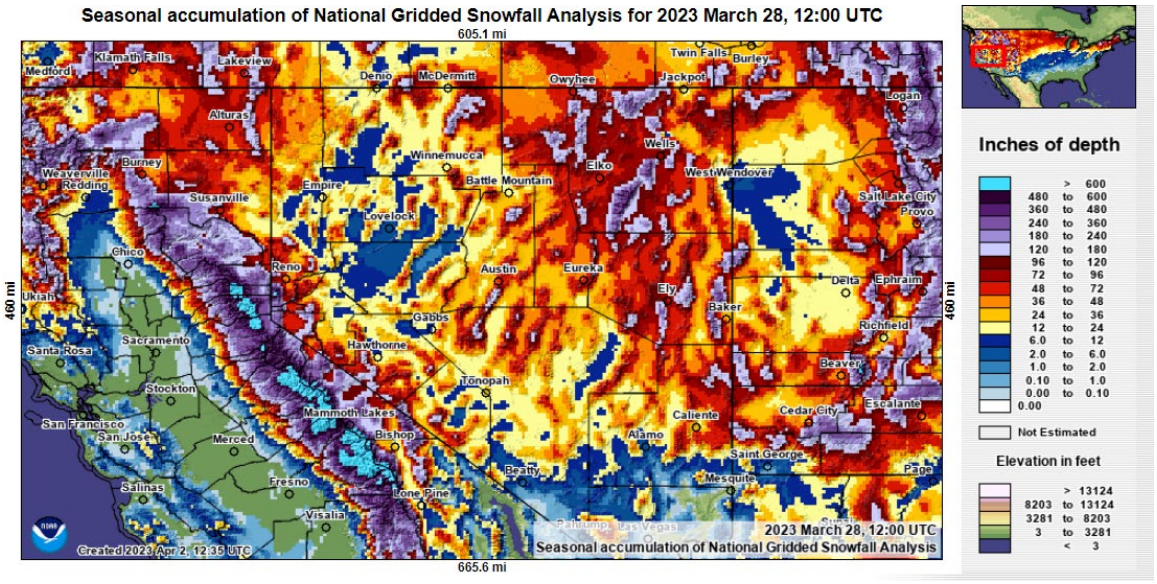


Figure 74: Seasonal National Gridded Snowfall Analysis, March 28, 2023

PREVIOUS OCCURRENCES/HISTORY

NOAA's NCEI Storm Events Database records 142 Winter Weather, Winter Storms, and Heavy Snow events in Washoe County between 2019 and 2023. No deaths, three injuries, $8M in property damage, and no crop damage were identified in the database.

The FEMA website (www.fema.gov/disasters) shows that FEMA made two major disaster declarations due to extreme weather in the State of Nevada since the initial plan was prepared (see Table 176, Figure 75, and Figure 76).

Table 176: FEMA Extreme Weather Declarations, 2010–2023[175]

#	Declaration Type	Event	Incident Period	Eligible Assistance for Washoe County
DR-4307	Major Disaster Declaration	Severe Winter Storms, Flooding, Mudslides	February 5–22, 2017	Public Assistance
DR-4303	Major Disaster Declaration	Severe Winter Storms, Flooding, Mudslides	January 5–14, 2017	Public Assistance

[175] FEMA, 2024, "FEMA Severe Storms Declarations, 2010-2023." Designated Areas | FEMA.gov

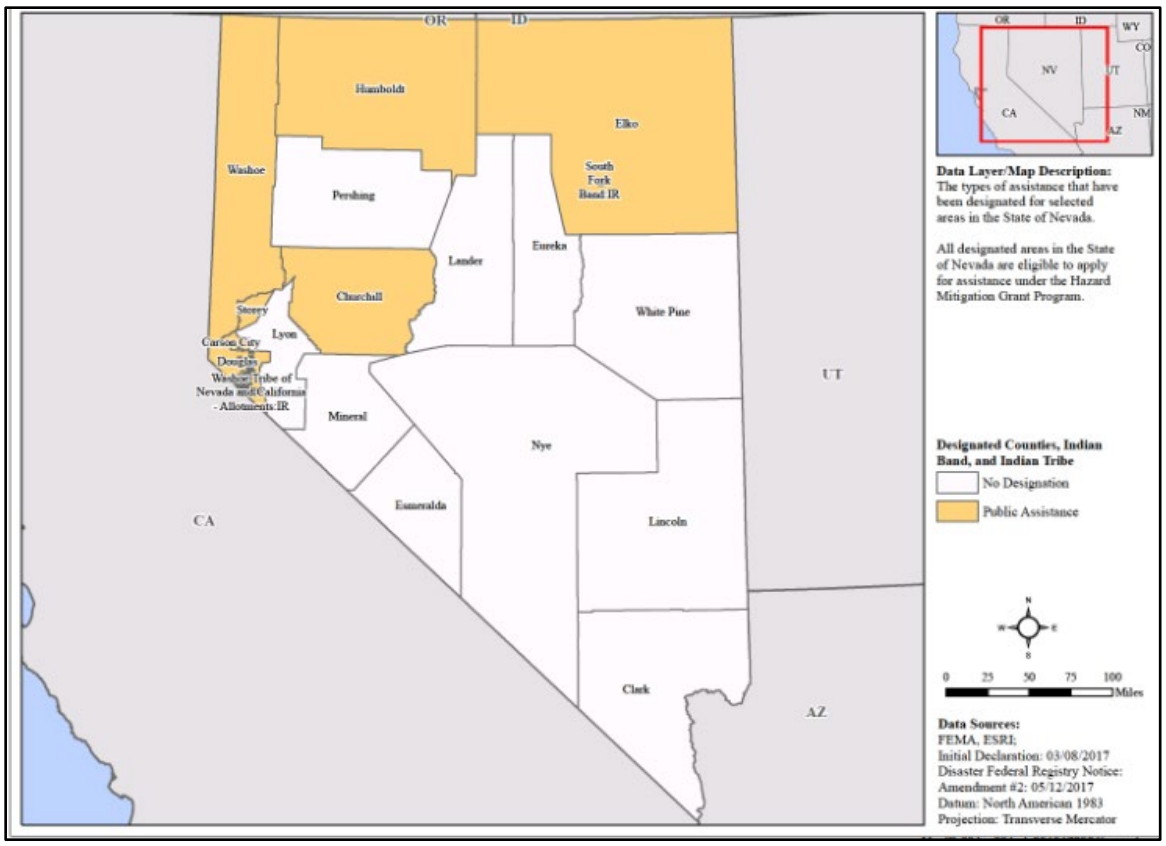


Figure 75: FEMA 4307-DR, Nevada Disaster Declaration as of 5/12/2017[176]

[176] FEMA, 2024, "FEMA 4307, Nevada Disaster Declaration as of 5/12/2017." Designated Areas | FEMA.gov

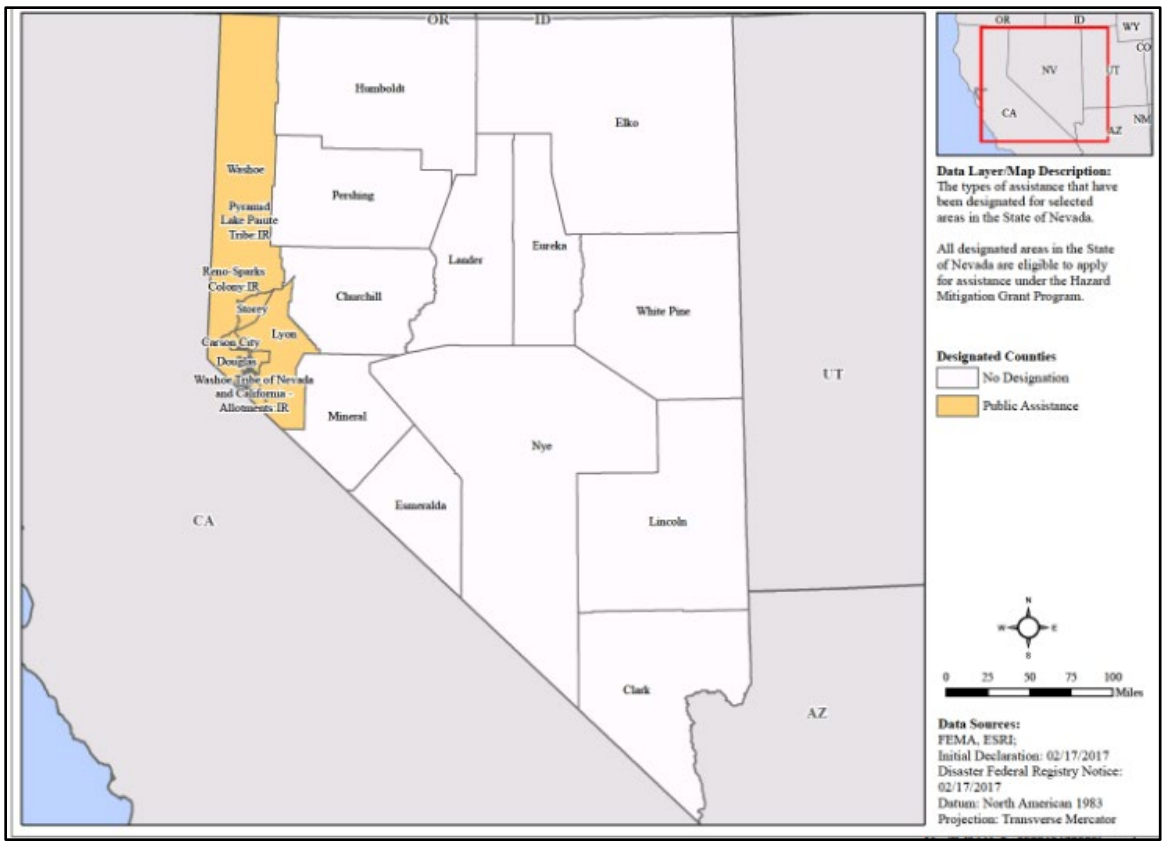


Figure 76: FEMA 4303-DR, Nevada Disaster Declaration as of 2/17/2017[177]

Historical snowfall data in Washoe County were extracted from the National Oceanic and Atmospheric Administration's (NOAA's) online climate database covering the years 2015–2023. During this period, the average daily snowfall in the winter months ranged from 0.16 to 0.28 inches, with the highest snowfall generally occurring in February.

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 of emergency protective measures.
- **February 25, 2011**: Winter storm with up 18 inches of snow and 50 mph winds, causing multiple auto accidents, two injuries, and roughly $250,000 in damage.
- **January 13–14, 2013**: Prolonged winter temperatures led Governor Sandoval to declare a state of emergency, and subzero temperatures were responsible for deaths across the state, including in Reno.

[177] FEMA, 2024, "FEMA 4303, Nevada Disaster Declaration as of 2/17/2017." Designated Areas | FEMA.gov

- **November 9–10, 2015**: A severe winter storm downed power lines because of 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 the Reno-Sparks area and areas in and near the foothills west of Reno received 8 to 10 inches of snow. Whiteout conditions occurred because of heavy lake-effect snow off Pyramid Lake.

RECENT WINTER STORM EVENTS

- **February 22, 2022:** Another inside slider tracked through the region with more snow and wind. This inside slider-type system moved into the area late Sunday through Tuesday. It brought periods of snow showers, increased wind, travel difficulties, and much lower temperatures to the region through Wednesday night. Snow Monday and into Tuesday morning overperformed in some areas, with several inches of new snow falling in bands over parts of the eastern Sierra and western NV. Two vehicles crashed on Tuesday, February 22, around 6:00 am PST, and three passengers were injured. A slider-type weather system moved over the region late Sunday, February 20, into the morning of Tuesday, February 22, producing several rounds of snowfall.
- **December 10, 2022:** A stronger winter storm brought another round of heavy snow, strong winds, and travel impacts on Sierra Passes December 9-11. Peak snowfall totals occurred through the period of December 10-11 with 2-4 feet of snow widely reported in Sierra locations and northeast CA. Storm total snowfall amounts even exceeded 5 feet over parts of the Sierra crest. Several inches of new snow also fell over some western Nevada valleys, with a foot-plus falling across some eastern Sierra foothills as well. Strong winds having gusts of 65-75 mph in far western Nevada resulted in reports of $8M in damage across parts of Sparks during the early morning of December 10.
- **December 31, 2022:** Heavy snow prompted a winter storm warning for Washoe County and neighboring counties. Heavy wet snow accumulation was expected to be from 4 to 8 inches, or 12 to 18 inches above 5,000 feet. Several downed power lines caused power outages to thousands of customers throughout the region. Heavy rain in previous days had prompted a flood watch for main stem rivers, creeks, streams, and low-lying areas due to excessive runoff.

The 2018 Nevada Enhanced State Hazard Mitigation Plan (SHMP) reported that to qualify as an “extreme” event, a snowfall must be above the 15th percentile of overall snowfall for a particular county. The state complied weather- related incidents and reported deaths or damage from 1995 through 2016 using data from the National Weather Service. Over this period, Washoe County experienced one extreme cold event, 25 incidents of hail, 279 heavy snowfall events, four ice storms, and 22 winter storms. Reported damage included $128,000 due to heavy snowfall, $30,000 due to ice storms, and $600,000 due to winter storms. Winter storms also led to the deaths of three people during this period in Washoe County.

EXTENT

The severity of the effects of snowstorms increases as the amount and rate of precipitation increase. In addition, storms with a low forward velocity are in an area for longer and become more severe in their effects. Storms in full force during morning or evening rush hours tend to have their effects magnified because more people are out on the roadways and are directly exposed. Snowfall accumulation and related hazardous conditions tend to increase at higher elevations, including Incline Village and other mountainous areas. Major transportation routes, such as Interstate 80, west of Reno, State Route 431, and State Route 28, are more likely to be affected by winter storms. Heavy snowfall generally refers to snowfall accumulating to 4" or more in-depth in 12 hours or less or 6" or more in-depth in 24 hours or less.

One tool to indicate the potential severity of a winter storm is the Winter Storm Severity Index (Figure 77). Based on the official forecast, the National Weather Service forecasters use this tool to maintain situational awareness of the possible significance of weather-related impacts. It can be used to communicate societal impacts on the public.

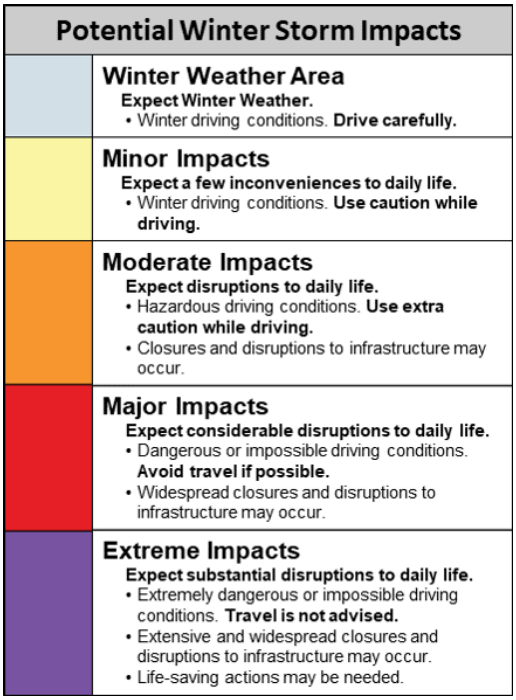


Figure 77: Winter Storm Severity Index[178]

PROBABILITY OF FUTURE OCCURRENCES

According to the NRI, the probability of a winter storm in Washoe County is High, based on an average frequency of three events per year. There has not been a significant number of historic

[178] National Weather Service, "Winter Storm Severity Index." https://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php

events, but occurrences are expected to increase in the future. The probability of an extreme weather event is High, and the potential impact of future climate conditions could increase the risk of extreme weather events. However, since extreme weather occur yearly in Washoe County, local and state jurisdictions and emergency response personnel are experienced in responding to such scenarios.

The 2018 State of Nevada Enhanced HMP provided the following statement related to future climate conditions: There are some aspects to Nevada extreme weather for which we have better confidence in anticipating the impacts of climate change, while for many other aspects, much is unknown. Recent observations and simulations suggest a continued rise in rain–snow elevation. This will cause more winter precipitation to fall as rain instead of snow. This scenario could lessen the frequency of lower elevation heavy snow events but increase the risk of winter floods. This scenario also means less snowpack from which to rely on for the summer water supply.

Simulations are mixed regarding winter precipitation in the coming decades, with some showing a decreasing trend for the Sierra and Great Basin and others showing an increasing trend. Most projections show more precipitation coming in fewer but larger atmospheric river-type storms. This scenario would increase the risk of severe weather impacts—heavy snow and floods. However, due to climate change, there is no reliable data on whether Nevada windstorms will increase or decrease in frequency and intensity in the coming decades.

The following represent the potential impacts of extreme weather on future climate conditions:

- Potential for a larger portion of winter precipitation falling as rain instead of snow.
- Potential for less frequency of heavy snow but increased risk of winter floods.
- Potential for less snowpack on which to rely for summer water supply.
- Potential for increased risk of severe weather events, such as heavy snow.
- Potential risk of increased windstorms
- Continuing increase in average temperatures across the region, along with increases in extreme heat events.

VULNERABILITY

The County's primary vulnerability from extreme weather is from power outages and impairment of transportation. Because nearly all social and economic activities depend 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

weather events. Buildings and roofs can be damaged if large amounts of heavy snow accumulate. If prolonged cold temperatures accompany a winter storm, pipes can freeze and burst.

Winter storms can lead to health concerns for unhoused populations who do not have insulated clothing or dry living conditions and are at increased risk of hypothermia. Populations who may not have sufficient heating or who lose heat due to a power outage may seek alternative heating sources. Carbon monoxide poisoning can occur if proper ventilation is not used. Home fires also occur more frequently in the winter because of inadequate safety precautions from using alternative heat sources. Exhaustion and heart attacks brought on by overexertion are two other common causes of death related to winter storms. Shoveling snow, pushing a vehicle, or even walking in heavy snow can lead to heart attack, particularly in older individuals or those not used to high levels of physical activity. Slick or icy conditions following heavy snow may lead to injuries from falls.

Winter storms are dangerous. They can bring cold temperatures, power failures, loss of communication services, and icy roads. This can make being outside dangerous, and for this reason, the Center for Disease Control and Prevention[179] recommends limiting time outside and staying indoors as much as possible to reduce the risk of car crashes and falling on the ice. However, there are hazards inside the home, such as improper heating sources due to power outages, such as the kitchen stove. Members of the community who are isolated or have disabilities may be more vulnerable, especially those who may be trapped in their homes from power failures, heavy snow and ice, and debris from falling trees and power lines. Power losses during winter storms have resulted in deaths from carbon monoxide poisoning if people attempt to keep warm by lighting charcoal fires or operating backup generators indoors.

ESTIMATED IMPACT AND POTENTIAL LOSSES

The Pyramid Lake Paiute Reservation, located in northern Nevada, is susceptible to winter storms that can have significant impacts on the community and its resources. These storms often bring heavy snowfall and strong winds, which can lead to road closures and transportation challenges. For residents, this can hinder access to essential services, including healthcare, education, and employment opportunities. Prolonged isolation can also have social implications, as community members may struggle to connect with one another.

In addition to transportation issues, winter storms can cause damage to infrastructure on the reservation. Power outages may occur due to fallen trees or ice accumulation on power lines, leaving households without electricity for heating or essential appliances. The maintenance and repair costs for damaged roads, buildings, and utilities can strain limited financial resources within the reservation's budget.

[179] Center for Disease Control and Prevention, 2024, Indoor Safety|Winter Weather (cdc.gov)

Agricultural activities may also face setbacks during severe winter weather. Infrastructure such as irrigation systems may become impaired, affecting crop production, which is vital for food security and economic stability. Additionally, livestock can be vulnerable to extreme cold and snow, possibly leading to losses for local ranchers and further impacting the community's economy.

Overall, the estimated impacts and potential losses of winter storms at the Pyramid Lake Paiute Reservation can be significant, affecting not only the physical environment but also the economic and social well-being of the community. Preparedness and response strategies will be crucial in mitigating these effects and ensuring the resilience of the reservation against future winter storms.

VULNERABLE POPULATIONS

The Pyramid Lake Paiute Reservation is home to a diverse population, including various age groups and individuals with specific vulnerabilities, particularly during winter storms.

Elderly residents are among the most vulnerable. As they may have limited mobility or access to transportation, they can be at greater risk during severe winter weather when roads may become impassable. Additionally, health issues that are more prevalent in older populations, such as respiratory conditions or mobility challenges, can be exacerbated by cold weather and isolation.

Children are another population that may be affected by winter storms. School closures can disrupt education and access to meals that some children rely on. Furthermore, younger children may have less awareness of safety measures related to severe weather, making them more susceptible to the dangers posed by winter conditions.

Individuals with disabilities also face unique challenges during winter storms. They may rely on assistive devices that can be hindered by snow and ice, and they might need additional support in evacuating if necessary. Access to resources such as heating and food can also be more complex for this population, particularly during adverse weather.

Finally, low-income families are particularly vulnerable as they may not have the financial means to prepare for or respond to winter storms effectively. This includes the inability to purchase adequate heating, food supplies, or medical necessities that can be critical during extended periods of inclement weather.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 177 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with

a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 177: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 178 provides the Calculated Priority Risk Index (CPRI) for winter storm impacts in Pyramid Lake Paiute Tribe (PLPT) based on the current plan's hazard risk assessment results. The PLPT assigned winter storm a risk factor value of 2, reflecting high frequency, medium duration, and medium onset impacts. This risk factor value falls in the range of 2.0 to 2.4, which is considered a medium-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 178: Calculated Priority Risk Index for Winter Weather in Pyramid Lake Paiute Reservation

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Winter Weather	1.6	0.8	2.4	2.4	4	2	Medium

RECENT DEVELOPMENT TRENDS

- **Economic:** Increased regional economic development continues to increase the potential for disruptions during and after severe weather 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**: Future development in more remote areas of the County may increase the cost of responding to snowstorms and increase the risk to residents, particularly the elderly or those with medical conditions.

Extreme Weather (Extreme Heat)

LOCATION

According to FEMA, extreme heat is "a long period (2 to 3 days) of high heat and humidity with temperatures above 90 degrees."[180] It may occur anywhere in Washoe County. However, urban areas are more likely to experience extreme heat conditions because of the heat island effect, in which the impervious surfaces concentrated in cities increase the surrounding area's temperature higher than in more rural areas.[181] Figure 78 shows the areas of urban heat island effects in Washoe in 2020, according to heat severity data provided by the Trust for Public Land. Landsat 8 imagery ground-level thermal sensors are used to show where certain areas of cities are hotter than the average temperature for the same city as a whole.

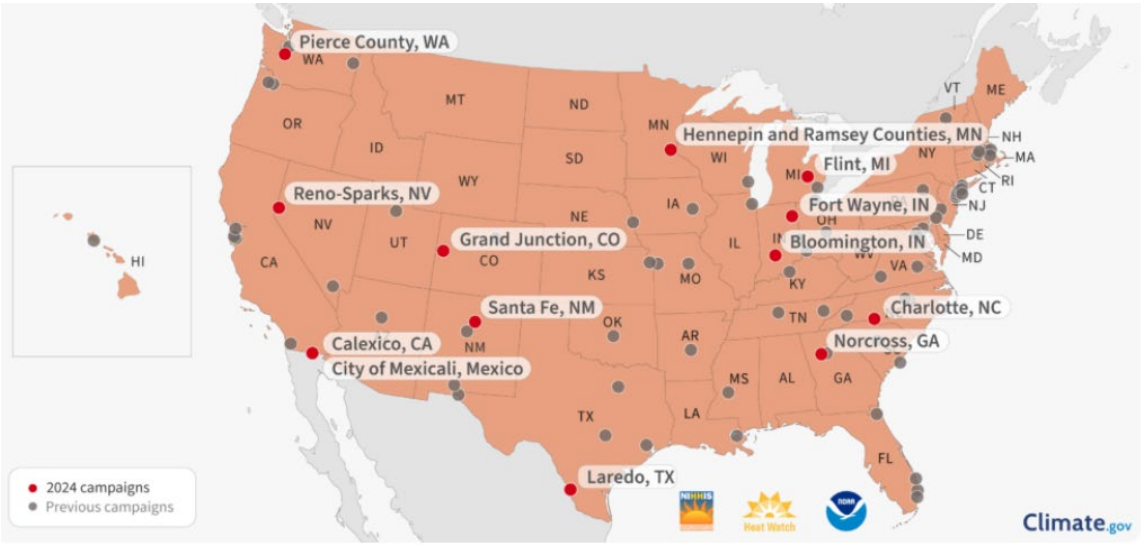


Figure 78: NOAA Urban Heat Island Mapping Identifies Reno–Sparks, NV, as Heat Island, 2017–2024[182]

[180] FEMA, "Be Prepared for Extreme Heat, https://fema-community-files.s3.amazonaws.com/hazard-information-sheets/Extreme+Heat-English.pdf

[181] United States Environmental Protection Agency, "Heat Island Effect." https://www.epa.gov/heatislands#:~:text=Heat%20islands%20are%20urbanized%20areas,as%20forests%20and%20water%20bodies.

[182] Desert Research Institute, 2024, Reno/Sparks selected to be part of Urban Heat Mapping Campaign – DRI

PREVIOUS OCCURRENCES/HISTORY

The National Weather Service issues advisories, watches, and warnings for "Excessive Heat."[183] Heat watches and warnings were issued in Washoe County in 2021[184] and 2023.[185] These warnings included information to help individuals avoid heat-related illnesses and the locations of cooling centers.

EXTENT

The heat index is what the temperature feels like to the human body when relative humidity is combined with air temperature. There is a direct relationship between air temperature and relative humidity, and the heat index. As the air temperature and relative humidity increase, the heat index increases (see Figure 79).[186] When the heat index is high, the body has more difficulty cooling itself through evaporation of perspiration to maintain a comfortable temperature. The potential for adverse health consequences increases with higher heat index values.

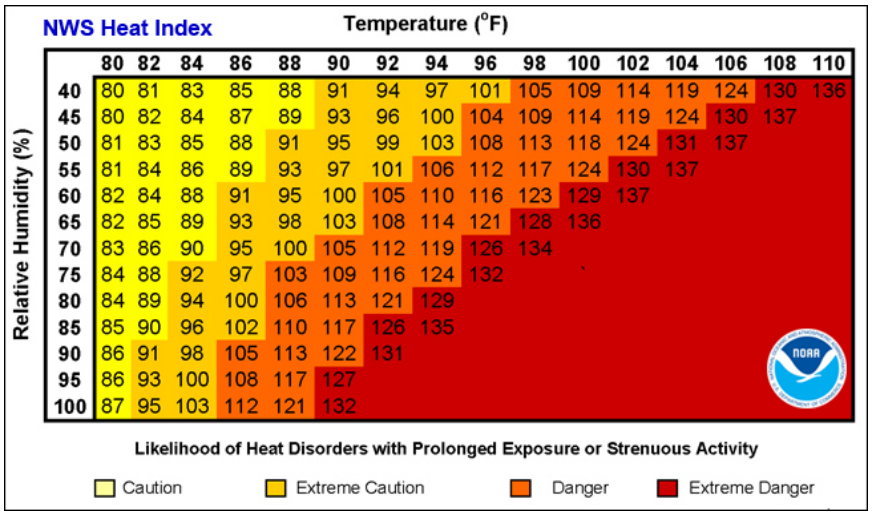


Figure 79: National Weather Service Heat Index

[183] National Weather Service, "Heat Watch vs. Warning," https://www.weather.gov/safety/heat-ww

[184] Reno Gazette Journal, "Excessive heat Warning Issued for Reno Area Beginning Sunday." https://www.rgj.com/story/news/2021/06/26/excessive-heat-warning-reno-area-beginning-sunday/5357958001/

[185] Reno Gazette Journal, Reno Experiencing 102-Degree Temps this Weekend; Excessive heat Watch into Next Week." https://www.rgj.com/story/news/2023/07/10/reno-expecting-102-degree-temps-this-weekend-heat-watch-through-monday-july-17-evening/70398343007/

[186] National Weather Service, "What is the Heat Index?" https://www.weather.gov/ama/heatindex

PROBABILITY OF FUTURE OCCURRENCES

The probability of extreme heat events is considered Medium. Based on the most recent long-range simulations, climate change can be expected to lead to more episodes of extreme heat in Nevada, especially in southern Nevada. The number of 105°+ days will likely increase, making the duration and severity of heat waves more extreme. Perhaps of more importance—based on the scientific consensus and what has already been observed—average overnight low temperatures are projected to increase considerably in the coming decades. This will remove the mitigating effect of cooling off at night, which has helped northern Nevada minimize the health impacts from recent heatwaves.

Recent studies by the Desert Research Institute conclude that climate change and an intense urban heat island have made Reno the fastest-warming city in the U.S. The warming temperatures pose risks to Reno's communities, as heat is the number one weather-related cause of death in the U.S.

VULNERABILITY

Extreme heat is associated with more fatalities than any other severe weather event in the United States. During extreme heat events, a person's body temperature may rise faster than it can cool itself, which can lead to heat-related illnesses, such as heat exhaustion or heat stroke. Older adults, young children, pregnant women, and individuals with chronic diseases, such as cardiovascular or respiratory conditions, are at the highest risk. Outdoor workers and unhoused populations are also particularly vulnerable. People who live in social isolation, including linguistic isolation or those living alone with few social relationships, also are at higher risk. Social factors, including race and ethnicity, income, and educational attainment, are correlated with many health outcomes, including heat-related illness. Lower-income individuals may not live in housing with air-conditioning and are at risk. Those living and working near urban heat islands may be more vulnerable.

Extreme heat events can also have negative impacts on worker productivity, such as time lost on the job when people need to take more frequent or longer breaks to avoid overheating or when it is too hot to work at all. Extreme heat can also affect the agricultural sector, such as livestock health and crop yields.

Heat waves can damage transportation infrastructure and pose challenges for maintenance and construction. Higher temperatures can put stress on bridge infrastructure through thermal expansion of bridge joints and paved surfaces, and deterioration of steel, asphalt, protective cladding, coats, and sealants. When the roadway surface expands at a crack or joint, heat can cause the pavement to buckle and warp, sometimes requiring closure for urgent repairs. Extreme heat can accelerate the deterioration or threaten the integrity of some types of asphalt pavement through the softening, rutting, and migration of liquid asphalt.

Extreme heat is also related to wildfire risk. High temperatures contribute to the drying out of vegetation, which may burn more rapidly once ignited. These conditions are exacerbated if they occur during times of drought.

ESTIMATED IMPACT AND POTENTIAL LOSSES

Extreme heat poses significant challenges to the Pyramid Lake Paiute Reservation, impacting both the environment and the community's way of life. Rising temperatures can lead to decreased water levels in Pyramid Lake and its surrounding ecosystem, affecting the local wildlife and fish populations that are crucial to the tribe's cultural and economic practices, such as fishing and hunting. As temperatures soar, the lake's evaporation rates increase, potentially leading to a reduction in water resources critical for both agricultural activities and sustaining the natural habitat.

Additionally, extreme heat impacts public health and safety. Higher temperatures can exacerbate health issues, particularly for vulnerable populations, including the elderly and those with pre-existing health conditions. Increased heat can lead to heat-related illnesses and strain healthcare resources. The community may face longer periods of heatwaves, requiring adaptations in living conditions, increased energy consumption for cooling, and more robust health programs to address heat-related risks.

Economically, the reservation may experience a decline in tourism, which is often tied to the natural beauty and recreational opportunities of Pyramid Lake. Extreme heat conditions could deter visitors, impacting local businesses that rely on tourism for their livelihoods. Furthermore, changes in traditional harvesting and fishing practices resulting from environmental heat stress can lead to economic losses for tribal members who rely on these resources for sustenance and economic stability.

In response to these challenges, the Pyramid Lake Paiute Tribe may need to invest in climate resilience strategies, such as developing sustainable water management practices, enhancing public health responses to extreme heat events, and promoting environmental protection measures to safeguard their natural resources and cultural heritage.

VULNERABLE POPULATIONS

On the Pyramid Lake Paiute Reservation, several populations may be particularly vulnerable to extreme heat.

Firstly, the elderly community is often at higher risk. Older adults can have diminished heat tolerance and may not adequately recognize or respond to heat-related stressors, making them more susceptible to heat-related illnesses such as heat exhaustion or heat stroke. Additionally, some seniors may have pre-existing health conditions that can be exacerbated by extreme heat, further increasing their vulnerability.

Children also represent a vulnerable group on the reservation. Young children are still developing their capacity to regulate body temperature and are often more active outdoors, which can increase their risk of overheating. Parents and caregivers may need to take extra precautions to ensure that children stay hydrated and cool during times of extreme heat.

Another at-risk population includes individuals with pre-existing health conditions, including cardiovascular problems or respiratory diseases. These conditions can be exacerbated by extreme heat, as high temperatures can lead to increased heart rates or respiratory distress. Furthermore, individuals experiencing homelessness may lack access to adequate shelter and cooling resources, making them particularly susceptible during heat waves.

Lastly, people with limited resources may struggle to cope with the effects of extreme heat. Those who cannot afford air conditioning or who live in poorly ventilated homes might face significant challenges during hot weather. Access to information about heat safety and cooling centers is crucial for these populations to mitigate the health and well-being impacts of extreme heat.

Overall, the convergence of age, health status, and socioeconomic factors contributes to the vulnerability of various segments of the Pyramid Lake Paiute Reservation's population to extreme heat.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 179 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 179: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 180 provides the Calculated Priority Risk Index (CPRI) for extreme heat impacts in Pyramid Lake Paiute Tribe (PLPT) based on the current plan’s hazard risk assessment results. The PLPT assigned extreme heat a risk factor value of 1.76, reflecting high frequency and

medium onset impacts. This risk factor value falls in the range of 0 to 1.9, which is considered a low-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 180: Calculated Priority Risk Index for Extreme Heat in Pyramid Lake Paiute Reservation

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Extreme Heat	1.6	0.8	2.4	1.6	3.2	1.76	Low

EXISTING MITIGATION CASE STUDY

Several municipal, county, and tribal governments and community groups based in the Reno-Sparks area are teaming up to map the hottest parts of Reno, Sparks, and adjacent portions of Washoe County. NOAA is partnering with the U.S. Departments of Health and Human Services and Housing and Urban Development to map urban heat islands.[187]

The City of Reno has been awarded a $500,000 grant from the United States Department of Agriculture and the U.S. Forest Service as part of the federal government's efforts to plant and maintain trees, combat extreme heat, and improve access to nature in cities nationwide.[188]

RECENT DEVELOPMENT TRENDS

- **Economic:** Increased regional economic development continues to increase the potential for disruptions during and after severe weather events (Increased Vulnerability).
- **Land Use:** The County's upward trend in development increases the overall strain on responding to severe weather event impacts at various locations (Increased Vulnerability).
- **Future Land Use:** Future development in more remote areas of the County may increase the cost of responding to severe weather events and increase the risk to residents, particularly the elderly or those with medical conditions.

[187] Desert Research Institute, 2024, Reno-Sparks selected to be part of Urban Heat Mapping Campaign – DRI

[188] MyNews4, Alyssa Beck, September 21, 2023, Reno named fastest-warming city in the United States from Climate Center (mynews4.com)

Drought

LOCATION

Drought affects broad regions and can affect the entire Pyramid Lake Reservation. Historically, the central and northern parts of Washoe County have experienced more frequent droughts than the southern part due to extensive stored water in reservoirs in the Truckee River basin in southern Washoe County. Low snowpack in the Truckee River basin can cause droughts of greater magnitude in the southern part of the county, as was experienced during drought conditions between 2012 and 2017.

PREVIOUS OCCURRENCES/HISTORY

Drought conditions are frequently recorded in Washoe County. According to information from the U.S. Drought Monitor, Washoe County and the PLPT have experienced several periods of drought since 2000. Since 2000, more often than not, the county has been subject to drought, which is frequently severe or worse. Three pronounced but relatively brief wet periods are noted, from 2005 to 2006, 2011 to 2012, and 2017, during which the region saw particularly wet/snowy winters, including significant floods in December 2005 and February and March 2017. This is a clear example of the variable climate in Washoe County.

EXTENT

The overall magnitude and potential severity of drought are considered Moderate for the PLPT. Drought impacts are wide-reaching and may be economic, environmental, and/or societal. Droughts lasting several years or more may affect the Tribe's economic enterprises, including ranching and recreation at Pyramid Lake.

PROBABILITY OF FUTURE OCCURRENCES

Drought is one of the least predictable hazards. The current state of seasonal weather prediction science is such that it is nearly impossible to predict the beginning or the ending of droughts well in advance with meaningful confidence levels. With that said, periods of drought have regularly occurred in the recent history of Washoe County and Nevada; therefore, droughts can be expected to occur with some regularity in the future. Based on the assessments in the previous sections, the probability of severe drought is considered High, with an approximately 50% chance of occurrence in a given year.

VULNERABILITY

The economic impacts of drought for the Tribe can range from crop losses and increased costs incurred by farmers and ranchers who need to buy additional water or feed for livestock to economic losses from decreased recreational use of Pyramid Lake or the need to close access to the lake to protect natural values. The effects of drought can last from one to multiple years,

and drought's economic and social impact is likely to be compounded as more prolonged drought conditions last.

ESTIMATED IMPACT AND POTENTIAL LOSSES

The Pyramid Lake Paiute Reservation, located in northwestern Nevada, is experiencing significant challenges due to prolonged drought conditions. One of the most pressing impacts is on the reservation's water supply. The limited availability of water affects not only the community's drinking water but also agricultural activities that are vital for local food sovereignty and economic sustainability. Reduced water levels in Pyramid Lake itself, a critical habitat for Lahontan cutthroat trout, threaten both the ecological balance and the recreational opportunities associated with fishing and tourism.

Furthermore, drought can exacerbate existing socio-economic issues within the reservation. With less water available for irrigation, agricultural productivity declines, leading to potential food shortages and increased reliance on external food sources, which may not be affordable or accessible. This can result in economic losses for local farmers and the broader community, reducing income and increasing vulnerability.

The cultural significance of the land and water resources to the Pyramid Lake Paiute Tribe is profound and cannot be overstated. Drought threatens traditional practices, rituals, and the very identity of the community, which are intricately tied to the health of the environment. The potential loss of culturally important plants and animals due to changing climate conditions may have long-term effects on the tribe's heritage and cultural practices.

Overall, the combination of ecological, economic, and cultural impacts from drought poses a significant threat to the Pyramid Lake Paiute Reservation, highlighting the urgent need for adaptive management strategies and sustainable practices to mitigate these challenges in the face of a changing climate.

VULNERABLE POPULATIONS

On the Pyramid Lake Paiute Reservation, several populations are particularly vulnerable to droughts, primarily due to their reliance on natural resources for sustenance and cultural practices. The Indigenous communities residing in this region depend heavily on available water sources for agriculture, fishing, and other traditional activities. A reduction in water supply can severely impact their ability to cultivate crops and maintain livestock, leading to food insecurity and economic challenges.

Additionally, the tribal members who fish in Pyramid Lake are affected by drought conditions, as lower water levels can diminish fish populations and disrupt traditional fishing practices. These populations often have deep cultural ties to the lake and its resources, making the effects of drought not just an economic issue but also a significant impact on their identity and heritage.

Moreover, vulnerable populations, such as the elderly and those with pre-existing health conditions, may face greater challenges during periods of drought. Water scarcity can lead to health problems associated with inadequate hydration and sanitation, exacerbating existing issues. The compounded stress of environmental changes can also affect mental health, creating a cycle of vulnerability that can be hard to break.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 181 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 181: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 182 provides the Calculated Priority Risk Index (CPRI) for drought impacts in Pyramid Lake Paiute Tribe (PLPT) based on the current plan's hazard risk assessment results. The PLPT assigned drought a risk factor value of 2.32, reflecting high probability, long duration, and high frequency impacts. This risk factor value falls in the range of 2.0 to 2.4, which is considered a medium-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 182: Calculated Priority Risk Index for Drought in Pyramid Lake Paiute Reservation

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Drought	3.2	0.8	0.8	4	3.2	2.32	Medium

EXISTING MITIGATION CASE STUDY

Groundwater supplies drinking water to more than 50% of the people in the United States. On the Pyramid Lake Paiute Reservation, groundwater is vital to the community's water supply. While much of the local water demand is met using surface water from the Truckee River, during periods of low river flow (such as during drought conditions) or when the Truckee River water is heavily sediment-laden or otherwise unavailable, the community may become entirely dependent on groundwater. On the Pyramid Lake Paiute Reservation, approximately 30% of the drinking water is sourced from groundwater annually. Groundwater wells must be protected or abandoned in accordance with state regulations to prevent them from becoming conduits for groundwater contamination. The Washoe County Health District (WCHD) also regulates activities to protect the environment from contamination.[189]

RECENT DEVELOPMENT TRENDS

- **Economic:** The relationship between the Tribe's economic enterprises and drought has not changed in recent years (Unchanged Vulnerability).
- **Land Use:** The Tribe relies on Pyramid Lake for much of its revenue. The lake's vulnerability to drought has not changed in recent years (Unchanged Vulnerability).
- **Future Land Use:** The Pyramid Lake Economic Development Plan sets goals for new agricultural and ranching enterprises on the reservation. These enterprises would be more vulnerable to the effects of drought and may increase the Tribe's vulnerability to economic losses caused by drought.

Volcano

LOCATION

No active volcanoes are in Washoe County. The three closest, potentially active volcanoes are in California.

PREVIOUS OCCURRENCES/HISTORY

The 2023 SHMP noted that Nevada has had a long history of volcanism and, "Small eruptions from the Mono Craters area near Lee Vining and Mono Lake in eastern California have sent ash into Nevada as recently as about 260 years ago; an eruption from these volcanoes presents the most likely current volcanic hazard for Nevada. Other volcanoes that have erupted in recent history and could deposit ash in Nevada include Lassen Peak, Mount Shasta, the Long Valley Caldera in California, and volcanoes in the Cascade Mountains in Oregon."[190]

[189] WashoeCounty.gov, 2024, Groundwater & Our Local Water Supply (washoecounty.gov)
[190] 2023 Enhanced SHMP, Section Three, "Volcano (Low Risk)"

Volcanic activity from surrounding states, notably California and Oregon, has created ash clouds that have drifted over Nevada, as evidenced by many young ash beds in western Nevada. An eruption from these volcanoes presents Nevada's most likely current volcanic hazard. Other volcanoes that have erupted in recent history and could deposit ash in Nevada include Lassen Peak, Mount Shasta, the Long Valley Caldera in California, and volcanoes in the Cascade Mountains in Oregon. Ash from the 1915 eruption of Lassen Peak traveled at least 200 miles northeast to Winnemucca. The eruption of Mount St. Helens in 1980 deposited up to several centimeters of ash several hundred kilometers away from the volcano. The biggest threat to Nevada from eruptions in California and Oregon is damage to flying aircraft.

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

Researchers at the University of Nevada, Reno (UNR) have interpreted seismic and geodetic data at the north end of Lake Tahoe.[191] These data indicate active magma at a depth of approximately 19 miles (30 kilometers). There does not appear to be a near-term threat of volcanic eruptions from this area, partly because the last documented eruption was approximately one million years ago.

The eruption of Lassen Peak in 1915 caused localized debris flows and a pyroclastic cloud that damaged and deforested a 3-square-mile area, as well as flooding and debris flows up to 10 miles from the volcano in Hat Creek. Ash from the eruption traveled at least 200 miles northeast to Winnemucca, Nevada.

EXTENT

The magnitude and potential severity of impacts of a volcanic eruption is considered Medium for Washoe County. However, Washoe County is close enough to the Long Valley Caldera to be impacted by ashfall less than 5 centimeters thick, based on a small to moderate eruption.

PROBABILITY OF FUTURE OCCURRENCES

The 2023 Enhanced SHMP notes that Nevada's most likely volcanic hazard is an eruption from Mono Craters, Inyo Craters, and Mammoth Mountain. Active volcanoes within approximately 150 miles of Reno have erupted four times in the past 304 years. This indicates a 1.3% chance

[191] K. D. Smith and others, 2004, Evidence for deep magma injection beneath Lake Tahoe, Nevada–California: Science, v. 305, p. 1277–1280

of these volcanoes erupting in a year. Therefore, the probability of occurrence with direct consequences for the planning area is considered Very Low.

Volcanic risk is Low, but it could increase if a volcano becomes active. The probability is low, but the consequences could have a severe local impact. Mitigation actions are limited to public awareness and evacuation procedures at the local level. No significant impacts of the volcanic hazard in Nevada from climate change are expected.

There are no direct connections between future climate conditions and volcanic activity.

VULNERABILITY

Volcanic hazards, particularly ashfall, have a very low probability of occurring. However, the vulnerability of the public, continuity of operations, infrastructure, and the environment to volcanic hazards are assessed below.

ESTIMATED IMPACT AND POTENTIAL LOSSES

The estimated impacts and potential losses to the Pyramid Lake Paiute Reservation due to volcanic activity can be significant, considering the geological context of the region. While the reservation is not directly within a volcanic zone, it is located near the Sierra Nevada and other volcanic formations in Nevada. Potential impacts include ash fall, which can disrupt air quality, contaminate water sources, and damage crops and vegetation critical to the reservation's ecosystem and economy.

Additionally, the reservation’s community could face health risks from volcanic ash inhalation, which may lead to respiratory issues. Infrastructure such as roads, buildings, and utility lines could suffer damage from ash accumulation or even from potential lava flows if they were to occur. Economic losses could arise from a decline in tourism, as visitors might avoid the area during volcanic events due to safety concerns. Overall, while the immediate threat may seem limited, the cascading effects of a volcanic event could pose substantial challenges for the Pyramid Lake Paiute Reservation and its inhabitants.

VULNERABLE POPULATIONS

Populations on the Pyramid Lake Paiute Reservation that may be vulnerable to volcanic activity include several key groups. The elderly are particularly at risk due to limited mobility and health issues, making quick evacuation challenging.

Children are also vulnerable, as they are more susceptible to health impacts from volcanic ash and require additional care during emergencies. Individuals with respiratory conditions, such as asthma, may experience aggravated symptoms from ash and toxic gases, highlighting the need for specific health considerations.

Low-income families face barriers in accessing supplies and transportation for evacuation, making them more susceptible during a volcanic event. Additionally, residents connected to culturally significant sites risk losing heritage if these areas are affected.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 183 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 183: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 184 provides the Calculated Priority Risk Index (CPRI) for volcano impacts in Pyramid Lake Paiute Tribe (PLPT) based on the current plan's hazard risk assessment results. The PLPT assigned volcanoes a risk factor value of 1.92, reflecting medium probability and long duration impacts. This risk factor value falls in the range of 0 to 1.9, which is considered a low-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 184: Calculated Priority Risk Index for Volcanoes in Pyramid Lake Paiute Reservation

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Volcano	2.4	1.6	2.4	3.2	0.8	1.92	Low

RECENT DEVELOPMENT TRENDS

- **Economic:** Active threats pose no new risk to economic interests (Unchanged Vulnerability).
- **Land Use:** Active threats pose no new risk to land use (Unchanged Vulnerability).

- **Future Land Use:** Development of any buildings or infrastructure where many people congregate or that has higher publicity will be somewhat vulnerable to acts of violence.

Hazardous Materials Incident

LOCATION

The potential for contact with hazardous materials is present throughout Washoe County because of four main factors:

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

PREVIOUS OCCURRENCES/HISTORY

According to the Federal Pipeline and Hazardous Materials Safety Administration (PHMSA), which releases annual hazardous materials incident reports, there were 1,806 reported incidents throughout the state of Nevada from 2015 to 2023, resulting in 14 injuries, two of which required hospitalization. There were no fatalities during this time. Total damage over this time totaled approximately $2,377,408 (PHMSA 2023).

Of these incidents, 1,589 occurred on state highways, resulting in damage of approximately $1,852,621 and one hospitalization. A total of 117 incidents occurred on railways, resulting in no injuries and approximately $502,647 in damage. The remaining 100 incidents were associated with airports. No damage was reported beyond five injuries that did not require hospitalization.

According to the PHMSA, Washoe County had one reported pipeline spill along the Kinder Morgan North pipeline in October 2007, which was caused by equipment failure. The incident released 851 barrels (35,742 gallons).

Since the l950s, only one major incident has been reported. The spill was caused by damage to the pipeline by a construction crew working above it. Over the past 50 years, the pipeline has been subjected to extensive stream erosion, landslides, and tectonic activity. The fact that the pipeline has survived relatively undamaged over the years is a testament to the quality of the original construction and the ongoing efforts to maintain the pipeline.

EXTENT

The overall magnitude and potential severity of hazardous materials incidents are considered Low in Washoe County but vary based on the type of facility. The vulnerability to hazardous

materials disasters at fixed facilities includes the potential for either an explosive release or insidious leaking of materials into the ground or groundwater. The impact of an accident or spill during roadway or rail transport depends largely on the spill location relative to population centers and waterways.

PROBABILITY OF FUTURE OCCURRENCES

The probability of hazardous materials events varies based on the type of accident considered. Based on the frequency of past incidents, particularly during the transportation of hazardous materials, the overall probability of hazardous materials incidents is considered Medium. As the volume of hazardous materials transport, handling, or production increases, the expected frequency of accidents involving uncontained releases increases correspondingly.

However, it is important to note that increased hazardous materials regulation will likely decrease the potential for hazardous materials releases. Due to the increased potential for human error or mechanical failure, the probability of a hazardous materials release on a roadway, rail line, or fixed facility is marginally higher than that of pipeline accidents.

VULNERABILITY

Hazardous materials incidents can be caused by a number of factors, including technological failures, natural hazards, such as earthquakes or floods, and 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 Nevada Highway Patrol regarding shipments of hazardous materials on all transportation routes throughout the County. Several factors can cause hazardous materials incidents. A transportation incident on the I-80 and/or I-580 highway presents the region's most pressing vulnerability. Many of the critical facilities and valuable assets are near I-80 and I-580, particularly in the Reno/Sparks corridor. Hazardous materials may be transported through the Reno-Tahoe International Airport. In addition, power plants, water and wastewater treatment plants, hospitals, fire stations, and other critical facilities in Washoe County may store hazardous materials on site.

PIPELINE

Any release from the pipeline might have severe consequences for the population and the environment. The pipeline's proximity to the Truckee River and its inlets and outlets signifies a potential threat to the water system. All the communities along the Truckee River draw their water supply from the river or wells directly affected by any product released from the pipeline. Environmental damage, including the potential for wildland fires, is an additional consideration.

ESTIMATED IMPACT AND POTENTIAL LOSSES

The estimated impacts and potential losses to the Pyramid Lake Paiute Reservation due to hazardous waste are significant and multifaceted. Firstly, the presence of hazardous waste can lead to severe environmental degradation. Contamination of soil and water resources can

threaten local ecosystems, affecting wildlife and plant life that are crucial for the cultural and economic well-being of the Pyramid Lake Paiute people. Access to clean water is particularly vital for both consumption and recreational activities, and contamination can compromise this essential resource, leading to health issues within the community.

Economically, hazardous waste can deter tourism and hinder development projects that are vital for the reservation's growth. The area is known for its natural beauty, and any environmental damage can dissuade visitors, impacting businesses that rely on tourism. This loss of revenue can be compounded by potential legal costs associated with cleanup efforts and the long-term management of contaminated sites. Furthermore, there could be financial implications resulting from decreased property values and a burden on local government resources to address these issues.

Socially, the impacts of hazardous waste can exacerbate existing inequalities and health disparities within the community. Exposure to toxic materials can lead to various health problems, increasing healthcare costs and putting a strain on the community's resources. There is also a psychological impact to consider; the threat of hazardous waste can create anxiety and stress among residents, affecting overall community well-being.

Overall, the impacts of hazardous waste on the Pyramid Lake Paiute Reservation are complex, intertwining environmental, economic, and social factors that could lead to both immediate and long-term challenges for the community. Addressing these issues requires comprehensive planning, community engagement, and support from external stakeholders to mitigate potential losses and promote sustainability.

VULNERABLE POPULATIONS

The Pyramid Lake Paiute Reservation in Nevada is home to a diverse population that includes various groups, each with unique vulnerabilities to hazardous waste exposure. One of the primary populations at risk includes the indigenous community, particularly the elderly and children. These groups may have higher susceptibility to health issues related to environmental contaminants due to their developing or declining health status.

Additionally, individuals with pre-existing health conditions, such as respiratory illnesses, are also more vulnerable. Exposure to hazardous waste can exacerbate these conditions, leading to increased health risks. The local economy, which often relies on traditional practices such as fishing and gathering from the land, can further compound these vulnerabilities. Contaminated water or soil can affect the safety of these traditional food sources, leading to food insecurity and health concerns.

Social factors also play a crucial role in vulnerability. Limited access to healthcare services on the reservation can mean that health issues related to hazardous waste may go unaddressed, resulting in long-term health consequences. Moreover, educational disparities may hinder the community's ability to effectively navigate and respond to environmental hazards.

Lastly, the overall socioeconomic status of the populations on the reservation can contribute to their vulnerability. Higher poverty rates often limit resources for prevention, education, and remediation efforts, making it difficult for these communities to protect themselves from the impacts of hazardous waste.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 185 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 185: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 186 provides the Calculated Priority Risk Index (CPRI) for hazardous material incidents in Pyramid Lake Paiute Tribe (PLPT) based on the current plan's hazard risk assessment results. The PLPT assigned hazardous materials incident a risk factor value of 1.68, reflecting long duration and quick onset impacts. This risk factor value falls in the range of 0 to 1.9, which is considered a low-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 186: Calculated Priority Risk Index for Hazardous Materials Incident in Pyramid Lake Paiute Reservation

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Hazardous Materials Incident	1.6	0.8	4	4	0.8	1.68	Low

EXISTING MITIGATION CASE STUDY

KINDER MORGAN PIPELINE MITIGATION ACTIONS

There are several locations along the pipeline where leak detection can occur; the threshold of detection is about one-tenth of one percent over a period of about 15 minutes. In a catastrophic break, the pipeline can be shut down in about 30 seconds using automatic shutoff valves. Manual valves' isolation depends on weather conditions and could require 30 minutes to an hour to close. If this break is caused by a single isolated event, such as a landslide or rockslide, the damage could be detected, contained, and repaired relatively quickly, assuming fair weather conditions and transportation routes are clear.

RECENT DEVELOPMENT TRENDS

- **Economic:** Increased transportation of hazardous materials in the corridor increases the probability of a release or spill of bulk hazardous materials to cause fire, explosion, toxic cloud, or direct contamination of people or property. Property damage could range from immediate destruction by explosion to permanent contamination by a persistent hazardous material (Increased Vulnerability).
- **Land Use:** Kinder Morgan operates an underground pipeline that transports approximately 13 million barrels of petroleum products (gasoline, diesel, and jet fuel) from the pump station in Rocklin, California, to the Sparks, Nevada, terminal. Jet fuel is then pumped from the Sparks terminal to the Fallon Naval Air Station. Kinder Morgan also shares a storage facility in Sparks[192] (Increased Vulnerability).
- **Future Land Use**: Excavation is the most likely cause of damage to the pipeline. The potential for rupture because of nearby excavation is greatest in areas where the pipeline corridor intersects highways and railroad right of ways and areas of new construction. As the area in the pipeline corridor continues to grow and expand, the potential for damage will also continue to grow[193] (Increased Vulnerability).

[192] Washoe County Emergency Management and Homeland Security Program, 2020, "Regional Washoe County Hazardous Materials Emergency Response Plan" HAZMAT-Annex-D-12-17-2020.pdf (washoecounty.gov)

[193] Washoe County Emergency Management and Homeland Security Program, 2020, "Regional Washoe County Hazardous Materials Emergency Response Plan" HAZMAT-Annex-D-12-17-2020.pdf (washoecounty.gov)

Criminal Acts and Terrorism

LOCATION

Criminal acts of terrorism can impact any populated area, including shopping structures, clinics and hospitals, schools, and government offices and buildings.

PREVIOUS OCCURRENCES/HISTORY

Criminal acts and violent crime have increased in Washoe County since the last plan, with a 4.33% increase from 2021 through 2022. However, from 2022 to 2023, violent crime declined by 1.08%. Table 187 Shows the number of violent crimes from 2020 to 2024.

Table 187: Crimes in Washoe County, 2020–2024

Year	Violent Crime	Criminal Homicide	Forcible Rape	Robbery Total	Aggravated Assault
2020	2302	23	410	379	1490
2021	2402	27	399	397	1579
2022	2506	26	409	467	1604
2023	2479	29	413	426	1611
2024	702	9	106	95	492

EXTENT

It is difficult to estimate the extent or probability of criminal activity or a terrorist incident. Nonetheless, these threats could affect all populated areas in Washoe County, and government facilities and schools may be the most likely targets. The magnitude and potential severity of the impacts of criminal activity or a terrorist incident are considered Medium.

PROBABILITY OF FUTURE OCCURRENCES

Climate change can impact terrorism in several ways. For example, increasing temperatures and extreme weather events can lead to food and water shortages, contributing to social and political instability. This can create conditions favorable to the spread of extremist ideologies and recruitment by terrorist groups. Moreover, as climate change leads to the displacement of populations and competition for scarce resources, it can exacerbate existing social tensions and fuel conflicts that terrorist organizations can exploit. Climate change can also impact the geographic range of certain groups, as changing environmental conditions can affect where they operate.

Political and social unrest, economic disparities, ideological extremism, and global geopolitical developments can increase the possibility of terrorism in the United States. Moreover, the

global rise of populist movements has fueled anti-immigrant and anti-minority sentiment, which can increase the chance of domestic terrorism. The explosion of advanced technologies and the potential for cyber-terrorism are also concerning factors. The probability of increased terrorism is difficult to quantify and can be influenced by domestic and international events.

Based on various factors, Washoe County could be considered a potential target for terrorism. It has several critical infrastructure sites, such as airports, major highways, and power plants. The area's significant population centers and notable events could also present attractive targets for individuals or groups seeking to cause harm. Based on the occurrence of previous incidents, the probability of an incident is considered relatively moderate.

VULNERABILITY

No estimates are available to determine the potential losses associated with criminal acts and terrorism. However, if an active threat were directed at the County, schools, government buildings, other public gathering places, and social events would be top targets. Active threats 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; declines in economic activity and hospitality business after the event; psychological and emotional trauma; and an increased need for emergency services and funding.

ESTIMATED IMPACT AND POTENTIAL LOSSES

The estimated impacts and potential losses to the Pyramid Lake Paiute Reservation due to criminal acts and terrorism can be significant and multifaceted. One of the primary concerns is the threat to community safety and well-being. Criminal acts, ranging from property crimes to violent incidents, can create a climate of fear among residents, leading to decreased quality of life and increased mental health issues. Additionally, acts of terrorism, while potentially rare, can result in devastating physical and emotional consequences, affecting not only individual lives but also the cohesion of the community as a whole.

Economically, the reservation may face substantial losses resulting from criminal activities. Increased crime rates can deter tourism and outside investments, leading to reduced revenue streams that are crucial for the local economy. Moreover, the costs associated with law enforcement and emergency response can strain the limited financial resources of the reservation. Resources that could be allocated to community development or essential services may instead be diverted to address the consequences of crime.

Infrastructure and property can also be adversely affected. Vandalism, theft, and property damage not only lead to direct financial losses but also necessitate additional expenditures on security measures and repairs. The physical environment may bear the scars of criminal activity, which can deter community pride and discourage investment in beautification projects or local businesses.

In terms of social impact, the fear of crime can lead to isolation and distrust among community members, weakening social ties and communal resilience. This erosion of social capital can hinder collective efforts to address community challenges and promote positive change. Overall, the potential impacts and losses due to criminal acts and terrorism on the Pyramid Lake Paiute Reservation highlight the importance of preventive measures, community engagement, and comprehensive safety strategies to protect both the community and its cultural heritage.

VULNERABLE POPULATIONS

The Pyramid Lake Paiute Reservation in Nevada is home to a diverse community, but certain populations may be particularly vulnerable to criminal acts and terrorism. First, the youth of the reservation can be considered at risk due to factors such as limited access to education, recreational opportunities, and positive role models. This vulnerability can increase their likelihood of being involved in or affected by criminal activities.

Additionally, the elderly population may also face higher risks. They often lack mobility and access to resources, making it difficult for them to seek help or escape dangerous situations. This demographic may be targeted more easily by individuals committing crimes, especially if they live in isolated areas.

Furthermore, individuals struggling with economic challenges are at greater risk. Economic instability can lead to a higher prevalence of crime, as individuals may resort to unlawful activities out of desperation. This population may be less likely to report crimes due to fears of repercussions or lack of trust in law enforcement.

Lastly, any marginalized groups within the community, including those facing discrimination or social exclusion, may also be more vulnerable. These populations often have fewer support systems and resources to protect themselves from criminal acts and may be targets for hate crimes or other forms of violence.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 188 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 188: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 189 provides the Calculated Priority Risk Index (CPRI) for criminal acts and terrorism impacts in Pyramid Lake Paiute Tribe (PLPT) based on the current plan's hazard risk assessment results. The PLPT assigned criminal acts and terrorism a risk factor value of 2.08, reflecting high frequency and quick onset impacts. This risk factor value falls in the range of 2.0 to 2.4, which is considered a medium-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 189: Calculated Priority Risk Index for Criminal Acts and Terrorism in Pyramid Lake Paiute Reservation

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Criminal Acts and Terrorism	1.6	1.6	4	0.8	3.2	2.08	Medium

EXISTING MITIGATION CASE STUDY

To reduce the community's vulnerability to criminal acts and terrorism, the Washoe County Sheriff's Office has developed an Emmy-nominated video and webpage describing how people can respond to an active assailant threat (https://www.washoesheriff.com/general-information/staying-safe/active-assailant-preparedness--what-you-can-do.php). WCHD has developed a Multi-Casualty Incident Plan to provide guidelines for managing multi-casualty incidents and coordinating between multiple responding agencies[194] and organizations.[195]

[194] Hidalgo, J. (2023, January 26). *Reno-Sparks growth: Forecast pegs housing, education as biggest challenges* [Review of *Reno-Sparks growth: Forecast pegs housing, education as biggest challenges*]. Reno Gazette Journal. https://www.rgj.com/story/news/money/business/2023/01/26/reno-sparks-growth-housing-education-are-biggest-challenge/69845214007/

[195] Rowles, L. (2023, December 15). *Northern Nevada Adds Over 1,200 Jobs in 2023 with Record Average Wage*. EDAWN. https://www.edawn.org/existing-business-update/northern-nevada-adds-over-1200-jobs-in-2023-with-record-average-wage/

WCHD published the Washoe County EMS Strategic Plan 2023–2028 at EMS-Strategic-Plan-2023-2028-PDF.pdf.

Case studies can provide valuable insights into the specific factors and circumstances that contribute to the risk of terrorism in a particular region. By examining past incidents and their underlying causes, authorities can better understand the root causes of terrorism and the conditions that may lead to such acts. This knowledge can help develop more targeted and effective strategies to mitigate the risk of terrorism in the future. Case studies can also provide valuable lessons and best practices from successful counterterrorism efforts in other regions, which can be adapted and applied to address similar challenges elsewhere.

In 2019, the State of Nevada established the One Nevada Agreement on allocating the opioid recovery framework. In 2021, legislation was passed to create funding to help mitigate the opioid epidemic.[196]

RECENT DEVELOPMENT TRENDS

Overall, Washoe County has not seen a significant increase in criminal acts and terrorism. World events have led to increased protests. So far, these have been peaceful. There appear to be no significant development changes that have impacted the overall vulnerability of the planning area to this hazard.

Future development in Washoe County may be vulnerable to criminal acts and terrorism, particularly places of employment, government buildings, and public gathering places. Some types of development may be associated with an increased need for response training.

Infectious Disease

LOCATION

Infectious diseases spread by humans, and vector-borne infectious diseases can occur in both urban and non-urban areas throughout the County. Areas in the county that are more susceptible to infectious diseases are typically those with higher population density, such as Reno and Sparks, and areas with poor sanitation and limited access to healthcare services. On the other hand, areas more susceptible to vector-borne diseases are often those with standing water or extensive vegetation, providing suitable habitats for disease-carrying vectors, such as mosquitoes and ticks. These are more prevalent in non-urban areas.

[196] *Opioid Epidemic*. (n.d.). Ag.nv.gov. https://ag.nv.gov/Hot_Topics/Opioid_Epidemic/

PREVIOUS OCCURRENCES/HISTORY

Selected occurrences of infectious diseases as human health hazards in Washoe County from 2015 to 2024 are discussed in the following sections.

- **2024 —Shigellosis** is an infectious disease caused by bacteria of the genus Shigella. It primarily spreads through the fecal-oral route, often via contaminated food or water, and can lead to symptoms such as diarrhea (which may be bloody), fever, and stomach cramps. Shigellosis is highly contagious, and good hygiene practices, such as handwashing, are essential for prevention. In 2024, 27 cases of Shigellosis were reported in Washoe County.[197]
- **2020, COVID-19:** COVID-19, or coronavirus disease 2019, is caused by the SARS-Co-V-2 virus. It is considered a respiratory illness, but it can affect areas of the body besides the respiratory system. Respiratory symptoms range from mild to severe. COVID-19 was declared a public health emergency of international concern (PHEIC) on January 30, 2020, and a global pandemic by the World Health Organization on March 11, 2020. The United States declared COVID-19 a national emergency from March 13, 2020, to May 11, 2023. The state of Nevada declared COVID-19 a public health emergency on March 12, 2020. Additional guidance and recommendations on gatherings and closure were issued in the weeks following and are detailed in the COVID-19 timeline of the Nevada Department of Health and Human Services Division of Public and Behavioral Health.
- **2018, Measles:** One lab-confirmed case of measles was reported in the County in 2018. The WCHD activated its Incident Command System and proactively treated, quarantined, isolated, or monitored people who had had contact with the infected person.[198]
- **2018, *Escherichia coli (E. coli):*** The WCHD identified six cases of infected people with a superbug called *Klebsiella pneumoniae carbapenemase* (KPC)-producing *E. coli* in a state-licensed group home. The WCHD's response to this outbreak contributed to the CDC re-evaluating its recommendations for preventing the spread of similar bacteria in group home settings.
- **2017, Zika:** The WCHD coordinated Zika testing for 53 individuals.
- **2017, Carbapenemase-producing organisms (CPO):** The WCHD investigated six cases of CPO. CPO are bacteria, such as *Klebsiella, E. coli, Acinetobacter*, and *Pseudomonas*, found in normal human intestines that have acquired genes that make them resistant to broad-spectrum antibiotics. CPO can spread outside the intestines and cause serious conditions , such as urinary tract infections, bloodstream or wound infections, and pneumonia, which

[197] Northern Nevada Public Health, "Vol 44 No 35 12-24-2024 Epi News Shigellosis Outbreak." https://www.nnph.org/files/ephp/epi-news/2024/Vol%2044%20No%2035%2012-24-2024%20Epi%20News_Shigellosis%20Outbreak.pdf

[198] Northern Nevada Public Health, "Vol 39 No 05 03-06-2019 Q4 2019 and 2018 State.pdf." https://www.nnph.org/files/ephp/epi-news/2019/Vol%2039%20No%2005%2003-06-2019%20Q4%202018%20and%202018%20Stats.pdf

are difficult to treat because of the antibiotic resistance developed by the bacteria.[199] In 2017, one resident of the County died from an infection of *New Delhi Metalo-Beta-Lactamase-Producing Klebsiella pneumoniae* that was resistant to all antibiotics available for treatment.

- **2015–2016, Ebola:** While no Ebola cases have been confirmed in Washoe County, WCHD and partner agencies have increased infectious disease preparedness efforts in response to the international Ebola outbreak. In 2015, the WCHD monitored individuals returning from countries with Ebola outbreaks, provided training and exercises for hospitals and healthcare providers, and developed a website for point of dispensing training. The WCHD provides personal protective equipment for first responders during Ebola and other highly infectious disease responses. The WCHD, regional hospitals, and the Regional Emergency Medical Services Authority (REMSA) in Reno designed a full-scale Ebola exercise that tested responses to both a walk-in Emergency Room patient and a patient identified at a satellite medical facility.
- **2015, Norovirus:** In 2015, the WCHD investigated a large outbreak of Norovirus affecting public and private schools and daycare facilities. Over 2,000 cases were identified during this outbreak.
- **2015, E. coli:** An outbreak of 28 cases of *E. coli* resulted in hospitalization of 13 people. Five individuals developed a serious complication known as Hemolytic Uremic.

Table 190: Reportable Cases of Selected Communicable Diseases by Year, Washoe County, 2018-2022[200]

Type	2018	2019	2020	2021	2022
Campylobacteriosis	46	48	28	92	61
Chlamydia	2729	2682	2526	2451	2448
Coccidioidomycosis	8	8	15	9	8
COVID			36,324	37,552	52,767
Cryptosporidium	18	18	5	5	12
Escherichia coli/ Shiga toxin-producing Escherichia coli (EHEC/STEC)	12	4	5	7	8
Giardiasis	20	10	20	17	15

[199] British Columbia Centre for Disease Control, "CPO Bacteria in BC_Factsheet_Feb7_2014.docx." http://www.bccdc.ca/resource-gallery/Documents/Statistics%20and%20Research/Statistics%20and%20Reports/Epid/Other/CPOBacteriainBC_factsheet_feb7_2014.pdf

[200] Northern Nevada Public Health, 2024, "Total Reportable Cases of Selected Communicable Diseases by Year, Washoe County, 2018–2022." CD_Annual_2022_Updated.pdf

Type	2018	2019	2020	2021	2022
Gonorrhea	918	864	1131	1054	824
Group A Strep, Invasive	5	2	10	5	5
Hepatitis B (Chronic)	62	65	60	48	56
Hepatitis C (past or present)	648	680	476	332	466
Human Immunodeficiency Virus (HIV)	27	37	31	24	27
Hospitalized with Influenza	542	266	11	148	348
Lyme	4	1	1	5	5
Pertussis	13	27	13	5	10
Invasive Pneumococcal Disease	70	100	67	53	79
Rotavirus	12	9	7	1	9
RSV	480	720	622	959	2141
Salmonellosis	36	30	25	31	20
Stage 3 HIV Infection (AIDS)	14	12	11	14	16
Syphilis (primary and secondary)	111	160	133	159	153
Tuberculosis	9	8	4	7	6

EXTENT

The overall magnitude and potential severity of infectious disease outbreak impacts are considered Medium in Washoe County. Typical disease outbreaks are handled at the city or county level. Severe outbreaks may disrupt services for weeks, and economic impacts may be felt at the county level.

The Northern Nevada Public Health 2022 Annual Communicable Disease Summary reports that communicable diseases are a continuing threat to everyone, regardless of age, gender, lifestyle, ethnic background, or socioeconomic status. They cause illness, suffering, and death and place an enormous financial burden on society. Currently, over 90 diseases or conditions are reportable in Nevada. In 2022, over 60,000 cases were reported to Northern Nevada Public Health.

PROBABILITY OF FUTURE OCCURRENCES

Climate change can have significant impacts on the spread of infectious diseases. As temperatures and precipitation patterns shift, the geographic range of disease-carrying vectors, such as mosquitoes and ticks, can expand, bringing diseases like malaria, dengue fever, and Lyme disease into new areas. Warmer temperatures can also speed up the reproduction and development of these vectors, allowing them to spread diseases more quickly. In addition,

changes in precipitation can create new breeding grounds for disease-carrying organisms. Overall, climate change can create more favorable conditions for the transmission and spread of infectious diseases, posing a threat to global public health.

Cases of infectious disease occur annually in Washoe County, and the probability of future events is estimated as Medium. Based on potentially changing climate patterns, an increase in the likelihood of emerging infectious diseases may impact Washoe County.

VULNERABILITY

Infectious diseases have been known to spread quickly through communities. Many spread through close contact, meaning that highly populated areas like Reno and Sparks are more prone to widespread outbreaks. Public gathering places where people may be together in close quarters, such as schools and childcare facilities, offices, and transportation terminals, provide more opportunities for diseases to pass from one person to another.

Land use changes can have a major impact on infectious disease numbers. This is done by changing the rate of contact between individuals and disease hosts, whether animal, insect, or fungal. Along with this change in contact rate, land use changes can also alter the composition of local species, potentially allowing vector species to become the dominant species.

Outbreaks of infectious diseases most often affect pockets of vulnerable populations. However, a worst-case scenario could overwhelm local hospitals and medical facilities and require a surge response.

VULNERABLE POPULATIONS

On the Pyramid Lake Paiute Reservation in Nevada, several populations are particularly vulnerable to infectious diseases. The elderly are at high risk due to weakened immune systems and chronic health issues. Young children, especially those under five, are also susceptible because their immune systems are still developing.

Low-income families face barriers to healthcare, nutrition, and hygiene, increasing their vulnerability. Individuals with chronic illnesses, such as diabetes and respiratory conditions, have compromised health that can lead to a higher risk of infections. Furthermore, homeless individuals lack stable access to healthcare and hygiene facilities.

Residents in remote areas may struggle to obtain medical care and health information, while those dealing with substance abuse often have impaired health and limited access to services.

ESTIMATED IMPACT AND POTENTIAL LOSSES

Vaccine hesitancy has been a public health issue for many years, and it increased during the COVID-19 pandemic. Many infectious diseases are entirely vaccine preventable (e.g., Hepatitis A) or have reduced transmission, extent, and severity (e.g., influenza, COVID-19). Vaccines are a

powerful public health tool to prevent and mitigate diseases and reduce the potential for outbreaks. Increases in vaccine hesitancy are of concern, as herd immunity is necessary to help reduce the likelihood of outbreaks.

Population growth could increase the risk of infectious disease outbreaks and their impact on hazard mitigation for Nevada. The estimated population of Washoe County in 2024 was 499,064, with a growth rate of 0.21% in the past year, according to the most recent United States census data. Washoe County is the second largest county in Nevada. The 2010 population was 421,969, and it has grown 18.27% since that time. An increase in the population can impact infectious disease risk. For example, areas with higher population densities saw earlier outbreaks of COVID-19. Population density has been identified as a risk factor for the spread of infectious diseases, particularly those that spread from person to person and through food and water. Furthermore, vector-borne illnesses can also increase or change patterns with increasing population density.

Various populations are vulnerable to communicable diseases, and understanding these groups is crucial for effective public health interventions. One vulnerable population consists of infants and young children whose immune systems are still developing, making them more susceptible to infection. Their proximity to daycare centers and schools increases the risk of disease transmission.

Another vulnerable group is the elderly, particularly those with preexisting health conditions or weakened immune systems. Age-related declines in immune function can make them more susceptible to infectious diseases and increase the severity of the illness. Long-term care facilities and nursing homes often house a significant proportion of elderly individuals, further amplifying the risk of disease outbreaks.

Individuals with compromised immune systems (such as those with HIV/AIDS), cancer, organ transplants, or autoimmune diseases are highly vulnerable. These conditions weaken their ability to fight infections, leaving them more susceptible to communicable diseases. Strict infection control measures and targeted prevention strategies are essential for protecting this group.

Homeless populations also face increased vulnerability to communicable diseases due to factors such as crowded living conditions, limited access to healthcare, poor nutrition, and higher rates of substance abuse. These circumstances can contribute to the spread of infections like tuberculosis, hepatitis, and respiratory illnesses in homeless communities.

Lastly, marginalized and socioeconomically disadvantaged populations may be at higher risk. Factors, such as limited access to healthcare, overcrowded living conditions, inadequate sanitation, and lack of education can contribute to increased vulnerability to communicable diseases.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 191 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 191: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 192 provides the Calculated Priority Risk Index (CPRI) for infectious disease impacts in Pyramid Lake Paiute Tribe (PLPT) based on the current plan's hazard risk assessment results. The PLPT assigned infectious disease a risk factor value of 2, reflecting long duration, medium frequency, and medium onset impacts. This risk factor value falls in the range of 2.0 to 2.4, which is considered a medium-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 192: Calculated Priority Risk Index for Infectious Disease in Pyramid Lake Paiute Reservation

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Infectious Disease	1.6	1.6	2.4	3.2	2.4	2	Medium

RECENT DEVELOPMENT TRENDS

Infectious, communicable, and vector-borne diseases can significantly impact development trends in various ways. They can strain healthcare systems, lead to workforce absenteeism, and cause economic disruptions. In addition, investment in infrastructure and public services may be diverted to disease control efforts, affecting overall development. Furthermore, the fear of contracting these diseases can affect consumer behavior, tourism, and foreign investment, influencing economic growth and development. The burden of infectious diseases can hamper

development's social, economic, and environmental aspects, and emerging infectious diseases can pose vulnerabilities to economic and land use trends in several ways.

- **Economic:** These diseases can increase healthcare expenditures and reduce productivity due to illness or workforce absenteeism. This can strain healthcare systems and have direct economic impacts on businesses and industries.
- **Land Use:** Emerging infectious diseases can also influence land use patterns. For instance, areas affected by outbreaks may experience changes in land development plans, shifting the focus toward healthcare infrastructure and away from other projects. Moreover, the occurrence of infectious diseases can lead to changes in travel patterns, affecting tourism and trade, which can further impact land use and economic trends.
- **Future Land Use:** Infectious diseases can affect future land use by impacting population distribution and density. An increased population can lead to more urbanization, which may lead to converting agricultural land into residential and commercial uses. In addition, the spread of infectious diseases can lead to changes in land use patterns, such as the creation of quarantine zones or restricted areas to control the spread of the diseases. This can impact land use for agriculture, housing, and other purposes.

Radiological Waste Transport

LOCATION

Radiological waste could be transported along rail systems, major airports, and highway corridors in Washoe County. The zones of potential impact extend beyond these transportation facilities. The sizes and shapes of those zones are affected by the material released and atmospheric and environmental effects, such as wind speed and water flow.

Figure 80 shows the locations of nuclear facilities in the United States. It is important to note the presence of Yucca Mountain in Nevada, located southeast of Washoe County, and the Lawrence Livermore National Laboratory near San Francisco. Both locations require large amounts of waste to be transported through the state, and this is expected to continue.



Figure 80: Nuclear Power Reactors in the United States[201]

PREVIOUS OCCURRENCES/HISTORY

As of now, only one radiological incident has been reported in Washoe County, while six incidents have been reported throughout Nevada. Table 193 lists these incidents.

Table 193: Radiological Incidents, 2013–2020[202]

Date	City	Entry Code#	Description
04/30/2014	Reno	2012213	An IR192 source was rerouted to a hospital in Nevada. The source was then delivered to the Radiation Safety Officer at the correct address. Once delivered, it was estimated that a dose of 2 mrem was received for 10 minutes of contact.
09/26/2019	Stateline	2019124	A moisture density gauge was stolen from the open bed of a truck. The gauge was locked to the bed, and several valuables were stolen from the cabin. An investigation is underway, and corrective actions will be determined.
11/12/2013	Las Vegas	2013075	A portable gauge fell off the back of a truck because it was unsecured. An anonymous man returned the

[201] United States Nuclear Regulatory Commission, "Operating Nuclear Power Reactors (By Location or Name)." https://www.nrc.gov/info-finder/reactors/index.html
[202] CNS Global Incidents and Trafficking Database, "Nuclear Trafficking 2020." https://www.nti.org/analysis/articles/2019-archive-of-the-cns-global-incidents-and-trafficking-database/

Date	City	Entry Code#	Description
			device, which appeared to be in normal working condition.
08/11/2016	Las Vegas	2016665	Desert Soils Geotechnical reported that two gauges containing AM241 and CS137 were stolen from a storage location. The Radiation Safety Officer had taken the gauges out of storage for routine maintenance. The gauges were in a lab unattended for three hours.
09/14/2018	Las Vegas	2018158	An employee of Aztech Inspection & Testing, LLC, RM secured a moisture density gauge to the steering wheel of his car at home.
11/07/2017	Las Vegas	2017165	The University of Nevada lost 1.4 grams of 90% enriched U235. The source was left beside a trash can under a professor's desk who intended to use it for research. The professor forgot about the source and believed the custodial staff accidentally threw it away.

EXTENT

The potential magnitude and severity of impacts from a radiological waste transport incident in Washoe County are categorized as Very High. Incidents involving the release of radioactive materials can necessitate federal support for response efforts, impact critical facilities, cause weeks-long service disruptions, and have widespread economic repercussions across the nation.

PROBABILITY OF FUTURE OCCURRENCES

Medical, construction, and traditional radiological materials, including waste, are commonly transported on major transportation routes through Washoe County. As traffic on these routes increases, the potential for radiological waste transport incidents increases. However, given the safety measures to prevent these incidents and that no incidents have been reported in Washoe County, the probability of future events is estimated to be Very Low.

Climate change can significantly impact the transportation of radiological waste. As extreme weather events become more frequent and intense, the risks associated with transporting radiological materials also increase. For example, extreme weather events, such as heavy storms, flooding, and hurricanes, can disrupt transportation routes and infrastructure, potentially leading to accidents or incidents involving radiological waste.

Furthermore, rising global temperatures can affect the stability and safety of transportation routes, increasing the likelihood of road and infrastructure damage. This, in turn, can pose

significant challenges to the safe transport of radiological waste and increase the risk of incidents such as spills or releases of radioactive materials.

VULNERABILITY

The MPT determined that hazards from the transport of radiological waste have a very low probability of occurring. However, the vulnerability of the public, continuity of operations, and infrastructure to radiological waste transport are assessed below. A radiological incident on a transportation corridor could cause a fire or explosion, dispersing radiological particles that contaminate people and property. Depending on several factors, communities near the event would be the most vulnerable. Moreover, if radioactive materials are not effectively contained, they can spread through the air, soil, and/or water. The materials pose a substantial risk to first responders and other emergency personnel in the immediate aftermath of a radiological incident on a roadway. Due to the infrequent occurrence of these accidents, emergency personnel may not be sufficiently trained in appropriate response protocols. Radiological materials incidents on transportation corridors require extensive administrative and operational support from impacted jurisdictions. Remote communities may not have the capacity to direct a response to a radiological incident.

Radiological materials would impact jurisdictions' continuity of operations, particularly if a major transportation corridor were affected. Radiological incidents could require the mobilization of resources to evacuate and/or shelter in place. Remote communities with few resources may be limited in their ability to mobilize these resources, and larger communities would have to expend more resources to protect population centers from the impacts of a radiological incident. Infrastructure and facilities near the radiological incident could be temporarily or permanently contaminated or physically impacted by a radiological incident.

ESTIMATED IMPACT AND POTENTIAL LOSSES

The potential impacts of radiological waste on the Pyramid Lake Paiute Reservation can be significant, affecting both the environment and the health of the local community. Firstly, contamination of soil and water resources poses a major risk. Radiological waste can leach into groundwater and surface water sources, potentially harming aquatic ecosystems and making water unsafe for consumption and traditional practices. The Pyramid Lake, an essential resource for fishing and cultural activities for the Paiute people, could experience ecological disruption, leading to declines in fish populations and loss of biodiversity.

In addition to environmental impacts, there are also serious health concerns associated with radiological exposure. Community members may face increased risks of cancer and other health issues due to contamination, particularly if they rely on local resources for food and water. These health implications can have long-term consequences for the well-being of the reservation's residents.

Economically, the presence of radiological waste could also lead to significant losses. Tourism, which may depend on the natural beauty and recreational opportunities at Pyramid Lake, could be negatively impacted if concerns about safety and contamination arise. Additionally, the costs associated with cleanup and monitoring efforts can place a financial burden on the tribe and potentially divert funds from other crucial community needs.

The overall potential losses to the Pyramid Lake Paiute Reservation from radiological waste can thus encapsulate environmental degradation, health risks, and economic setbacks, threatening the community's way of life and traditional practices. Addressing these concerns requires collaborative efforts to ensure the safety and sustainability of the reservation's resources.

VULNERABLE POPULATIONS

The Pyramid Lake Paiute Reservation is home to several populations that may be vulnerable to the effects of radiological waste. First and foremost, the tribal members residing in closer proximity to areas designated for waste disposal or potential contamination are at higher risk. These individuals often rely on traditional diets, which include fish and other wildlife from the lake and surrounding areas. Exposure to radiological contaminants through these food sources can pose significant health risks.

Additionally, children and the elderly within the community are particularly susceptible to the harmful effects of radiation. Due to their developing and sensitive systems, children can experience more severe consequences from exposure. Similarly, older adults may have pre-existing health conditions that could be exacerbated by exposure to radiological materials.

Moreover, individuals with underlying health issues, such as respiratory or cardiovascular diseases, may also be more vulnerable to the impacts of radiation exposure. Access to medical care and education regarding the risks associated with radiological waste can be limited, compounding the challenges faced by these populations.

Finally, individuals who participate in cultural practices, such as gathering medicinal plants and hunting, may unknowingly expose themselves to radiological hazards. The intertwining of health, culture, and environmental stewardship underscores the need for protection and advocacy among vulnerable populations on the Pyramid Lake Paiute Reservation.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 194 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a

framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 194: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 195 provides the Calculated Priority Risk Index (CPRI) for radiological waste transport impacts in Pyramid Lake Paiute Tribe (PLPT) based on the current plan's hazard risk assessment results. The PLPT assigned radiological waste transport a risk factor value of 1.92, reflecting long duration and medium onset impacts. This risk factor value falls in the range of 0 to 1.9, which is considered a low-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 195: Calculated Priority Risk Index for Radiological Waste Transport in Pyramid Lake Paiute Reservation

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Radiological Waste Transport	2.4	1.6	2.4	3.2	0.8	1.92	Low

EXISTING MITIGATION CASE STUDY

The Operations Command Center (OCC) and Emergency Operations Center (EOC) of the Nevada National Security Site (NNSS) have dedicated time and resources to establishing essential planning partnerships with stakeholder organizations at the local, state, and national levels. By following FEMA's updated National Response Framework for collaboration between government and private sector organizations, this guidance allows emergency management officials to create integrated planning strategies and common operating objectives.[203]

RECENT DEVELOPMENT TRENDS

Despite the population growth in Washoe County, the risk of incidents during the transport of radiological waste is small. However, climate change could lead to changes in transportation

[203] Nevada National Security Sites, 2024, NNSS readiness featured at 2024 Nevada Emergency Preparedness Association summit – Nevada National Security Site

routes and infrastructure development, which could impact the transportation of radiological waste. Since the last plan, vulnerability has remained unchanged.

Transportation Incident (Aircraft Crash)

LOCATION

Washoe County has four publicly operated airports: the Reno–Tahoe International Airport (RNO), the Reno-Stead Airport (RTS), the Spanish Springs Airport (N86) in Reno, and the Empire Airport (1A8) in Empire. Several privately operated airports in the County serve commercial, non-commercial, private commuter, and recreational aircraft. The greatest volume of commercial aircraft service passes through Reno–Tahoe International Airport. Federal agencies, such as the Bureau of Land Management, also operate and lease airports in Nevada.

PREVIOUS OCCURRENCES/HISTORY

Most aircraft crashes in Washoe County are associated with small aircraft. Recent crashes that have impacted local communities are as follows:

- **September 17, 2023:** A T-6G and an AT-6B collided in the traffic pattern at the Reno Air Races, killing both pilots.
- **May 1, 2018**: An American Air Racing Thunder Mustang crash landed at Reno after the pilot declared Mayday and landed beyond the midpoint of the 9,000-ft runway at a higher rate of speed than usual. The plane overran the runway, entered a gravel area, and overturned.
- **August 30, 2016:** A single-engine Beechcraft A36 crashed into the River's Edge RV Park in Sparks. The pilot and one passenger were killed. The plane did not hit any RVs. However, a fire from the crash spread to surrounding RVs and vehicles. Residents were evacuated but could return home once the conditions were safe.
- **September 16, 2011**: The Galloping Ghost, a highly modified North American P-51D Mustang racing aircraft, crashed into spectators while competing at the Reno Air Races, killing the pilot and 10 people on the ground. An additional 69 people on the ground were injured. This was the third-deadliest airshow disaster in U.S. history, following accidents in 1972 in Sacramento, California, and 1951 in Flagler, Colorado.
- **January 21, 1985:** Galaxy Airlines Flight 203. Shortly after takeoff from Reno–Cannon International Airport (now Reno–Tahoe International Airport), the Lockheed L-188 Electra four-engine turboprop crashed about 1.5 miles from the end of the runway. It burst into flames, killing all but one of the 71 passengers on board. Figure 81 shows the memorial of this incident.

Figure 82 and Figure 83 present the Nevada statistical aviation accident and injury data from 2014 to 2024. The National Transportation Safety Board aggregates, updates, and publishes these data monthly.



Figure 81: Memorial for Galaxy Airlines Flight 203 Victims, Located at San Rafael Regional Park in Reno[204]

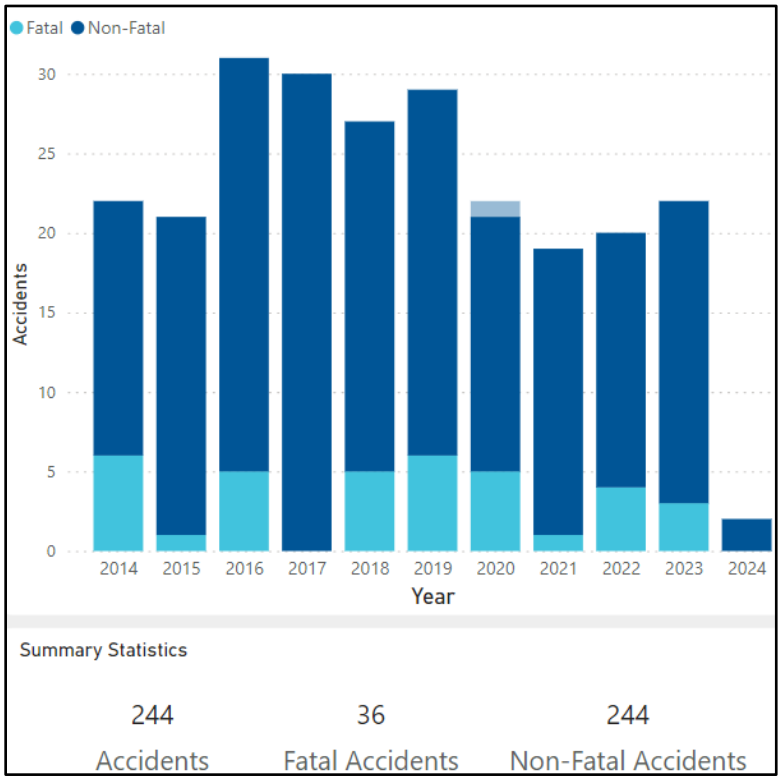


Figure 82: Aviation Accidents by Calendar Year in Nevada, 2014-2024[205]

[204] 2018 Enhanced SHMP, Reno Gazette Journal, Clifton 2015 "The memorial monument for the Galaxy Airlines Flight 203 victims, located at Rancho San Rafael Regional Park in Reno."
[205] National Transportation Safety Board, "Monthly Aviation Dashboard-Aviation Accidents by Calendar Year-Nevada." Monthly Aviation Dashboard (ntsb.gov)

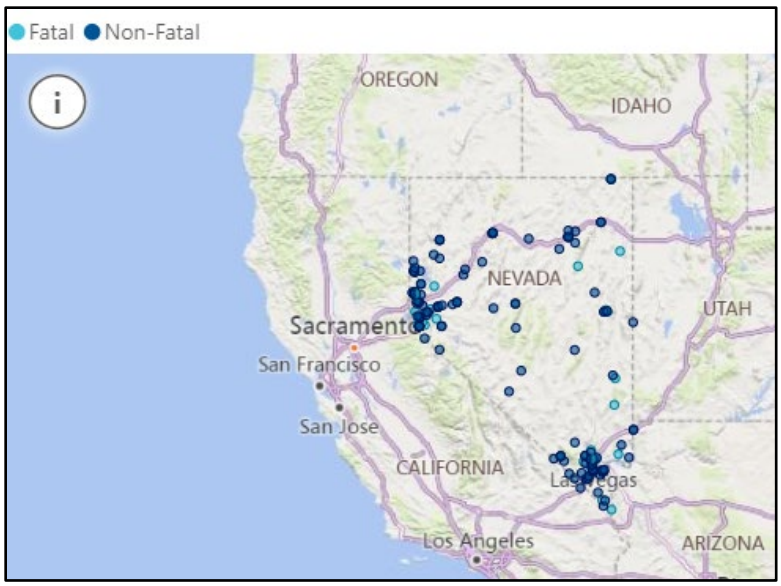


Figure 83: Locations of Aviation Accidents in Nevada, 2014–2024

EXTENT

It is difficult to estimate the extent or probability that aircraft accidents will occur. This type of incident is most likely to occur during takeoff or landing. Aircraft crashes often cause injuries or death to people in the aircraft and on the ground. Crashes can also damage or destroy structures or cause secondary hazards, such as fires or the release of hazardous materials. Aircraft crashes are typically handled at the local level and can disrupt transportation and business services nearby. The magnitude and potential severity of the impact of an aircraft crash is considered Medium in Washoe County. Such events are not likely to have significant regional impacts.

PROBABILITY OF FUTURE OCCURRENCES

Statistics on airplane crashes include the following:[206]

- The chance of a large commercial airplane carrier crashing is 0.000001%.
- The odds of being involved in a commercial airplane accident are 1 in 260,256.
- The odds of you dying in a plane crash are 1 in 816,545,929.
- On-demand air taxis (e.g., private jets) had a total of 225 accidents, of which 47 resulted in at least 1 fatality.
- Between 2015 and 2019, general aviation (e.g., recreational pilots) averaged 0.88 fatalities per 100,000 flight hours. On-demand air taxis averaged just 0.23, and commuter airplanes

[206] Flyfright.com [2023] The Real Odds of Experiencing a Plane Crash (flyfright.com)

averaged 0.21. On-demand air taxis (e.g., private jets) had a total of 225 accidents, of which 47 resulted in at least 1 fatality.

- Between 2015 and 2019, general aviation (e.g., recreational pilots) averaged 0.88 fatalities per 100,000 flight hours. On-demand air taxis averaged just 0.23, and commuter airplanes averaged 0.21.

Future weather conditions are not directly related to aircraft crashes. However, increased development and urbanization can increase the number of people on the ground who may be affected by an aircraft crash. The probability of an aircraft crash with severe consequences on the ground is considered Medium. Climate change will likely impact the occurrence, extent, or probability of aircraft crashes in Washoe County.

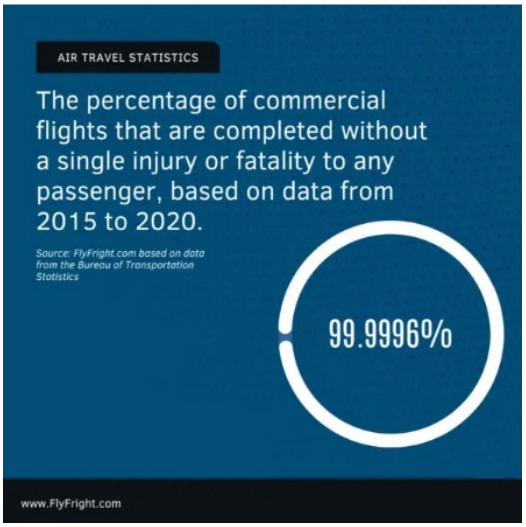


Figure 84: Air Travel Statistics, 2015–2020

VULNERABILITY

Public airports that have accepted federal assistance, including the Reno–Tahoe International Airport, must designate runway protection zones (RPZs) at each end of their runways to protect people and property on the ground if an aircraft lands or crashes beyond the runway. Reno–Tahoe International Airport owns most of the land in its RPZs in Reno (Reno–Tahoe Airport Authority 2018a). Mixed commercial, residential, and commercial–industrial development in the RPZs is where aircraft crashes are more likely to occur.

Reno–Stead Airport has designated airport-critical areas at the ends of its runways. These trapezoidal areas help ensure that land use is compatible with airport operations to reduce risks to people and property on the ground. The airport-critical areas at either end of Runway 8/26 or the south end of Runway 14/32 extend beyond airport property (Reno–Tahoe Airport Authority 2013). Residential areas in the County and industrial and recreational areas in Reno near the airport are critical areas where aircraft crashes are more likely to occur.

ESTIMATED IMPACT AND POTENTIAL LOSSES

The estimated impacts and potential losses to the Pyramid Lake Paiute Reservation due to aircraft transportation incidents can be significant, affecting various aspects of the community, environment, and economy. One of the primary concerns is the risk of safety hazards posed by low-flying aircraft or accidents that could occur in or near the reservation. Such incidents might lead to injuries or fatalities among community members, which would not only be a tragic loss but could also result in psychological trauma that affects the wider community.

In addition to human costs, environmental impacts are a critical concern. Aircraft transportation incidents can lead to fuel spills, debris, and pollution, adversely affecting the natural resources that the reservation relies on for subsistence and cultural practices. These impacts can undermine the health of local ecosystems, disrupt wildlife habitats, and contaminate water sources, which are vital for both the community's well-being and its cultural traditions.

Economically, the reservation might face potential losses from decreased tourism and outdoor activities. Aircraft incidents could create negative perceptions of the area, deterring visitors and impacting local businesses that rely on tourism revenue. Furthermore, the costs associated with emergency response and recovery efforts could strain the reservation's financial resources, diverting funds from essential community services and projects.

Overall, the implications of aircraft transportation incidents for the Pyramid Lake Paiute Reservation encompass a complex interplay of safety, environmental health, and economic stability, warranting a thorough assessment and proactive measures to mitigate risks.

VULNERABLE POPULATIONS

Aircraft crashes, particularly those that involve small aircraft, may happen farther away from the runway near flight tracks. Buildings and above-ground infrastructure may be damaged or destroyed by an aircraft crash. Crashes are likely to cause injury or death to the pilot and passengers on a plane and can cause injuries and fatalities on the ground. Aircraft crashes are localized events that local governments can handle.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 196 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 196: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 197 provides the Calculated Priority Risk Index (CPRI) for transportation incident impacts in Pyramid Lake Paiute Tribe (PLPT) based on the current plan's hazard risk assessment results. The PLPT assigned transportation incident a risk factor value of 2.08, reflecting medium probability, medium frequency, and medium duration impacts. This risk factor value falls in the range of 2.0 to 2.4, which is considered a medium-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 197: Calculated Priority Risk Index for Transportation Incident in Pyramid Lake Paiute Reservation

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Transportation Incident	2.4	1.6	1.6	2.4	2.4	2.08	Medium

RECENT DEVELOPMENT TRENDS

- **Economic:** The Reno–Tahoe Airport Authority's FY 2024–2028 Strategic Plan calls for increasing commercial air service and cargo activities at Reno–Tahoe International Airport, which may increase the risk of aircraft crashes (Increased Vulnerability).
- **Land Use:** Runway protection zones have been mapped at Reno–Tahoe International Airport, and airport critical areas have been mapped at Reno–Stead Airport. Development is directed away from these areas (Decreased Vulnerability).

VULNERABILITY ASSESSMENT

ASSET INVENTORY

Local assets that may be affected by hazards include members of the Tribe, properties, utilities, and infrastructure. Geographic information system (GIS) data from federal, state, and local databases were used to inform the vulnerability assessment and identify critical infrastructure. . Data collection for the vulnerability assessment was complicated because the region has never comprehensively identified critical infrastructure; therefore, the list of critical infrastructure on the Pyramid Lake Reservation may be incomplete. Similarly, the region still needs to compile

valuation information, so valuation data were 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 in the next plan update.

REPETITIVE LOSS PROPERTIES

The Tribe does not participate in the National Flood Insurance Program (NFIP), so it does not maintain a repetitive loss property inventory that meets the Repetitive Loss or Severe Repetitive Loss criteria.

EXPOSURE ASSESSMENT

Table 198 shows the exposure of the Tribe's identified critical facilities to natural hazards that can be mapped.

Table 198: Exposure Assessment from the Pyramid Lake Paiute Tribe[207]

Type	Name	Address	Seismic Ground Motion Hazards		Landslide Susceptibility	Wildland Fire Hazard Potential
			with 2% Probability	with 10% Probability		
Hospital	Pyramid Health Center	N/A	48–64	32–48	Low	1
School	Trinity Valley Elementary School	N/A	64+	32–48	Moderate	1
School	Natchez Elementary School	1 NV-447, Wadsworth, NV 89442	48–64	32–48	Low	1
School	Sutcliffe School (historical)	N/A	64+	32–48	Moderate	3
School	Pyramid Lake High School	711 State St. Nixon, NV 89424	48–64	32–48	Low	1

Note: None of the identified critical facilities on the Pyramid Lake Reservation is located in a mapped flood zone.

[207] State of Nevada, "Washoe County Regional Hazard Mitigation Plan." https://dem.nv.gov/uploadedFiles/demnvgov/content/About/Washoe_Regional_HMP_2020.pdf

Land Use and Development Trends

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

The Tribe has no formal zoning or other land use regulations. New developments are reviewed to determine potential hazard risks and sited outside hazard areas when possible. Since 2017, the Tribe has invested resources to recover from major flooding in the Truckee River basin. The Tribe has also continued to look for opportunities to invest in renewable energy projects, economic development, and other community projects that will benefit all members of the Tribe, including the proposed community center.

The vulnerability subsection of each hazard profile in Section 3.3 outlines recent development trends to illustrate how vulnerability might 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 increased, decreased, or unchanged vulnerability. Table 199 provides a snapshot of how vulnerability has changed since 2020.

Table 199: Recent Development Trends at the Pyramid Lake Paiute Reservation

Type of Hazard Event	Changes in Land Use	Changes in Population	Changes in Conditions (e.g., climate change)	Overall Vulnerability
Avalanche and Landslide	No development in the area of concern	N/A	N/A	Low
Criminal Acts and Terrorism	Increase based on population increase	Increase	N/A	Moderate
Drought	N/A	N/A	Reduction in drought	Low
Earthquake	N/A	N/A	N/A	Low
Energy Emergency	No development affecting land use	N/A	N/A	Low

Type of Hazard Event	Changes in Land Use	Changes in Population	Changes in Conditions (e.g., climate change)	Overall Vulnerability
Flood	Housing development has been proposed in Wadsworth and Nixon, but it will be a few years.	Increase	N/A	Low
Hazardous Materials Incident	N/A	N/A	N/A	Low
Infectious Disease	N/A	N/A	N/A	Low
Radiological Waste Transport	N/A	N/A	N/A	Low
Extreme Weather (Winter Storm, Windstorms, Extreme Heat)	Not at this time however with new development, critical infrastructure could be affected i.e., high energy use	Increase	Higher energy use	Moderate
Transportation Incident (Aircraft Crash)	N/A	N/A	N/A	Low
Volcano	N/A	N/A	N/A	Low
Wildland Fire	Livestock, wildland urban face could affect new development	Could increase	More drought	High

Capability Assessment

FEMA	**C1.** Does the plan document [PLPT'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))

Planning and Regulatory

Planning and regulatory capabilities are the plans, policies, codes, and ordinances that prevent and reduce the impacts of hazards.

Table 200: Planning Capabilities of the Pyramid Lake Paiute Tribe

Plan	Do you have this? (Y/N)	Does the plan address hazards? (Y/N)	How can the plan be used to implement mitigation actions?	When was it last updated? When will it be updated next?
General Plan	No	N/A	N/A	N/A
Capital Improvement Plan	No	N/A	N/A	N/A
Climate Change Adaptation Plan	No	N/A	N/A	N/A
Community Wildfire Protection Plan	No	N/A	N/A	N/A
Economic Development Plan	No	N/A	N/A	N/A
Land Use Plan	No	N/A	N/A	N/A

Plan	Do you have this? (Y/N)	Does the plan address hazards? (Y/N)	How can the plan be used to implement mitigation actions?	When was it last updated? When will it be updated next?
Local Emergency Operations Plan	No	N/A	N/A	N/A
Stormwater Management Plan	No	N/A	N/A	N/A
Transportation Plan	No	N/A	N/A	N/A
Substantial Damage Plan	No	N/A	N/A	N/A
Other	Washoe County has a Damage Assessment Plan that serves the same intent and covers all jurisdictions	N/A	N/A	N/A
Other? (Describe)	No plans besides the hazard mitigation plan.	N/A	N/A	N/A

Table 201: Regulations and Ordinances of the Pyramid Lake Paiute Tribe

Plans	Does this regulation/ordinance effectively reduce hazard impacts?	Is it adequately administered and enforced?	When was it last updated? When will it be updated next?
Building Code	N/A	N/A	N/A
Flood Insurance Rate Maps	N/A	N/A	N/A
Floodplain Ordinance	N/A	N/A	N/A
Subdivision Ordinance	N/A	N/A	N/A
Zoning Ordinance	N/A	N/A	N/A
Natural Hazard Specific Ordinance (Stormwater, Steep Slope, Wildfire)	N/A	N/A	N/A
Acquisition of Land for Open Space and Public Recreation Use	N/A	N/A	N/A
Prohibition of Building in At-Risk Areas	N/A	N/A	N/A
Other? (Describe)	The tribe does not enforce any ordinances.	N/A	N/A

Administrative and Technical

Administrative and technical capabilities include staff and their skills. They also include tools that can help you carry out mitigation actions.

Table 202: Administrative Capabilities of the Pyramid Lake Paiute Tribe

Administrative Capability	Do you have this? (Y/N)	Is staffing adequate?	Is staff trained on hazards and mitigation?	Is coordination between agencies and staff effective?
Chief Building Official	No	N/A	N/A	N/A
Civil Engineer	Sometimes – hired in as needed	No	N/A	N/A
Community Planner	No	N/A	N/A	N/A
Emergency Manager	Yes	Yes	Yes	Yes
Floodplain Administrator	No	N/A	N/A	N/A
Geographic Information System (GIS) Coordinator	No	N/A	N/A	N/A
Planning Commission	Trying to set this up through the housing authority	N/A	N/A	N/A
Fire Safe Council	No	N/A	N/A	N/A

Administrative Capability	Do you have this? (Y/N)	Is staffing adequate?	Is staff trained on hazards and mitigation?	Is coordination between agencies and staff effective?
CERT (Community Emergency Response Team)	No	N/A	N/A	N/A
Active VOAD (Voluntary Agencies Active in Disasters)	No	N/A	N/A	N/A
Other? (Please describe.)	No	N/A	N/A	N/A

Table 203: Technical Capabilities of the Pyramid Lake Paiute Tribe

Technical Capability	Do you have this? (Y/N)	How has the capability been used to assess/mitigate risk in the past? (Answer or N/A)	How can the capability be used to assess/mitigate risk in the future?
Mitigation Grant Writing	Yes – does pursue mitigation grants when possible	N/A	Pursue more grants to reduce risks
Hazard Data and Information	No	N/A	N/A
GIS	Yes – maps are developed through the Tribal Lands Management Office, has mapped	N/A	To mark changes in topography

Technical Capability	Do you have this? (Y/N)	How has the capability been used to assess/mitigate risk in the past? (Answer or N/A)	How can the capability be used to assess/mitigate risk in the future?
	mitigation projects before.		
Mutual Aid Agreements	Yes – with multiple counties (Lions County, Humbolt County, BLM) and part of the intrastate mutual aid agreement	Recently entered into the state compact for Fire and EMS	Ability to draw from additional resources
Other? (Please describe.)			

Financial

Financial capabilities are the resources to fund mitigation actions. Talking about funding and financial capabilities is important to determine what kinds of projects are feasible given their cost. Mitigation actions like outreach programs are lower cost and often use staff time and existing budgets. Other actions, such as earthquake retrofits, could require substantial funding from local, state, and federal partners. Partnerships, including partners willing to donate land, supplies, or an in-kind match and cash, can be included.

Table 204: Financial Capabilities of the Pyramid Lake Paiute Tribe

Funding Resource	Do you have this?	Has this funding resource been used in the past and for what types of activities?	Could this resource be used to fund future mitigation actions?	Can this be used as the local cost match for a federal grant?
Capital Improvement Project Funding	No	N/A	N/A	N/A

Funding Resource	Do you have this?	Has this funding resource been used in the past and for what types of activities?	Could this resource be used to fund future mitigation actions?	Can this be used as the local cost match for a federal grant?
General Fund	No	N/A	N/A	N/A
Hazard Mitigation Grant Program (HMGP/404)	No	N/A	N/A	N/A
Building Resilient Infrastructure & Communities (BRIC)	No	N/A	N/A	N/A
Flood Mitigation Assistance (FMA)	No	N/A	N/A	N/A
Public Assistance Mitigation (PA Mitigation/406)	No	N/A	N/A	N/A
Community Development Block Grant (CDBG)	Yes, the tribe puts in for this.	Yes, parks and recreation	Yes	Yes
Natural Resources Conservation Services (NRCS) Programs	No	N/A	N/A	N/A
U.S. Army Corps (USACE) Programs	No	N/A	N/A	N/A

Funding Resource	Do you have this?	Has this funding resource been used in the past and for what types of activities?	Could this resource be used to fund future mitigation actions?	Can this be used as the local cost match for a federal grant?
Property, Sales, Income, or Special Purpose Taxes	No	N/A	N/A	N/A
Stormwater Utility Fee	No	N/A	N/A	N/A
Fees for Water, Sewer, Gas, or Electric Services	No	N/A	N/A	N/A
Impact Fees from New Development and Redevelopment	No	N/A	N/A	N/A
General Obligation or Special Purpose Bonds	No	N/A	N/A	N/A
Federal-funded Programs (Please describe)	No	N/A	N/A	N/A
Other State-funded Programs (Please describe)	No	N/A	N/A	N/A
Private Sector or Nonprofit Programs	Yes	Yes, Public Safety from the Helen Close Foundation	Yes	No

Funding Resource	Do you have this?	Has this funding resource been used in the past and for what types of activities?	Could this resource be used to fund future mitigation actions?	Can this be used as the local cost match for a federal grant?
Other?				

Education and Outreach

Education and outreach capabilities are programs and methods that could communicate about and encourage risk reduction. These programs may be run by a participant or a community-based partner. Partners, especially those who work with underserved communities, can help identify additional education and outreach capabilities.

Table 205: Education and Outreach Capabilities of the Pyramid Lake Paiute Tribe

Education and Outreach Capability	Do you have this? (Y/N)	Does this resource currently incorporate hazard mitigation?	Notes
Community Newsletter(s)	Yes – the tribal newsletter goes out quarterly	Yes	Articles in the newsletter and social media
Hazard Awareness Campaigns (such as Firewise, Storm Ready, Severe Weather Awareness Week, School Programs)	No	N/A	N/A
Public Meetings/Events (Please Describe)	No	N/A	N/A
Emergency Management Listserv	No	N/A	N/A

Education and Outreach Capability	Do you have this? (Y/N)	Does this resource currently incorporate hazard mitigation?	Notes
Local News	No	N/A	N/A
Distributing Hard Copies of Notices (e.g., public libraries, door-to-door outreach)	No	N/A	N/A
Insurance Disclosures/Outreach	No	N/A	N/A
Organizations that Represent, Advocate for, or Interact with Underserved and Vulnerable Communities (Please Describe)	No	N/A	N/A
Social Media (Please Describe)	Yes – actively use all the social media platforms	Yes	PIO actively uses social media to inform citizens of various hazards

National Flood Insurance Program Participation

FEMA	**C2.** Does the Plan address participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3))

The National Flood Insurance Program (NFIP) is a FEMA program that provides flood insurance to millions of policyholders across the country. The plan must describe participation in the NFIP for each participant, as applicable, in accordance with NFIP regulatory requirements.

The community does not participate in the NFIP.

Table 206: Floodplain Management, Mapping, and Insurance for the Pyramid Lake Paiute Tribe

Question	Response
Why does the community not participate in the NFIP?	The tribe does not participate and does not implement floodplain ordinances.
Is the community interested in joining the NFIP?	Not at this time.

Opportunities to Expand and/or Improve Capabilities

- **Planning and Regulations:** The tribe would like to adopt building codes.

Plan Integration

FEMA	**C6.** Does the Plan describe a process by which it will incorporate the requirements of the mitigation plan into other planning mechanism, such as comprehensive or capital improvement plans, when appropriate?

An updated plan must explain how the plan participants incorporated the previous mitigation plan, when appropriate, into other planning mechanisms over the last 5 years. This demonstrates progress in local mitigation efforts. Planning mechanisms refer to the governance structures used to manage local land use development and community decision making, such as budgets, comprehensive plans, capital improvement plans, or other long-range plans, codes, and ordinances. If the plan was integrated into another planning mechanism, list them and note how hazard mitigation was integrated. This discussion could include the following:

- The integration of the hazards the community is vulnerable to;
- The data and analysis presented in the risk assessment;
- The goals of the mitigation plan; and
- Potential projects or actions to carry out in the future.

Table 207: Previous Plan Integration by the Pyramid Lake Paiute Tribe

Plan Name (or "none," if applicable)	Description
None	N/A

The plan must also identify the planning mechanisms where and how the updated hazard mitigation information/actions may be integrated.

Table 208: Future Plan Integration Opportunities for the Pyramid Lake Paiute Tribe

Plan Name	Description
The Pyramid Lake Paiute Tribe has no active planning mechanisms to integrate concepts from the RHMP. However, the Tribe will monitor for future opportunities to integrate concepts from the RHMP into new planning mechanisms such as general plans, emergency operations plans, and others.	N/A

Mitigation Strategy

FEMA	**C4.** Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure?

Mitigation Goals and Objectives

Mitigation goals are broad, policy-type statements which represent what the County and its partners seek to achieve by implementing their mitigation plan. The goals are general guidelines and provide a framework for identifying more detailed objectives and actions. In developing these goals, the MPT reviewed the goals from the 2023 SHMP and the goals and objectives from the 2020 RHMP update. Overall, the MPT thought that the goals and objectives continued to reflect its approach to hazard mitigation. There has been progress on some objectives since the last plan update, but those objectives remain important considerations which should be noted in the current plan. A few changes were identified, including clarifying the intent of Goal 1, removing Objective 1.3, and adding a new objective to Goal 4. Both long-term and short-term goals and objectives were identified. Long-term initiatives may take longer the duration of the planning cycle (five years) to completely realize, while short-term initiatives may be accomplished in the next five years.

Therefore, the County and its partners have selected the following goals and objectives for this plan update:

Goal 1: Study, maintain, upgrade, and expand transportation routes, including evacuation routes across the County, to ensure function and public awareness during emergencies. (Long-term)

- **Objective 1.1:** Study, establish, upgrade, and maintain evacuation routes. (Short-term)
- **Objective 1.2:** Plan for continuity of operations of critical transportation facilities in the county in the event of a disaster or emergency. (Short-term)

Goal 2: Maintain emergency services capabilities by providing redundancies. (Long-term)

- **Objective 2.1:** Provide redundant lifeline utilities and services to allow medical and emergency response services to continue to operate following a disaster or emergency. (Long-term)
- **Objective 2.2:** Establish evacuation centers and provide redundant lifeline utilities to serve communities at risk from all identified hazards. (Long-term)

Goal 3: Maintain key communications to ensure connectivity during and after key hazard events. (Short-term)

- **Objective 3.1:** Provide methods for notification, warning, and emergency communications. (Short-term)
- **Objective 3.2:** Establish an additional emergency operations center (EOC) to serve the RSIC community. (Long-term)
- **Objective 3.3:** Harden electrical infrastructure in moderate to high-risk areas for wildland fire. (Long-term)
- **Objective 3.4:** Establish procedures for communication between the Governor's Office on Radiological Waste and Washoe County before transport of radiological waste. (Short-term)
- **Objective 3.5:** Develop a response plan for clean-up and disposal of ash fall from a volcanic eruption. (Short-term)

Goal 4: Maintain the reliability of utilities (electricity, gas, drinking water, sewer) during and after key hazard events. (Long-term)

- **Objective 4.1:** Provide redundant or hardened utility lifelines to areas at risk of energy emergencies, loss of communications, or loss of service. (Long-term)
- **Objective 4.2:** Identify vulnerable facilities and establish procedures for clean-up and disposal of ash fall from a volcanic eruption to minimize risk to lifeline utilities. (Short-term)
- **Objective 4.3:** Protect utility infrastructure from hazards like winter storms and high winds including acquiring resources ahead of time and hardening infrastructure. (Long-term)

Goal 5: Minimize property damage and reduce repetitive losses to property from key hazards. (Long-term)

- **Objective 5.1:** Provide additional emergency services resources to reduce response times. (Short-term)
- **Objective 5.2:** Adopt current international building and fire codes. (Short-term)
- **Objective 5.3:** Develop plans and provide resources to reduce risk in moderate to high-risk areas for wildland fire. (Short-term)
- **Objective 5.4**: Update flood maps to incorporate changes in conditions and flood risk. (Short-term)

- **Objective 5.5:** Complete improvements to storm water drainage infrastructure to address areas of localized Flooding (including closed-basin flooding), or insufficient capacity. (Long-term)
- **Objective 5.6:** Standardize Emergency Action Plans for dams in the City of Sparks. (Short-term)
- **Objective 5.7:** Complete infrastructure improvements identified as part of the Truckee River Flood Management Project. (Long-term)
- **Objective 5.8:** Elevate or mitigate flood risks to homes in neighborhoods identified by the TRFMA as being at a high risk of Flooding (including closed-basin flooding). (Long-term)
- **Objective 5.9:** Identify and complete retrofits to unreinforced masonry buildings and other facilities at increased risk of damage from earthquakes. (Long-term)
- **Objective 5.10:** Implement measures to prepare first responders for active shooter incidents or acts of terrorism. (Long-term)
- **Objective 5.11:** Purchase equipment to minimize the risk of and protect emergency responders in the event of criminal acts or terrorism. (Long-term)
- **Objective 5.12:** Purchase additional equipment to perform immediate containment of hazardous materials spills. (Long-term)
- **Objective 5.13:** Address risks to properties in the runway protection zones at Reno-Tahoe International Airport and airport-critical areas at Reno-Stead Airport, and along the railway. (Long-term)
- **Objective 5.**14: Identify inundation areas for high-hazard dams in Washoe County**.**

Goal 6: Increase public participation and responsibility in reducing their risks. (Short-term)

- **Objective 6.1:** Educate members of the public on hazards that may affect their communities. (Short-term)
- **Objective 6.2:** Provide building requirements and standards to guide property owners and developers in reducing risk. (Short-term)
- **Objective 6.3:** Provide resources to involve residents in disaster preparedness, response, and recovery. (Short-term)

Review of 2020 Hazard Mitigation Actions

As part of the mitigation strategy update, all mitigation actions identified in the 2020 plan were evaluated to determine their status and whether any ongoing or incomplete actions should be included in the 2025 plan update.

Prioritizing Mitigation Actions

The identified mitigation actions were then prioritized, based on the following terms:

- **S – Social:** The public must support the overall mitigation implementation strategy and specific mitigation actions. Consider, will the action disrupt housing or cause the relocation of people? Will the proposed action adversely affect one segment of the population? Is the action compatible with present and future community/agency values?
- **T – Technical:** It is important to determine if the proposed action is technically feasible, will help reduce losses in the long term, and has minimal secondary impacts. How effective is the action in avoiding or reducing future losses? Does the action solve the problem or only a symptom? Will the action create more problems than it solves? Consider the root cause of the issue at hand to determine whether the action is a whole or partial solution, or not a solution at all.
- **A – Administrative:** This category examines the expected staffing, funding, time, and maintenance requirements for the mitigation action to determine if the jurisdiction/special district has the personnel and administrative capabilities to implement the action or whether outside help will be necessary. Consider, a) Staffing (enough staff and training): Does the jurisdiction/special district have the capability (staff, technical experts) to implement the action? b) Funding allocated: does the jurisdiction/special district have the funding to implement the action or can it readily be obtained? c) Time: can it be accomplished in a timely manner? d) Maintenance/Operations: can the jurisdiction/special district provide the necessary maintenance? It is important to remember that most federal grants will not provide funding for maintenance.
- **P – Political:** This considers the level of political support for the mitigation action. Is there political support to implement and maintain this action? Have political leaders participated in the planning process so far? Is there a local champion willing to help see the action to completion? Is there enough public support to ensure the success of the action? Have all stakeholders been offered an opportunity to participate in the planning process?
- **L – Legal:** The jurisdiction/special district must have the legal authority to implement the action or consider what new laws or regulations would be needed to carry out the mitigation action. Evaluate, are the proper laws, ordinances, and resolutions in place to implement the action? Are there any potential legal consequences? Is the action likely to be challenged by stakeholders who may be negatively affected?

- **E – Economic:** Economic considerations must include an evaluation of the present economic base and projected growth. Cost-effective mitigation actions that can be funded in current or upcoming budget cycles are more likely to be implemented than actions requiring general obligation bonds or other instruments that would incur long-term debt in a jurisdiction/special district. Consider benefits and costs at the planning level. A detailed benefit–cost analysis will be performed as project-specific funding becomes available. What financial benefits will the action provide? Does the cost seem reasonable for the size of the problem and the likely benefits? What burden will be placed on the tax base or local economy to implement this action? Does the action contribute to community economic goals, such as capital improvements or economic development? Are there currently sources of funding that can be used to implement the action?
- **E – Environmental:** The impact on the environment is an important consideration because of public desire for sustainable and environmentally healthy communities. Also, statutory considerations, such as the National Environmental Policy Act (NEPA), must be kept in mind when using federal funds. How will this action impact land/water? Impact on endangered species: How will this action impact endangered species? How will this action impact hazardous materials and waste sites? Is this action consistent with community environmental goals? Is the action consistent with federal laws, such as NEPA?

Table 209: Status of Previous Mitigation Actions by the Pyramid Lake Paiute Tribe

ID	Mitigation Action	Lead Department	Status For Plan Update
MH-9	Implement and/or use Community Emergency Response Teams and the Citizens Homeland Security Council, to shift burden from sworn officers, where appropriate (All Partners)	All Jurisdictions: • Emergency Managers • Police Departments	Carried forward
WF-1	Develop surge capabilities in the region to handle burn patients (All Partners)	Renown Health	Carried forward
WF-13	Adopt 2018 wildland fire code County-wide (All Partners)	Regional Fire Protection Districts	Complete
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)	Regional Fire Protection Districts	Complete
FL-6	Replace and up-grade culverts and natural runoffs to reduce flooding losses (PLPT)*	PLPT Environmental Tribal Public Utilities	Complete

ID	Mitigation Action	Lead Department	Status For Plan Update
		Tribal Roads Department	
FL-9	Complete drainage ditch improvements (Washoe County, City of Reno, City of Sparks, RSIC,* PLPT)	All Jurisdictions – Public Works	As of Nov 2023: Steamboat Ditch preliminary evaluation completed. Other ditches not started.
FL-14	Complete improvements to address undersized drainage ditches and systems County-wide (Washoe County, City of Reno, City of Sparks, RSIC, PLPT)	All Jurisdictions: • Public Works • Engineering	As of Nov 2023: City of Sparks – in progress
MH-9	Implement and/or use Community Emergency Response Teams and the Citizens Homeland Security Council, to shift burden from sworn officers, where appropriate. (All Partners)	All Jurisdictions: • Emergency Managers • Police Departments	Carry forward
WF-1	Develop surge capabilities in the region to handle burn patients (All Partners)	Renown Health	Carry forward
WF-13	Adopt 2018 wildland fire code County-wide (All Partners)	Regional Fire Protection Districts	Complete
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)	Regional Fire Protection Districts	Complete
FL-6	Replace and up-grade culverts and natural runoffs to reduce flooding losses (PLPT)	PLPT Environmental Tribal Public Utilities Tribal Roads Department	complete
FL-9	Complete drainage ditch improvements (Washoe County, City of Reno, City of Sparks, RSIC, PLPT)	All Jurisdictions: Public Works	As of Nov 2023: Steamboat Ditch preliminary evaluation

ID	Mitigation Action	Lead Department	Status For Plan Update
			completed. Other ditches not started.
FL-14	Complete improvements to address undersized drainage ditches and systems County-wide (Washoe County, City of Reno, City of Sparks, RSIC, PLPT)	All Jurisdictions: • Public Works • Engineering	As of Nov 2023: City of Sparks – in progress
EQ-9	Complete seismic strength evaluations of critical facilities in all jurisdictions, including schools, community colleges, public infrastructure, and other critical facilities, to identify vulnerabilities for mitigation to meet current seismic standards. Mothball or demolish life-threatening buildings, particularly unreinforced masonry buildings (Washoe County City of Sparks, RSIC, PLPT)	Washoe County, City of Sparks, RSIC, PLPT –Public Works Engineering School Districts	Carry forward
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)	All Jurisdictions: Public Works Engineering	In progress water infrastructure
EE-5	Install backup generators for critical infrastructure and facilities along with other measures to improve reliability (e.g., alarms, meters, remote controls, and switchgear upgrades) (All Partners)	All Jurisdictions: Emergency Management	Carry forward, only clinic has been completed
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 (e.g., Prohibiting open carry). (All Partners)	Law Enforcement Agencies Facility Managers	complete
DT-1	Construct new groundwater wells and water lines to provide additional water supplies. (PLPT)	PLPT Public Utilities	In progress
DT-2	Implement current TMWA* Conservation Plan including encouraging transition to less water-intensive landscaping on both public and private properties (City of Reno, City of Sparks, RSIC, PLPT)	City of Reno, City of Sparks, RSIC, PLPT: • Water Utilities	Carry forward

ID	Mitigation Action	Lead Department	Status For Plan Update
		• Planning Departments	
ID-1	Implement a range of emission-reduction strategies (e.g., policies geared toward renewable energy measures and projects, reduction in vehicle miles traveled, and increased use of transit and multimodal transportation) to reduce levels of particulate matter, ozone, and other criteria pollutants (All Partners)	WCHD Air Quality Management Division	Carry forward

* Note: PLPT = Pyramid Lake Paiute Tribe, RSIC = Reno-Sparks Indian Colony, TMWA = Truckee Meadows Water Authority, WCHD = Washoe County Health District

2025–2029 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 (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 Tribe. The implementation plan includes both short-term strategies that focus on planning and assessment activities, and long-term strategies that will cause ongoing capability or structural projects to reduce vulnerability to hazards.

THIS PAGE INTENTIONALLY LEFT BLANK

Table 210: 2025–2029 Mitigation Implementation Plan for the Pyramid Lake Paiute Tribe

#	Project Title	Hazard Addressed	Vulnerability Addressed	Responsible Agency	Partners	Existing Planning Mechanisms	Potential Funding Source	Cost Estimate	Benefit (Losses Avoided)	Project Useful Life	Timeframe	Priority
1	Backup generators for government facilities.	Windstorm, Winter storm, Wildland Fire, Energy Emergency	This could put the Tribe out of business. Very important to maintain government operations.	Pyramid Lake Fire Rescue/ EMS	N/A	N/A	FEMA Hazard Mitigation Assistance funding sources	$1M	Keep critical facilities operating	Long-term	1–2 years	High
Description: Backup generators for government facilities.												
2	Study on backup water supply	Earthquake, Volcano	Drinking water supply tank is on a fault line.	Pyramid Lake Fire Rescue/ EMS	TMWA, Indian Health Service	PED	HMA grants	$2–3M	Clean drinking water	Long-term	1–5 years	High
Description: Study and implement as possible options for backup drinking water supply.												
3	Fuel mitigation funding sources	Wildland Fire	Essentially, the entire area is at risk.	Pyramid Lake Fire Rescue/ EMS	BLM	Mutual aid agreements	Possibly private–public partnership, HMA Grants	$200K/ yr.	Preservation of life and property	Long-term	1–5 years	High
Description: Identify funding sources and implement fuel mitigation projects.												

#	Project Title	Hazard Addressed	Vulnerability Addressed	Responsible Agency	Partners	Existing Planning Mechanisms	Potential Funding Source	Cost Estimate	Benefit (Losses Avoided)	Project Useful Life	Timeframe	Priority
4	Public information on risk reduction of wildfires	Wildland Fire	Entire community	Pyramid Lake Fire Rescue/ EMS	Living with Fire/ UNR*	Public information	Tribal funding, university support, EMPG, SERC funds	$10K	Increase public safety through information	Medi-um	1–5 years	Medium
Description: Share information with the public on signs and at events on defensible space, fuels mitigation, and dragging of chains to reduce risk.												
5	Stream banks	Flood, Landslide	Low-lying areas	Pyramid Lake Fire Rescue/ EMS	Environ-mental department	Monitoring	Public Assistance Mitigation (406)	$50K	Reduced flooding	Short-term	1–5 years	Low
Description: Stabilize stream banks												
6	Enhancing irrigation ditch and headgate functionality for optimal water management	Drought	Agricultural irrigation	Pyramid Lake, Environmental Department/ Public Utilities	Environ-mental department	Updated irrigation ditches and headgates	HMA Grants	$1M	Ensure proper irrigation of agricultural fields	Long-term	1–5 years	Medium
Description: Improve irrigation ditches and headgates to ensure functionality.												
7	Enhancing awareness and education on	Extreme Heat	Public education to reduce the	Pyramid Lake Fire Rescue/ EMS	UNR	Public Information	EMPG, SERC funds	$20K	Increase public awareness of	Medi-um	1–5 years	Medium

#	Project Title	Hazard Addressed	Vulnerability Addressed	Responsible Agency	Partners	Existing Planning Mechanisms	Potential Funding Source	Cost Estimate	Benefit (Losses Avoided)	Project Useful Life	Timeframe	Priority
	extreme heat risks for vulnerable populations		loss of life and health implications						safety through information			
Description: Promote education and awareness of extreme heat risk and opportunities to reduce risk, especially with the elderly, people with medical conditions, and other vulnerable populations.												
8	Promoting awareness and access to vaccination for infectious disease prevention	Prevention of infectious diseases	Routine Vaccines,	Pyramid Lake Health Clinic	Pyramid Lake Health Clinic, CDC	Encourage public participation to reduce illness and death	EMPG, SERC funds	$30K/yr.	Healthier population	Short-term	1–5 years	High
Description: Promote awareness of infectious diseases when they are a concern and provide opportunities to be vaccinated.												
9	Enhancing safety: Ongoing education and engagement strategies for railroad and pipeline risk mitigation	Hazardous Materials Incident, Radiological Waste Transport education	To prevent Hazardous Material spills	Pyramid Lake Fire Rescue/ EMS	Paradigm liaisons pipeline	Educational training opportunities for emergency responders	National Pipeline Association Grants	$500.00 + staff time	Continuing education on pipeline and railroad radiological waste transportation safety and response	Short-term	1–5 years	Medium
Description: To reduce risk, provide continuing education and engagement with railroad and pipeline owners.												

#	Project Title	Hazard Addressed	Vulnerability Addressed	Responsible Agency	Partners	Existing Planning Mechanisms	Potential Funding Source	Cost Estimate	Benefit (Losses Avoided)	Project Useful Life	Timeframe	Priority
10	Flood insurance study	Flooding	People and infrastructure	Pyramid Lake Emergency Management, Washoe County	PLPR	Need further investigation	General Fund, USACE	$50,000	Studying areas lacking flood insurance can pinpoint vulnerable regions and guide policy decisions, enhancing community preparedness and economic resilience. It raises awareness about the need for adequate coverage and supports stronger disaster mitigation efforts.	5-10 years	1-2 Years	Medium

Description: This study aims to identify gaps in flood insurance coverage in the county by assessing accessibility, awareness, and mitigation efforts. Through data analysis and community engagement, it highlights areas lacking insurance and offers recommendations to improve community resilience against flooding.

#	Project Title	Hazard Addressed	Vulnerability Addressed	Responsible Agency	Partners	Existing Planning Mechanisms	Potential Funding Source	Cost Estimate	Benefit (Losses Avoided)	Project Useful Life	Timeframe	Priority
MH-9	CERT in CHSC to help shift the burden from law enforcement	All hazards	Assisting law enforcement in reducing vulnerabilities to hazards	Pyramid Lake Emergency Managers, Police Departments	Washoe County Sheriffs	Emergency response, trained civilians to assist LEOs	Homeland Security, State Funding if available	$700 per trainee	Reduce the burden on LEOs to assist with other priorities	Medi-um	1–3 years	Medium
Description: Implement and/or utilize Community Emergency Response Teams, as well as the Citizens' Homeland Security Council, to shift the burden from sworn officers, where appropriate. (All Partners)												
WF-1	Surge capabilities for burn patients	Wildfire	Health of citizens and first responders	Pyramid Lake Fire Department, Renown Health	Fire Department	Care and transportation of victims to facilities	Existing funds, HMA grants	$200K	Reduce loss of life by providing immediate care to victims	Medi-um	1–5 years	Medium
Description: Develop surge capabilities within the region to handle burn patients. (All Partners)												
FL-9	Drainage ditch improvements	Flooding	Community flooding	Pyramid Lake Public Works	Local roads department, NDOT	Roads, general improvement plan	HMA Grant, existing budget	Un-known	Prevent roadway structural loss to keep roads open during evacuations	Long-term	5+ years	High
Description: Complete drainage ditch improvements. (Washoe County, City of Reno, City of Sparks, RSIC, PLPT)												
FL-14	Expand drainage	Flooding	Community flooding	Pyramid Lake, Public Works, Engineering	NDOT. Local Roads Department	Roads, general improvement plan	HMA Grant, existing budget	$20/ linear foot of	Preventing roadway structural loss	Long-term	5+ years	Medium

#	Project Title	Hazard Addressed	Vulnerability Addressed	Responsible Agency	Partners	Existing Planning Mechanisms	Potential Funding Source	Cost Estimate	Benefit (Losses Avoided)	Project Useful Life	Timeframe	Priority
	ditches and systems							drainage ditch				
Description: Complete improvements to address undersized drainage ditches and systems County-wide. (Washoe County, City of Reno, City of Sparks, RSIC, PLPT)												
EQ-9	Critical facilities seismic strength evaluations	Earthquake	Seismic	Pyramid Lake, Washoe County CSD, City of Sparks, RSIC, PLPT: Public Works, Engineering, School Districts	UNR and USGS	Seismic mitigation	HMA Grant, existing budget	Un-known	Reduce property loss and critical facilities by improving seismic capabilities	Long-term	1–5 years	High
Description: Complete seismic strength evaluations of critical facilities in all jurisdictions, including schools, community colleges, public infrastructure, and other critical facilities, to identify vulnerabilities for mitigation to meet current seismic standards. Mothball or demolish life-threatening buildings, particularly unreinforced masonry buildings. (Washoe County City of Sparks, RSIC, PLPT)												
EQ-10	Infrastructure mitigation	Earthquake	Seismic	Pyramid Lake Public Works, Engineering	UNR and USGS	Seismic mitigation	HMA Grant, existing budget	Un-known	Reduce infrastructure loss	Long-term	1–5 years	High
Description: 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)												
EE-5	Backup generators and other measures for critical	Energy Emergency	Loss of critical infrastructure	Pyramid Lake Emergency Management	Local government	Maintain working government facilities during emergencies	HMA Grant	$100K per design and installation	Reliable services for the community	Medi-um	1–3 years	High

#	Project Title	Hazard Addressed	Vulnerability Addressed	Responsible Agency	Partners	Existing Planning Mechanisms	Potential Funding Source	Cost Estimate	Benefit (Losses Avoided)	Project Useful Life	Timeframe	Priority
	infrastructure and facilities											
Description: Install backup generators for critical infrastructure and facilities along with other measures to improve reliability (e.g., alarms, meters, remote controls, and switchgear upgrades). (All Partners)												
DT-1	Additional water supplies	Hydration	Identify and support the need for additional water access	PLPT Public Utilities	TMWA and local public utilities, and the Indian Health Services	Identify and provide for clean water redundancies	Indian Health Services funding, EPA, Bureau of Reclamation Water Resource Management Grants	$5M	Water redundancy	Long-term	1–5 years	High
Description: Construct new groundwater wells and water lines to provide additional water supplies. (PLPT)												
DT-2	Implement TMWA Conservation Plan	Drought	Water conservation	PLPT Water Utilities Planning Departments	TMWA Indian health services and public utilities, City of Reno, City of Sparks, RSIC Water Utilities Planning Departments	Education on water conservation. Less water for landscape uses	HMA Grant, existing budget	$50K/ year	Conserving water	Long-term	5+ years	High
Description: Implement the current TMWA Conservation Plan, including encouraging the transition to less water-intensive landscaping on public and private properties. (City of Reno, City of Sparks, RSIC, PLPT)												

#	Project Title	Hazard Addressed	Vulnerability Addressed	Responsible Agency	Partners	Existing Planning Mechanisms	Potential Funding Source	Cost Estimate	Benefit (Losses Avoided)	Project Useful Life	Timeframe	Priority
ID-1	Climate adaptation and resiliency	Renewable energy and reduction in emissions	Reduce emission pollution and create a smaller carbon footprint	Pyramid Lake environmental services department, WCHD Air Quality Management Division	Environmental department and department of energy	Increase solar and electric vehicle usage to reduce pollution and increase renewable energy	EPA grants, existing budget, and DOE grants	Un-known	Reducing carbon footprint	Long-term	5+ years	High
Description: Implement a range of emission reduction strategies (e.g., policies geared toward renewable energy measures and projects, reduction in vehicle miles traveled, and increased use of transit and multi-modal transportation) to reduce levels of particulate matter, ozone, and other criteria pollutants. (All Partners)												
A-2	Preparedness Education	Avalanche/Landslides	People, Visitors, Property	Pyramid Lake Emergency Management	Pyramid lake Subject Matter experts such as USGS, NWS/NOAA	RHMP	HMGP, Local, EMPG, SERC funds	$500.00 + staff time	Fatalities, casualties	Life of plan	1 – 3 years	High
Description: Prepare and administer an educational program that will enhance the knowledge of what can be done during an avalanche or landslide.												
CAT-1	Preparedness Education	Criminal Acts and Terrorism	People, Visitors	Pyramid Lake Emergency Management	Pyramid lake, Subject Matter Experts such as Homeland Security, LEO	RHMP	HMGP/Local, EMPG, SERC funds	$500.00 + staff time	Fatalities, casualties	Life of plan	1-3 years	High
Description: Education program to prepare citizens and visitors on criminal acts and terrorism and how to protect themselves.												

#	Project Title	Hazard Addressed	Vulnerability Addressed	Responsible Agency	Partners	Existing Planning Mechanisms	Potential Funding Source	Cost Estimate	Benefit (Losses Avoided)	Project Useful Life	Timeframe	Priority
TI-1	Preparedness Education	Transportation Incident	People, Visitors	Pyramid Lake Emergency Management	Subject Matter Experts such as NDOT	RHMP	HMGP/Local, EMPG, SERC funds	$500.00 + staff time	Fatalities, casualties	Life of Plan	1-3 years	High
Description: Education program to provide knowledge on transportation incidents and what can be done to mitigate and prevent.												

Notes: *Includes vulnerable populations; **Through which the action will be implemented.

BLM = Bureau of Land Management, BRIC = Building Resilient Infrastructure & Communities, CDC = Centers for Disease Control and Prevention, CERT = Community Emergency Response Team, CHSC = Citizens Homeland Security Council, CSD = Community Services District, DOE = Department of Energy, EMPG = Emergency Management Preparedness Grant; EMS = Emergency Medical Services, EPA = Environmental Protection Agency, HMA = Hazard Mitigation Assistance, HMGP = Hazard Mitigation Grant Program, LEO = Law Enforcement Organizations, NOAA = National Oceanic Atmospheric Administration, NDOT = Nevada Department of Transportation, NWS = National Weather Service, PA = Public Assistance, PLPT = Pyramid Lake Paiute Tribe, RHMP = Reno Hazard Mitigation Program, RSIC = Reno-Sparks Indian Colony, SERC = State Emergency Response Commission; TMWA = Truckee Meadows Water Authority, UNR = University of Nevada, Reno, USACE = United States Army Corps of Engineers, USGS = United States Geological Service, WCHD = Washoe County Health District

THIS PAGE INTENTIONALLY LEFT BLANK

References

Colorado State University Extension. 2019. Cheatgrass and Wildfire – 6.310. Available online: https://extension.colostate.edu/topic-areas/natural-resources/cheatgrass-and-wildfire-6-310/A Accessed August 15, 2019.

NV Energy. 2019. Public Safety Outage Management. https://www.nvenergy.com/safety/psom. Accessed September 23, 2019.

Pyramid Lake Paiute Tribe. 1996-2004. "About Us." https://plpt.nsn.us/about-us/. Accessed September 17, 2019.

U.S. Census Bureau. 2017. American Community Survey 5-year estimates. Retrieved from Census Reporter Profile Page for Pyramid Lake CCD, Washoe County, NV: https://censusreporter.org/profiles/25000US3010-pyramid-lake-paiute-reservation/ .

U.S. Census Bureau. No date(a). 2013-2017 American Community Survey 5-Year Estimates for Pyramid Lake CCD, Washoe County, Nevada: S2301 Employment Status. https://data.census.gov/profile/Pyramid_Lake_CCD,_Washoe_County,_Nevada?g=060XX00US3203194686#employment

WRCC (Western Regional Climate Center). No date. Sutcliffe, Nevada (267953), Period of Record Monthly Climate Summary, Period of Record : 06/01/1967 to 06/10/2016 https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?nv7953. Accessed August 12, 2019.

Acronyms

°F	degrees Fahrenheit
BLM	Bureau of Land Management
BRIC	Building Resilient Infrastructure & Communities
CCD	County Subdivision
CDC	Centers for Disease Control and Prevention
CERT	Community Emergency Response Team
CHSC	Citizens Homeland Security Council
DOE	Department of Energy
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
GIS	Geographic Information System
HMP	Hazard Mitigation Plan
LEO	Law Enforcement Organizations
MPT	Mitigation Planning Team
NCEI	National Centers for Environmental Information
NDOT	Nevada Department of Transportation
NFIP	National Flood Insurance Program
NNSS	Nevada National Security Site
NOAA	National Oceanic and Atmospheric Administration
OCC	Operations Command Center
PA	Public Assistance
PER	preliminary engineering report

PG&E	Pacific Gas and Electric Company
PHMSA	Pipeline and Hazardous Materials Safety Administration
PLPT	Pyramid Lake Paiute Tribe
RNO	Reno–Tahoe International Airport
RPZ	runway protection zone
RSIC	Reno-Sparks Indian Colony
RTS	Reno-Stead Airport
SHMP	State Hazard Mitigation Plan
TMWA	Truckee Meadows Water Authority
TRFMA	Truckee River Flood Management Authority
UNR	University of Nevada, Reno
USGS	United States Geological Service
WCHD	Washoe County Health District
WUI	Wildland–Urban Interface

Reno-Sparks Indian Colony Hazard Mitigation Program

FEMA

A1. Does the plan document the planning process, including how it was prepared and who was involved in the process? 44 CFR § 201.7(c)(1)
A2. Does the plan document an opportunity for public comment during the drafting stage and prior to plan approval, including a description of how the tribal government defined "public"? 44 CFR § 201.7(c)(1)(i)
A3. Does the plan document, as appropriate, an opportunity for neighboring communities, tribal and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development, as well as other interests to be involved in the planning process? 44 CFR § 201.7(c)(1)(ii)
A4. Does the plan describe the review and incorporation of existing plans, studies, and reports? 44 CFR § 201.7(c)(1)(iii)

The following annex represents the Reno-Sparks Indian Colony (RISC or the Colony)'s strategic approach to reducing risk and lessening disaster impacts across the Colony. RSIC actively participated in the hazard mitigation plan update process through attending planning meetings, completing planning forms, attending the public meeting in Reno, sharing the digital survey, and reviewing the draft plan. Throughout the 2025 update process, the following Regional Hazard Mitigation Plan (RHMP) participation were recorded:

Name	Title	Department
Genn Bronczyk	Assistant Planner	Community Services Department
Cameron Kramer	Emergency Services Assistant	Emergency Management
Ceira Sampson	Emergency Services Manager	Reno-Sparks Indian Colony (RSIC)
Candace Stowell	Planning & Community Development Director	Planning Department

RSIC defines the public, known as the Tribal Community, as tribal members, community members (those living on tribal land with tribal members) and employees. RSIC welcomed input from the Tribal Community on this plan update at a General Council Meeting as described in the base plan. One question on the volcano hazard was received and discussed at this meeting.

What's New in the 2025 Update?

With the 2025 RHMP update, Washoe County and its regional partners have recognized changes in planning priorities by placing an added emphasis on incorporating actionable strategies into the mitigation implementation plan and moving away from including ongoing coordination activities. Recent disasters and emerging hazards have also influenced planning priorities and the development of mitigation actions for the 2025 RHMP update.

Since the 2020 Hazard Mitigation Plan (HMP), the Reno-Sparks Indian Colony (RSIC) has continued to grow and develop its Hungry Valley location. Recent conservation efforts have focused on managing off-highway vehicle use, promoting sustainable land management, and restoring native vegetation. Biodiversity recovery has been observed, with new species of birds and small mammals identified. Community-led projects and collaborations with local tribes, environmental organizations, and government agencies have increased. Climate change impacts, such as altered precipitation patterns and more frequent extreme weather events, have made these efforts even more critical. The Planning Department provides interactive maps for effective land use management. The 2025 RHMP update includes references to new housing projects, community facilities, and economic activities through tribal enterprises and small businesses.

The 2025 update of the RHMP includes the following major revisions to the 2020 plan:

- Updating the plan in accordance with the new Local Mitigation Planning Policy Guide, including additional climate change information
- Adding additional opportunities for public and stakeholder engagement
- Expanding the capability assessment
- Updating the goals/objectives to incorporate additional tribal considerations

Plan Adoption

44 CFR §201.6(c)(5) requires that an HMP be formally adopted by elected officials from each participating jurisdiction. The Tribal Council formally adopted the 2025 update of the Washoe County RRHMP on July 30, 2025.

This RHMP was approved by FEMA Region 9 on September 24, 2025. Once the plan is approved and signed, a copy of the Tribe's adoption resolution will be placed in Appendix E of the Base Plan.

The tribal government will comply with all applicable Federal statutes and regulations in effect with respect to the periods for which it receives grant funding, including 2 CFR Parts 200 and 3002, and will amend its plan whenever necessary to reflect changes in tribal or Federal laws and statutes? [44 CFR § 201.7(c)(6)]

Continued Public Involvement

FEMA	D1. Is there discussion of how each community will continue public participation in the plan maintenance process? (Requirement 44 CFR § 201.6(c)(4)(iii))

Public involvement is a key component of the plan implementation and update process. As part of this plan update, an ArcGIS StoryMap website has been developed to inform the public about the hazard mitigation plan update and their local risks. The StoryMap will be made available once the plan goes out for public comment in December. This user-friendly website is intended to make the hazard mitigation plan more accessible to the general public. This website also informs the public how to leave comments on the draft plan and continue participating in the plan maintenance process. The IEM Project Manager for the Washoe County RHMP update will collect, disseminate, and integrate any public comments received, as appropriate.

Following the annual review of the RHMP, the County will prepare and make available via the Internet an Annual Mitigation Status Report providing an update on the implementation of the current mitigation plan. This report, along with specific reports for each mitigation measure being implemented and all stakeholder comments received, will be assessed to make improvements in the plan update released every five years.

In addition to the ongoing input collected and compiled during the implementation of the previous plan, the MPT, as mentioned above, will review aspects of the draft update plan. Comments received from the public will also be considered and incorporated, where appropriate, into updates of the plan.

The County and its partners, The Cities of Reno and Sparks, North Lake Tahoe Fire Protection District, Pyramid Lake Paiute Reservation, Reno-Sparks Indian Colony, Truckee Meadows Fire Protection District, and Truckee River Flood Management Authority, will also engage community members on an ongoing basis through outreach at local events and meetings to ensure that public participation is incorporated outside the five-year plan update process. The County and its partners maintain public engagement and awareness programs focused on increasing the community's awareness of hazards and promoting actions to reduce individuals' and families' exposure to hazard risks. Recognizing that these are ongoing programs, the

The County and its partners will continue to implement the following programs during this five-year planning period:

- Seasonal Multi-Hazard Public Awareness Program;
- Annual weather safety activities to maintain the County's StormReady Community accreditation;
- Community Wildfire Protection Plan preparation;

- Community evacuation plan preparation and evacuation drills;
- Community Emergency Response Team (CERT) academy training sessions;
- Washoe County Emergency Preparedness Program;
- Green waste collection events;
- Food Truck Fridays in Reno;
- Meetings with homeowners' associations and other community groups; and

Outreach through social media.

Community Profile

Tribal Sovereignty and Governance

The RSIC is a federally recognized Indian Tribe organized under the provisions of the Indian Reorganization Act of 1934. Its Constitution was adopted in 1936 by the residents of the Colony. A chairman and eight-member Tribal Council are elected to serve as the governing body and to act in accordance with the provisions of the constitution. To be eligible, candidates must be enrolled members of the Colony, be 21 years of age by the election date, have no felony convictions, and physically reside on Colony land for not less than one year immediately before the election, as written in the bylaws.

The constitution gives the Tribal Council authority and responsibility to raise revenues, incur expenses, enter into contracts, borrow money, administer funds, purchase land, and provide services for the general welfare and benefit of Colony members.

The RSIC's last Tribal election took place on November 4, 2023, and the next is scheduled for November 2025.[208] Council seats have four-year terms, and four seats are up every two years, with staggering meant to improve continuity among the council.

The Colony is a growing organization with over 1,336 members. It employs approximately 300 people, including over 150 Tribal members, and is progressively taking steps to provide for the needs of its members while maintaining Tribal culture and protecting sovereignty.

[208] Reno-Sparks Indian Colony, "Tribal Government." https://www.rsic.org/228/Tribal-Government#:~:text=The%20RSIC%20held%20its%20last,up%20for%20election%20in%202027.

"Our vision is for a strong community that promotes and encourages individual spiritual, physical and emotional health to foster a long, abundant and prosperous life, which will lead to personal, family and community responsibility and prosperity" (www.rsic.org)

The RSIC's mission is "to offer opportunities for tribal members to improve their lives and enhance tribal values by making community programs, services, and projects available."[209]

Geography and Climate

The RSIC is located near Reno and Sparks, Nevada. The reservation lands consist of the original 28-acre residential Colony in central-west Reno, the 15,426-acre Hungry Valley reservation, located 19 miles north of the Colony in a more rural setting in Eagle Canyon, west of Spanish Springs, and commercial properties near the original Colony location, in Verdi, In Spanish Spring, and in Hungry Valley. The Hungry Valley reservation is nearly 17 square miles. The total land holdings are 15,609 acres.

The area features a steppe climate, which means it is in the range between desert and humid. The Colony's climate is the same as the city of Reno's, with an average precipitation of 7.4 inches. Most rainfall and snow occur in winter and spring, with the possibility of summer thunderstorms occurring between April and October. Extreme highs have reached 104°F to 108°F, and lows range from -16°F to 17°F. Reno averages 50 days with precipitation a year. Figure 85 shows averages based on data from 1981 to 2010.

[209] Reno-Sparks Indian Colony, "About Us." https://www.rsic.org/27/About-Us

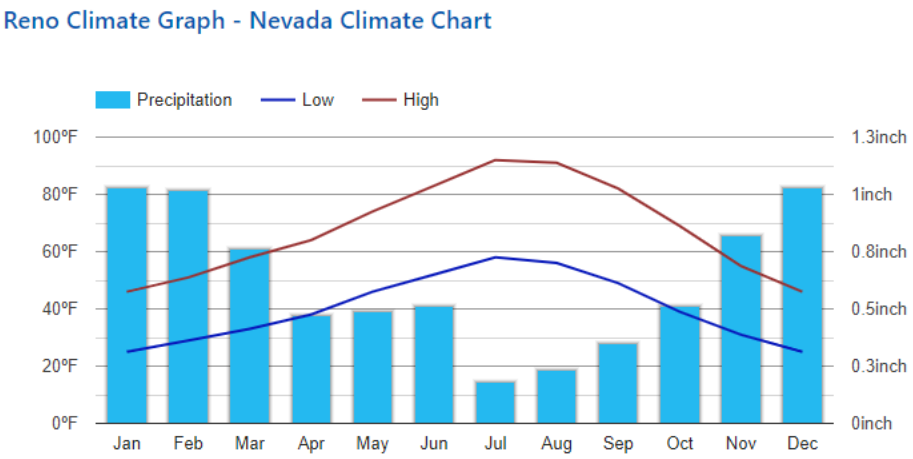


Figure 85: Temperature and Precipitation Averages for the City of Reno[210]

Population and Demographics

The RSIC comprises three Great Basin Tribes: Paiute, Shoshone, and Washoe. It is unusual in that it occupies both an urban setting and a rural land base. The RSIC records 1,336 Tribal members. The 2020 Census reported a total resident population of 916 for RSIC, with 530 residents living in Hungry Valley and 386 residents living on the Reno Colony.

The Colony's original Reno location has a smaller community than Hungry Valley due to constraints on acreage. It is located between the cities of Reno and Sparks along a four-block stretch next to a freeway. The Colony's Hungry Valley community is located 19 miles away. The Hungry Valley community consists of two Tribal housing developments, a community center, emergency services, childcare, a cemetery, and pow-wow grounds. It covers 15,426 acres adjacent to land administered by the Bureau of Land Management. All the surrounding roads are dirt, except those in the housing area and leading to the Community Center, which are paved. The Hungry Valley community has approximately 530 residents, according to the 2020 Census.

Due to a lack of housing on Tribal lands, other RSIC members live near the Colony. They receive services and participate in Tribal programs, activities, and resources. The RSIC has deemed these members eligible for services at the Tribal Clinic, education programs, social services, and other tribally funded programs, such as the Seniors Program. Many members residing off Colony lands are on the waiting list for housing on the reservation, which occasionally becomes available. Indians from other tribes residing on the reservation also receive governmental and Tribal services as community residents.

[210] U.S. Climate Data, "Climate Reno, Nevada." https://www.usclimatedata.com/climate/reno/nevada/united-states/usnv0076

The 2018–2022 American Community Survey five-year estimates report that the RSIC's population has a per capita income of $18,415[211] and a median household income of $47,500.[212] Persons living below the poverty line made up 32.2%[213] of the RSIC's population, which is more than twice the U.S. rate in 2022: 12.4%.[214] There are 299 housing units on the RSIC.[215]

Tribal Enterprises

The Tribal Council oversees Colony affairs and has final authority over all contracts, leases, and the business affairs of the Colony. The Colony created its planning and economic development department in 1975 to provide a revenue stream to pay for essential government services. The Colony attributes a positive track record of dealing with commercial tenants to its stable government, experienced staff, and consistency of purpose. The Colony's business development program is assisted by various federal incentives and a compact with the State of Nevada, which covers the collection of Tribal sales and excise taxes.

The Colony manages 4 commercial development sites, is landlord to 20 commercial tenants, and operates 6 smoke shops. For economic support, many tribes outside Nevada build casinos that have little or no competition. Nevada Tribes, however, compete in an already glutted gaming market in the state. The RSIC previously relied upon sales revenue from its six smoke shops but has leased and developed its commercial sites to diversify the Colony's general fund from sole reliance on tobacco revenues.

Revenues from the Colony's commercial real estate projects provide funds for the Colony's government, which provides essential services to Tribal members, residents, and other urban Indians. For example, the RSIC leased land to Walmart in 2003. The resulting tax revenues

---

[211] Census Reporter, "Reno-Sparks Indian Colony." https://censusreporter.org/profiles/25200US3130R-reno-sparks-indian-colony/

[212] United States Census Bureau, "S1903|Median Income in the Past 12 Months (In 2022 Inflation Adjusted Dollars)." https://data.census.gov/table/ACSST5Y2022.S1903?q=Reno-Sparks%20Indian%20Colony%20and%20Off-Reservation%20Trust%20Land,%20NV

[213] United States Census Bureau, "S1701|Poverty Status in the past 12 Months." https://data.census.gov/table?q=Reno-Sparks%20Indian%20Colony%20and%20Off-Reservation%20Trust%20Land,%20NV%20poverty

[214] United States Census Bureau, "Income, Poverty and Health Insurance Coverage in the United States: 2022." https://www.census.gov/newsroom/press-releases/2023/income-poverty-health-insurance-coverage.html#:~:text=Official%20Poverty%20Measure-,The%20official%20poverty%20rate%20in%202022%20was%2011.5%25%2C%20with%2037.9,was%20the%20lowest%20on%20record.

[215] United States Census Bureau, "DP04|Selected Housing Characteristics." https://data.census.gov/table?q=Reno-Sparks%20Indian%20Colony%20and%20Off-Reservation%20Trust%20Land,%20NV%20housing%20value

enabled RSIC to secure a 2006 Bond Issue to finance the design and construction of a 65,000-square-foot health center for the RSIC, which was completed in 2008.[216]

The Reno-Sparks Indian Colony owns and operates six Tribal Smoke Shops, which offer a wide variety of cigarettes and tobacco products at competitive prices. These smoke shops have continued to thrive, providing a significant source of revenue for the Colony. In addition to tobacco products, the RSIC has expanded its economic ventures by opening two cannabis dispensaries with drive-thru services in South Reno and Verdi, NV, in 2022. This expansion is part of the RSIC's strategy to diversify its economic base and create well-paying jobs for both tribal members and the public.

DEVELOPMENT HIGHLIGHTS

- Recent Development: Plans are underway to build 22 new homes in Hungry Valley with a $4.4 million grant from the Department of Housing and Urban Development. This project will provide affordable single-family homes for rent to tribal members and is expected to start construction in 2025 after infrastructure upgrades are completed.
- Recent Development: Justice Center. RSIC received a $1.6 million grant from the US Department of Justice to construct a multi-purpose Justice Center. The Justice Center will be located in Reno at 2 Sunshine Lane. This property comprises 3.69 acres and is held in trust.
- Recent Development: Pow Wow Grounds Master Plan. A Master Plan for the Pow Wow Grounds was adopted by the Tribal Council in September 2024.

Tribal Lands and Ownership Trends

The Reno-Sparks Indian Colony (RSIC) has a rich history of land ownership and development. Archeological evidence places the earliest residents of Nevada—the Paiute, Washoe, and Shoshone—at 10,000 years ago. Major land changes began with the discovery of gold in California, leading to increased settlement in the mid-1800s. This resulted in legislation around the formation of reservations, such as the Moapa River Paiute Reservation and the Walker River Paiute Indian Reservation, established by executive order in 1873. The U.S. Department of Interior recommended in 1859 that land be set aside for Indian use north of the Truckee River, including Pyramid Lake. Though an executive order was issued in 1874 to establish the Pyramid Lake Reservation, the legal year of establishment was 1859.

The RSIC was formed in response to a series of legislative actions, from the Indian Removal Act of 1830 to the Dawes Act of 1887, which resulted in disillusionment and a loss of traditional community structure. The RSIC was created to bring together Indians under their own government. In 1917, the federal government purchased 20 acres for non-reservation Indians of Nevada and for homeless Indians in what is now the Colony. In 1928, the Supreme Court

[216] Reno-Sparks Indian Colony, "Health Center." https://www.rsic.org/186/Health-Center

ruled that there is no distinction between a reservation and a colony, enabling the RSIC to procure an additional 8 acres of land.

The Colony became a federally recognized Indian Tribe under the Indian Reorganization Act of 1934, with the Constitution adopted in 1936. In 1937, the RSIC attempted to purchase an additional 1,080 acres but failed due to political challenges. In 1984, 1,920 acres were put into trust for the Tribe in Hungry Valley. The Nevada Native Nations Land Act, enacted by Congress on October 7, 2016, conveyed approximately 13,434 acres of land in Hungry Valley to the RSIC, expanding the Tribe's reservation from 1,960 acres to 15,263 acres. At present, the reservation includes 15,426 acres in Hungry Valley.

The RSIC is actively engaged in several economic development projects aimed at diversifying their revenue sources and supporting community growth. Key initiatives include commercial property development with tenants like Mercedes Benz of Reno and Walmart, generating revenue to fund essential government services. The RSIC also constructed a $20 million Tribal Health Center on Kuenzli Street, providing healthcare services to members and urban Indians in Washoe County.

Additionally, the RSIC is focusing on diversifying from reliance on tobacco revenues by developing various commercial operations and leasing land in high-growth areas. Community projects are also in the works, enhancing the quality of life for RSIC members and surrounding communities.

Natural Resources

Hungry Valley is where the western edge of the Mojave ecosystem intersects with the coastal mountain range. Hungry Valley has three shrub communities (mixed shrub, juniper shrub, and pinyon juniper-oak woodland), and major tree species in the area include cottonwood, willow, and sycamore, which provide food, nesting, and perching for a large number of birds. It hosts over 16 species of reptiles, amphibians, and diverse small mammals.

Recent conservation efforts by the Reno-Sparks Indian Colony have focused on restoring and protecting the natural resources of Hungry Valley. These initiatives include managing off-highway vehicle use to minimize environmental impact and promoting sustainable land management practices. Recent surveys have shown signs of biodiversity recovery, with new species of birds and small mammals being identified. Community-led projects aimed at restoring native vegetation and improving soil health have increased, often involving collaboration between local tribes, environmental organizations, and government agencies. Additionally, the impact of climate change on the Mojave ecosystem, including changes in precipitation patterns and increased frequency of extreme weather events, has made these conservation efforts even more critical. The Planning Department also provides interactive maps that show the boundaries of the reservation, authorized travel routes in Hungry Valley, and other important land use information, which are useful for planning and managing land use within the reservation.

Hazard Profiles and Vulnerability Assessments

FEMA	**B1.** Does the plan include a description of the type, location, and extent of all natural hazards that can affect the tribal planning area? 44 CFR § 201.7(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 tribal planning area? 44 CFR § 201.7(c)(2)(i) **B3.** Does the plan include a description of [each] identified hazard's impact, as well as an overall summary of the vulnerability of the tribal planning area? 44 CFR § 201.7(c)(2)(ii)

This section presents hazard profiles and vulnerability assessments to determine the potential impact of hazards on the people, economy, and built and natural environments of the Reno-Sparks Indian Colony. They have been streamlined to increase the effectiveness and usability of the RHMP for the RSIC, while additional information in presented in the base plan.

General

The County has received 48 major disaster declarations since 1965, including 15 since the previous HMP update. Table 211 identifies the declarations since 2020 that are relevant to the RSIC.

Table 211: Disaster Declarations in Washoe County since 2020[217]

Disaster Number	Individual Assistance Program Declared	Public Assistance Program Declared	Hazard Mitigation Program Declared	Declaration Date	Title
FM-5602	No	Yes	Yes	8/2/2025	Peavine Fire
FM-5586	No	Yes	Yes	6/10/2025	Marie Fire
FM-5546	No	Yes	Yes	11/11/2024	Callahan Fire
FM-5533	No	Yes	Yes	9/7/2024	Davis Fire
FM-5530	No	Yes	Yes	8/12/2024	Gold Ranch Fire

[217] FEMA, "Disasters and Other Declarations" Disasters and Other Declarations | FEMA.gov

Disaster Number	Individual Assistance Program Declared	Public Assistance Program Declared	Hazard Mitigation Program Declared	Declaration Date	Title
FM-5495	No	Yes	Yes	6/12/2024	Sullivan Fire
FM-5494	No	Yes	Yes	6/11/2024	Trail Fire
FM-5448	No	Yes	Yes	08/14/2022	Joy Lake Fire
FM-5382	No	Yes	Yes	11/07/2020	Pinehaven Fire
FM-5328	No	Yes	Yes	08/15/2020	Loyalton Fire
FM-5326	No	Yes	Yes	08/03/2020	North Fire
FM-5322	No	Yes	Yes	07/21/2020	Rockfarm Fire
FM-5316	No	Yes	Yes	06/27/2020	Poeville Fire
DR-4523	Yes	No	No	04/04/2020	Biological (COVID-19)
EM-3443	No	No	No	03/13/2020	Biological (COVID-19)

In addition to official disaster declarations, RSIC noted the following previous hazard events:

Type of Hazard Event	FEMA Disaster #	Date(s)	Damage or Impacts	Description
Avalanche and Landslide	N/A	None	N/A	N/A
Criminal Acts and Terrorism	N/A	None	N/A	N/A
Drought	N/A	Annual	No damage, however, requires	Annual droughts lead to conservation of water in the Hungry

Type of Hazard Event	FEMA Disaster #	Date(s)	Damage or Impacts	Description
			conservation of water use.	Valley and Reno Tribal community.
Earthquake	N/A	N/A	N/A	N/A
Energy Emergency	N/A	Frequent	Community members with medical devices	Intermittent power outages lasting less than 24 hours.
Flood	N/A	2017	Impacted the Tribal community by impeding travel and damaging small structures.	2017 Flood in the Reno Colony as well as road flooding in the Hungry Valley community
Hazardous Materials Incident	N/A	N/A	N/A	N/A
Infectious Disease	N/A	N/A	N/A	N/A
Radiological Waste Transport	N/A	N/A	N/A	N/A
Extreme Weather (Winter Storm, Windstorms, Extreme Heat)	N/A	2022 and 2023	Extreme snow impacting travel and causing power outages—some lasting longer than 24 hours.	Winter storm lasting several days with record high snow pact.

Type of Hazard Event	FEMA Disaster #	Date(s)	Damage or Impacts	Description
Transportation Incident (Aircraft Crash)	N/A	None	N/A	N/A
Volcano	N/A	None	N/A	N/A
Wildland Fire	N/A	2019	Wildland fire threatened Hungry Valley community	Wildland fire just outside RSIC Jurisdiction in area by Hungry Valley requiring multi-jurisdiction efforts.

Hazard Ranking Methodology

CALCULATED PRIORITY RISK INDEX

A risk assessment result for the entire county does not mean that each municipality is at the same amount of risk for each hazard. Each jurisdiction considered how it is uniquely at risk of the hazards profiled. The Calculated Priority Risk Index (Table 212) assessment resulted in hazard rankings for the RSIC.

Table 212: Factors for Calculating Risk

Risk Index Factor	Degree of Risk Level		Criteria	Factor Weight for Degree of Risk Level
Probability *What is the likelihood of the hazard occurring?*	1	Unlikely	Less than 1 percent probability of occurrence in the next year or a recurrence interval of greater than every 100 years.	30%
	2	Occasional	1 to 10 percent probability of occurrence in the next year or a recurrence interval of 11 to 100 years.	

Risk Index Factor	Degree of Risk Level		Criteria	Factor Weight for Degree of Risk Level
	3	Likely	11 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.	
	4	Highly Likely	91 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.	
Magnitude *What will be the overall impact?*	1	Negligible	Less than 5% of the affected area's critical and non-critical facilities and structures are damaged/destroyed. Only minor property damage and minimal disruption of life. Temporary shutdown of critical facilities.	30%
	2	Limited	Greater than 5% and less than 25% of property in the affected area is damaged/destroyed. Complete shutdown of critical facilities for more than one day but less than one week.	
	3	Critical	Greater than 25%, but less than 50% of property in the affected area was damaged/destroyed. Complete shutdown of critical facilities for over a week but less than one month.	
	4	Catastrophic	Over 50% of critical and non-critical facilities and infrastructures in the affected area are damaged/destroyed. Complete shutdown of critical facilities for more than one month.	
	1	Self-defined	More than 24 hours	10%
	2	Self-defined	12 to 24 hours.	
	3	Self-defined	6 to 12 hours.	

Risk Index Factor	Degree of Risk Level		Criteria	Factor Weight for Degree of Risk Level
Onset *How long will be there be between when it is recognized the hazard is approaching and when the hazard will begin affect the community?*	4	Self-defined	Less than 6 hours.	
Duration *What is the length of time the hazard will remain active, including how long emergency operations will have to continue after the hazard event?*	1	Brief	Up to 6 hours.	10%
	2	Intermediate	Up to one day.	
	3	Extended	Up to one week.	
	4	Prolonged	More than one week.	
Frequency *How often has this kind of hazard resulted in an emergency or disaster?*	1	Every 10+ years	This hazard is not frequent but may still impact the area.	20%
	2	Every 5–10 years	This hazard is not as frequently occurring, but it could occur in the next 10 years.	
	3	Every 1–5 years	This hazard is likely to occur relatively often. It might have occurred more or less frequently recently, but on average, it can be expected every 1–5 years.	
	4	Annually	This hazard is a frequent occurrence which the area actively has to respond to on an approximately annual basis.	

The following is the risk factor equation:

Risk Factor Equation

RF Value = [(Probability x .30) + (Magnitude x .30) + (Onset x .10) + (Duration x .10) + (Frequency x .20)]

Table 213 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 through 4.0 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 213: Overall Risk Scores for the CPRI

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

The Washoe County base plan is comprehensive for regional assessments and effectively addresses the calculated risk indexes. It provides a thorough evaluation that highlights its commitment to risk management and community safety, while the annexes are specific to each jurisdiction. Table 214 displays the CPRI values for the RSIC.

Table 214: Calculated Priority Risk Index for the Reno-Sparks Indian Colony

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Avalanche and Landslide	1	1	4	3	1	1.5	Low
Criminal Acts and Terrorism	2	3	2	3	3	2.6	High
Drought	3	3	1	4	4	3.1	High
Earthquake	2	4	1	4	3	2.9	High

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Energy Emergency	4	3	4	2	4	3.5	High
Flood	2	2	4	3	3	2.5	High
Hazardous Materials Incident	2	2	4	3	2	2.3	Medium
Infectious Disease	3	2	1	4	4	2.8	High
Radiological Waste Transport	3	2	3	4	1	2.4	Medium
Extreme Weather (Winter Storm, Windstorms, Extreme Heat)	4	3	1	4	4	3.4	High
Transportation Incident (Aircraft Crash)	2	1	4	3	1	1.8	Low
Volcano	1	1	4	4	1	1.6	Low
Wildland Fire	3	2	3	4	1	2.4	Medium

NATIONAL RISK INDEX

The National Risk Index (NRI) is not included in the local jurisdiction annexes as the dataset is developed at a county and census tract level, and it is not aggregated to individual jurisdictional boundaries. While the NRI provides useful context for understanding countywide hazard overall risk data, it does not offer the resolution needed to support jurisdictional specific assessments.

Hazard-Specific Profiles and Risk Assessments

Wildland Fire

LOCATION

According to the USFS Wildfire Risk to Communities, RSIC has low, moderate, or high risk area depending on the exact location. Fires are a high risk in the Hungry Valley reservation; the entire reservation is in a high-risk area for wildland fires. The majority of the area surrounding the RSIC is considered moderate risk, except for the urban areas around the City of Reno, which are low risk.

PREVIOUS OCCURRENCES/HISTORY

The following recent wildland fires have occurred near Tribal assets:

IMPACTING THE HUNGRY VALLEY RESERVATION

- **September 9, 2019, the Hungry Fire** burned a total of 305 acres. The fire threatened structures on the Hungry Valley reservation, including the water tank and communications tower, but it was contained without damaging any structures. This fire also threatened areas of Spanish Springs. No known cultural sites were damaged.
- **July 2019, the Big Dog Fire** in Hungry Valley burned 5 acres.
- **July 2019, the Jasper Fire** burned 1,165 acres before it was fully contained on Tuesday, July 16, 2019. It started Saturday, July 13, around 3 p.m. in the area of Chimney Drive and Leon Drive in Sun Valley, burning in grass and sagebrush, and then spread into Spanish Springs. This fire resulted in a temporary closure of Eagle Canyon Road, the main paved route leading into and out of the RSIC Hungry Valley land base.
- **July 2017** – The Hungry Valley Fire Department contained a 13.62-acre fire on the reservation.
- **July 11, 2017, the Long Valley Fire** took 10 days of intense firefighting against unpredictable winds, extremely high temperatures, and saturating humidity. The blaze burned 83,733 acres, or about 131 square miles. It started near Doyle, California, and burned into the north end of Spanish Springs Valley toward Pyramid Lake. It could be seen by Hungry Valley residents.

- **July 4, 2017, the Winnemucca Ranch Fire** east of Pyramid Highway and in Palomino Valley burned around 4800 acres. Although 58 structures were threatened at the fire's onset, it destroyed only one mobile home and two outbuildings on Amy Road. The fire was human-caused. This fire did not directly impact the Hungry Valley community but was nearby.

IMPACTING THE RSIC IN RENO

While there is no record of the following fires directly damaging the Colony, smoke from nearby fires could have adversely impacted residents.

- **October 24, 2023**: Hill Fire near Verdi area fire broke out at 11:00 pm, and homes were evacuated on both sides of the Nevada–California state line near Dog Valley Road. Truckee Meadows Fire and Protection crews worked to stop the brush fire burning in the Verdi area that ultimately burned 47 acres of land due to erratic winds and threatened to encroach on an estimated 40-60 homes on Hill Road from Bridge Street to Dog Valley Road neighborhoods.
- **August 23, 2021:** California Dixie and Caldor Fires – Dense smoke from massive wildfires burning in neighboring California created hazardous air quality in the Reno–Tahoe area, canceling flights and forcing schools, parks, and popular summer beaches to be closed. Government air monitors recorded some of the region's most hazardous conditions in years. The National Weather Service issued an air quality alert for parts of northeast Nevada's Elko County, more than 300 miles (482 kilometers) east of the closest California fires. Smoke blowing from the Dixie and Caldor fires in California blanketed northern Nevada on and off for weeks, leaving particulate matter in the air and causing ash to rain on cars in some areas.
- **November 17, 2020, Greater Reno/Carson City** – Powerful Pacific jet stream, rain shadowing, and mountain waves yielded some of the highest winds the region has seen in a few years. Still, dry vegetation and high winds contributed to several major wildfires near Reno, NV, and Walker, CA. A brief period of spillover rain and snow occurred that night into the morning of November 18.
- **November 17, 2020, the Pinehaven Fire** in the Caughlin Ranch area of SW Reno with wind gusts 72-77 MPH measured in the vicinity. On Tuesday, November 17, at approximately 1 p.m., a fire started on the hillside just south of Pinehaven Road and Sierra Pine Drive. Five homes were destroyed, three homes were heavily damaged, and 21 homes suffered minor damage from the fire.
- **October 4, 2024: The Baccarat Fire** started near Red Rock Road north of Reno on the 4th before being contained on the 8th. The fire burned 10,500 acres, but no structures were destroyed. However, the fire threatened 75 to 100 homes. Mandatory evacuations were ordered for some residents in the path of the fire. Firefighting costs were approximately $2.4M, according to the Carson City District Office, Nevada Bureau of Land Management. October was dry and warm, with much of the area reporting no measurable monthly precipitation.

- **August 24, 2019: The Long Valley Fire** started near the Red Rock exit along US Highway 395 and spread across the California/Nevada border into northwestern Nevada on the 24th before being contained on the 27th. The fire burned 2,438 acres, and one structure was destroyed. FEMA stated that the fire threatened 250-300 homes in and around Rancho Haven, Nevada. The fire also threatened five buildings, infrastructure, utilities, equipment, farms, ranches, and a watershed in the area. Mandatory evacuations were ordered for approximately 800 people before containment was reached. Firefighting costs were approximately $600K, according to the Nevada Bureau of Land Management. The fire was caused by warm temperatures and dry conditions and occurred from the 23rd through the end of the month. Breezy conditions occurred on the 24th and 25th, but the combined effects of winds and humidity did not reach critical fire weather criteria.
- **July 13, 2019: The Jasper Fire** in northern Sun Valley burned 1,165 acres from July 13 to July 16. Sierra Front Dispatch Center stated that one home and two outbuildings were destroyed. At one point, more than 100 homes were threatened, and the Washoe County Sheriff's Office was going door to door, urging people to evacuate. Firefighting costs were approximately $769K, according to the Nevada Bureau of Land Management. The fire was caused by a longwave trough that moved across the northwestern US and brought breezy conditions each afternoon to western Nevada and eastern California.
- **2016: The Little Valley Fire** resulted from an escaped prescribed burn, causing a blaze that consumed 2,300 acres in Washoe Valley, just south of Reno.
- **2012:** Careless disposal of hot ashes ignited brush that destroyed 26 homes and closed US Highway 395. The fire occurred along the southern outskirts of Reno, blackening 2,000 acres of suburban scrubland and causing the death of one elderly man.
- **2011: The Coughlin Fire** was a wildland–urban interface fire started in the low Sierra Nevada foothills at the west edge of Reno, Nevada. Strong winds contributed to the fire, which burned 1,935 acres, destroyed 28 homes, and damaged an additional 15 homes. Forty-three homes were destroyed or damaged by this fire, and an estimated 4,500 homes were threatened. The estimated market value of the property lost was over $10,400,000. About 445 personnel on 59 firefighting apparatuses, hand crews, and support vehicles responded to this incident. The 2000-acre fire resulted in the evacuation of 9,000+ people, the death of 1 man during the evacuation, and the admittance of 17 to the hospital for smoke inhalation and burns (one firefighter).

EXTENT

Tribal assets on the RSIC urban campus are better positioned for support from Reno's many fire stations. However, Hungry Valley is poised to develop over 100 new homes in a region rated as a high fire risk, with just one volunteer fire department in proximity.

Weather conditions greatly influence the impact and extent of wildland fires. Drought, high temperatures, and wind contribute to the dynamics and changing conditions of wildland fires. Fuel load and vegetation contribute to the size and intensity of wildland fires. As weather

conditions change due to climate change, wildland fire may become more frequent and intense.

PROBABILITY OF FUTURE EVENTS

Based on projected changes including reduced snowpack and earlier snowmelt, aridification, and more frequent and prolonged drought and heat the RSIC may be impacted by an increase in the probability of wildland fires.

VULNERABILITY

Hungry Valley is especially vulnerable to fire risk because it is located in a High-Risk fire area and due to the limited road infrastructure. This vulnerability is demonstrated by the closure of the main paved route in and out of Hungry Valley from the 2019 Jasper Fire. The Hungry Valley community is located in a rural mountainous area surrounded by dry vegetation susceptible to wildfire with volatile fuels, such as cheatgrass, sagebrush, and juniper, which can easily start a fire. Another vulnerability is that Hungry Valley's evacuation routes are in High-Risk fire areas. Further, wildfire smoke can impact the area. Where wildfires do not directly impact the tribal community, wildfire smoke could potentially impact vulnerable populations within the tribal community.

ESTIMATED IMPACT AND POTENTIAL LOSSES

According to the Climate and Economic Justice Screening Tool (CEJST), the Hungry Valley portion of the Colony is in the 90th percentile for projected wildfire risk to properties. The Internal Fire Code, 2018 edition was recently adopted in 2024, indicating that structures built prior to the adoption of this code may be at an increased risk of wildland fire damage. Members of the Tribe are vulnerable to the effects of fire and may be displaced by fires that spread to residential areas of the reservation. Wildfire could also impact business operations and commercial businesses including structural impacts as well as reduction of customers or closure of businesses during or following an event. Community events such as the Annual Numaga Powwow, which is usually held in the summer, could also be impacted by a wildland fire event.

Carports in new residential developments in Hungry Valley continue to pose a fire risk due to the potential for blown embers to cause a fire. Flammable materials may be stored in carports, and fuels such as dead leaves and other debris might collect in carports, making them pose a fire risk.

VULNERABLE POPULATIONS

Diminished air quality is an environmental impact that can result from a wildfire and pose a potential health risk. The smoke plumes from wildfires can contain potentially inhalable carcinogenic matter. Fine particles of invisible soot and ash too small for the respiratory system to filter can cause immediate and possibly long-term health effects. The elderly and individuals with compromised respiratory systems may be more vulnerable to the effects of diminished air

quality after a wildfire event. Fires outside the RSIC may also affect Tribal members by worsening air quality. Tribal elders and those with existing medical conditions such as asthma would be most at risk of experiencing health effects due to smoke from wildland fires; however, during very poor air quality periods, all Tribal members may be at risk of very poor air quality.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 215 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 215: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 216 provides the Calculated Priority Risk Index (CPRI) for wildland fire impacts in the Reno-Sparks Indian Colony (RSIC) based on the current plan's hazard risk assessment results. The RSIC assigned wildland fire a risk factor value of 2.4, reflecting medium probability, long duration, and medium onset impacts. This risk factor value falls in the range of 2.0 to 2.4, which is considered a medium-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 216: Calculated Priority Risk Index for Wildland Fire in the Reno-Sparks Indian Colony

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Wildland Fire	3	2	3	4	1	2.4	Medium

EXISTING MITIGATION CASE STUDY

Ongoing mitigation efforts are being conducted by the RSIC Hungry Valley Fire Department which include the mowing and creation of fire breaks in the valley. The evacuation routes are also graded by RSIC Public Works throughout the year.

Energy Emergency

LOCATION

A power outage or other energy emergency may impact any area of the RSIC. Hungry Valley, at the edge of the regional electrical grid, is more vulnerable than the Tribe's Reno campus to power outages. Hungry Valley receives power via a single transmission line from Lemmon Valley.

PREVIOUS OCCURRENCES/HISTORY

The Tribe experiences frequent power outages on an annual basis, particularly intermittent power losses lasting less than 24 hours. Historically, power outages have been caused by natural events and human-caused accidents. NV Energy also noted that regional heatwaves and the adaptation rate of EVs could influence the occurrence of rolling blackouts.

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.[218] Planned outages by NV Energy or Pacific Gas and Electric Company (PG&E) in California can affect fuel availability for the Tribe. Outages affecting PG&E's system would cut power to the equipment that controls the operation of the fuel pipeline serving the region.

Based on the NV Energy Red Rock PSOM Zone Map (Figure 86), residents in Reno-Sparks Indian Colony would be affected by the scheduled power outages. NV Energy will monitor weather patterns 7 to 10 days ahead for any concerning weather patterns. By the 72-hour mark, NV Energy will begin communicating with local emergency management officials and discussing where they see risks.

[218] NV Energy, "Emergency De-Energization|NV Energy." https://www.nvenergy.com/publish/content/dam/nvenergy/brochures_arch/safety/Emergency-De-Energization-Infosheet-2024-07-02.pdf

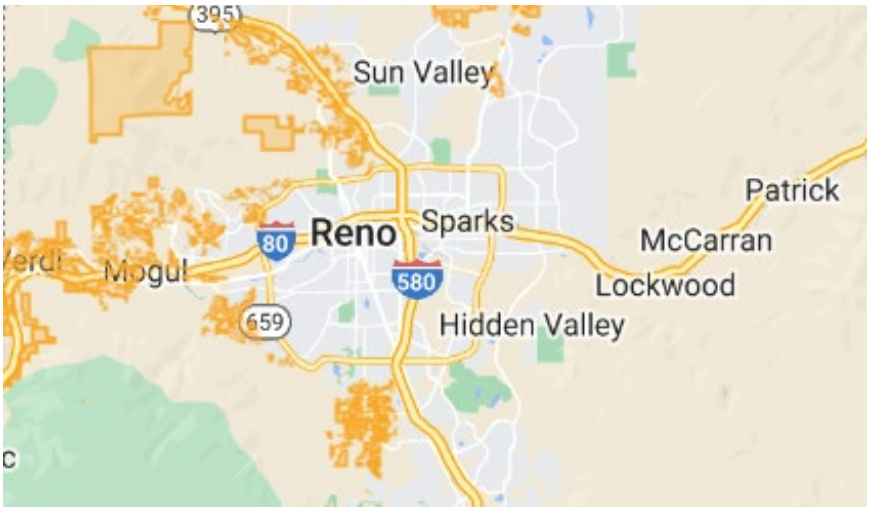


Figure 86: NV Energy Red Rock Public Safety Outage Management Zone Map[219]

EXTENT

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

PROBABILITY OF FUTURE OCCURRENCES

Given the historic occurrences, it can be assumed that the RSIC will experience energy emergencies annually. Based on potential increases in heat waves, increasing regional development resulting in greater demand, and the adoption rate of EV vehicles, the RSIC may be impacted by an increase in the probability of power outages.

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 of widespread and longer-duration power outages.

However, power outages can disrupt government and business operations over time periods ranging from several hours to several days. The Colony has installed solar panels on a few of its

[219] NV Energy, "Power Safe NV." https://www.nvenergy.com/safety/wildfire

government buildings. The solar panels installed at Hungry Valley facilities are connected to the electric grid and would not be able to provide power in the event of a grid outage.

Electricity customers in areas on the fringes of the electric system may be some of the last to have service restored, as repairs to urban areas with more customers are prioritized. Elderly Tribal members and those who are sick or economically disadvantaged are more vulnerable to the effects of extended power outages. Community members with medical devices are a notable concern for the tribe when there is an energy emergency.

Depending on the season, if a power outage occurs, the Colony will activate incident command. The Fire Department and Tribal Clinic perform welfare checks for vulnerable residents in Hungry Valley and at the Reno campus to ensure that they have enough food and critical supplies.

VULNERABLE POPULATIONS

The Reno-Sparks Indian Colony has several vulnerable populations during energy emergencies. Elderly residents often depend on stable energy for heating, cooling, and medical devices, making them particularly at risk. Low-income families may struggle to afford energy costs, heightening their vulnerability during crises.

Individuals with disabilities also face challenges, as many rely on electric medical equipment. Children and infants require consistent living conditions for health and safety, which can be jeopardized during energy outages. Single-parent households may experience added stress due to limited resources.

Finally, community members with chronic health conditions depend on energy for essential treatments and can suffer serious health risks when outages occur.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 217 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 217: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 218 provides the Calculated Priority Risk Index (CPRI) for energy emergency impacts in the Reno-Sparks Indian Colony (RSIC) based on the current plan's hazard risk assessment results. The RSIC assigned energy emergency a risk factor value of 3.5, reflecting high probability, high frequency, and quick onset impacts. This risk factor value falls in the range of 2.5 to 4.0, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 218: Calculated Priority Risk Index for Energy Emergency in the Reno-Sparks Indian Colony

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Energy Emergency	4	3	4	2	4	3.5	High

EXISTING MITIGATION CASE STUDY

The Tribal Energy Development Capacity Grant Program is a competitive, discretionary grant program that seeks to develop the Tribal management, organizational, and technical capacity that Tribes need to maximize the economic impact of energy resource development on Indian land. Each year, the program awards funding that provides Tribes with the necessary resources to develop or enhance Tribal policies, codes, regulations, or ordinances related to energy resources, including land-lease regulations for energy development purposes in accordance with the Helping Expedite and Advance Responsible Tribal Homeownership Act, also known as the HEARTH Act. Reno-Sparks Indian Colony was awarded $150,000 for the Hungry Valley Tribal Utility Authority and the Reno Government Complex Energy Infrastructure Feasibility Project in 2023.[220]

[220] U.S. Department of Interior, Indian Affairs, February 2023, "Indian Affairs Announces Tribal Energy Development Capacity Grants." Indian Affairs announces Tribal Energy Development Capacity grants | Indian Affairs (bia.gov)

Extreme Weather (Windstorm)

LOCATION

Extreme wind events are experienced in every region of the United States. A useful tool for determining the location of the extreme wind hazard area in a jurisdiction is depicted in Figure 87**.** The map shows RSIC is in Zone I, with a design windspeed for shelters of 130 miles per hour. Windstorms may occur anywhere in Washoe County.

PREVIOUS OCCURRENCES/HISTORY

Windspeeds in Washoe County can reach high levels. In 2016, Reno was ranked as the second windiest city in the United States, and Reno has reported record wind gusts exceeding 80 mph. Daily wind speeds were obtained from NOAA's online climate database for Washoe County from 2015 through 2018. The data suggest that the windiest months in Washoe County are April through June. Average daily wind- speeds from 2015 to 2018 for the months of April through June ranged from 6.09 to 7.50 mph.

NOAA's NCEI Storm Events Database records 170 events of high wind, strong wind, and thunderstorm wind in Washoe County between 2019 and 2023. No deaths, no injuries, $5K in property damage, and $250 in crop damage were identified in the database. No specific records of windstorm damages to the RSIC has been recorded.

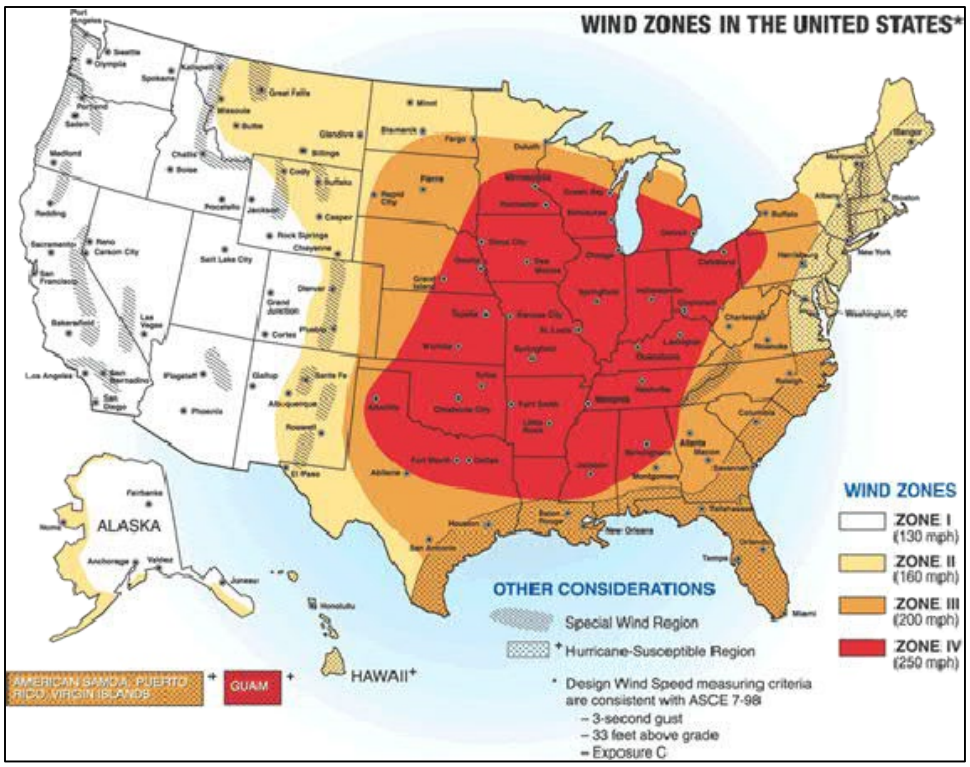


Figure 87: Wind Zones in the United States[221]

EXTENT

Extreme wind can occur alone, such as during straight-line wind events and derechos, or it can accompany other natural hazards, including snowstorms, blizzards, and severe thunderstorms. Severe wind threatens lives, property, and vital utilities, primarily because of the effects of flying debris or downed trees and power lines. Properties with above-ground infrastructure, utilities, and tree stands may be more damaged during windstorms. Severe wind will typically cause the greatest damage to structures of light construction, particularly manufactured homes. An additional 22 manufactured homes are expected to be built in Hungry Valley.

PROBABILITY OF FUTURE OCCURRENCES

The probability of windstorms is high, based on the number of occurrences recorded in NCEI. There is no reliable data on whether Nevada windstorms will increase or decrease in frequency and intensity in the coming decades due to climate change.

[221] Resilient Action Fund, FEMA, 2022, "Wind Zones in the United States." U.S. Wind Zones Map Resilience Action Fund (buildingresilient.com)

VULNERABILITY

Most vulnerabilities to windstorms occur in the built environment. Buildings, utilities, and transportation systems are vulnerable to wind damage. Old or poorly constructed buildings or insufficiently anchored manufactured homes are more vulnerable to strong winds and can be heavily damaged. Uprooted and fallen trees can damage above-ground power and other utility lines and can block roads, railways, or other transportation networks. Windstorms can also generate storm-related debris that can be costly and time consuming to clear. Building damage and service interruptions also cause economic losses from business interruptions.

Falling trees or blowing debris can cause injuries or death. Power outages and transportation disruptions can also negatively impact populations.

ESTIMATED IMPACT AND POTENTIAL LOSSES

The estimated losses and potential impacts to the Reno Sparks Indian Colony due to windstorms can be significant, affecting both the community's infrastructure and natural resources. High winds can lead to property damage, including the destruction of homes and damage to public buildings, such as schools and community centers. The cost of repairs and rebuilding can strain the Colony’s finances, especially if federal or state assistance is limited. Additionally, windstorms can cause disruptions to essential services like electricity and water supply, impacting the daily lives of residents and increasing the burden on local resources.

Moreover, the environmental impact of windstorms can also be profound. Severe winds can uproot trees and damage the local ecosystem, leading to long-term consequences for wildlife habitats and the natural landscape. This loss not only affects biodiversity but can also have cultural implications for the community, as many Indigenous cultures are deeply connected to their natural surroundings. Furthermore, such weather events can make it more challenging for the community to engage in cultural practices and activities, thereby affecting the social fabric of the Reno Sparks Indian Colony.

VULNERABLE POPULATIONS

The Reno Sparks Indian Colony is home to diverse populations, some of which are particularly vulnerable to the impacts of windstorms. Among them, elderly residents stand out as a significant group at risk. Many older adults may face mobility challenges or health conditions that hinder their ability to evacuate quickly or find safe shelter when severe weather strikes. This demographic often requires additional support and planning to ensure their safety during emergencies.

Additionally, low-income families within the colony may also be at heightened risk during windstorms. Limited financial resources can make it difficult for these families to prepare adequately for such events, leaving them without essential supplies or safe housing. This economic vulnerability can exacerbate the effects of a windstorm, as recovery efforts become more challenging in the aftermath.

Individuals with disabilities represent another group vulnerable to windstorm impacts. Those with physical or cognitive disabilities might struggle with evacuation procedures or comprehending emergency instructions, making timely responses to severe weather even more difficult.

Furthermore, the presence of children and infants in the community adds another layer of concern. Young children often require close supervision and special care during emergencies, and their safety becomes a paramount concern for families facing extreme weather conditions.

Lastly, the homeless population in the area faces severe risks during windstorms, as they typically lack a safe place to seek shelter. Without access to adequate protection from the elements, individuals experiencing homelessness are particularly susceptible to the dangers associated with severe weather.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 219 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 219: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 220 provides the Calculated Priority Risk Index (CPRI) for extreme weather impacts (including windstorms) in the Reno-Sparks Indian Colony (RSIC) based on the current plan's hazard risk assessment results. The RSIC assigned extreme weather impacts a risk factor value of 3.4, reflecting high probability, long duration, and high frequency impacts. This risk factor value falls in the range of 2.5 to 4.0, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 220: Calculated Priority Risk Index for Extreme Weather in the Reno-Sparks Indian Colony

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Extreme Weather	4	3	1	4	4	3.4	High

Earthquake

LOCATION

The State of Nevada is the third most seismically active state in the U.S. and Washoe County is in one of 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. At least two faults are running through the region that may be capable of a large, damaging earthquake of magnitude 7 or more, larger than the Northridge earthquake in January 1994. There are many more, smaller faults which could also impact the RSIC.

During an earthquake, the developed areas of the reservation and its commercial districts including the northern half of the original RSIC colony, Hungry Valley VSIC, and smoke shops may experience seismic ground motion hazard of a 2% probability in 50 years.

PREVIOUS OCCURRENCES/HISTORY

Section 4 of the Base Plan includes information on previous major earthquakes in Washoe County, with magnitudes greater than 5 on the Modified Mercalli Intensity (MMI) Scale. Shaking from these earthquakes would have been felt in Reno and might have caused structural damage.

The largest earthquake in the past 50 years in Washoe County occurred on April 25, 2008. Small earthquakes began in the western Reno, Nevada, region in February 2008 and grew in size and frequency until mid-April. On April 15, 2008, seismic activity greatly increased, producing four events of magnitude 3 and above. The earthquake swarm increased again on April 24, 2008, with two magnitude 4 events. The mainshock occurred on April 25, 2008, with a magnitude of 5, and caused violent shaking at Mogul and Somersett (see Figure 88). A vigorous aftershock sequence followed into the summer of 2008.

While buildings overall survived the shock well, reports indicated that the violent rocking of buildings caused some structural damage, such as cracked paint and plaster along drywall seams, wall and ceiling corners, and doors and entryways. Although the greater Reno area has

experience earthquake losses, there are no specific previous occurrences of note which impacted the RSIC.



Figure 88: Water Flume Damaged by the 2008 Mogul–Somersett Earthquake[222]

EXTENT

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

PROBABILITY OF FUTURE OCCURRENCES

Seventeen earthquakes with a magnitude greater than 5 on the MMI scale have occurred in Washoe County in the last 150 years. The probability of future occurrence can be estimated at 10%, meaning 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 damage structures, roads, utilities, and any new development.

VULNERABILITY

Earthquakes can cause significant, widespread structural damage throughout the region. The Tribe recently adopted the International Building Code, 2018 Edition in 2024. The majority of the Reno Colony's housing stock was built before 1990, while the majority of the Hungry Valley housing stock was built before 2000. Prior housing stock may not meet current seismic

[222] 2020 Regional HMP, "2008 Mogul-Somersett Earthquake Damage Rock fall damage to water flume (Nevada Bureau of Mines and Geology, University of Nevada, Reno; dePolo 2008)

standards. The Tribal Health Center, the Tribe's newest government facility, meets seismic standards as of 2008. However, several other government facilities, including the Reno gym, Reno Health Clinic, Hungry Valley gym, and Hungry Valley community center, are cinderblock construction and have not been retrofitted. Existing homes at the Reno campus and Hungry Valley reservation have not been retrofitted to meet current seismic standards. The Tribe's Housing Department plans to construct additional homes in Hungry Valley, which will be constructed according to current seismic standards.

Additional tribal assets which may be impacted include:

- The Tribe identified the Cultural Resources Department building as more vulnerable to earthquake damage.
- The Reno gym—a cinderblock building—has also been identified as at risk of earthquake damage, an additional vulnerability, as the gym is a shelter facility for residents of the RSIC urban campus. The Tribe has identified retrofitting this facility as a priority.
- Other cinderblock facilities owned by the Tribe include the Reno Health Clinic, Hungry Valley gym, and all buildings in the Hungry Valley community center.

ESTIMATED IMPACT AND POTENTIAL LOSSES

The Reno-Sparks Indian Colony is at risk of several significant impacts and potential losses in the event of an earthquake. One of the primary concerns is the damage to infrastructure. Buildings, roads, and utility systems could be severely compromised, leading to high repair costs and disruptions in essential services.

Economic losses would likely be substantial as well. Business interruptions due to physical damage or safety concerns can result in reduced revenue and employee layoffs, ultimately affecting the local economy. Additionally, if businesses are forced to close for repairs or face decreased customer traffic due to fear of aftershocks, the longer these disruptions persist, the more pronounced the economic impact will be.

The displacement of residents is another critical concern. An earthquake could force individuals and families to evacuate their homes, leading to both temporary and potentially long-term homelessness. This situation can strain local resources, as the community may not be fully equipped to handle an influx of displaced individuals seeking shelter and support.

In terms of health and safety, earthquakes pose direct risks to personal well-being. Injuries and fatalities can occur during seismic events, and the demand for medical assistance may surge. Local healthcare facilities, already operating under considerable strain, may struggle to provide adequate support in the aftermath of a significant earthquake.

Moreover, cultural and historical impacts cannot be overlooked. The colony may contain important cultural sites and historical landmarks that could be damaged or lost in an earthquake, leading to a detrimental effect on the community's heritage and identity.

Environmental effects are another consideration. Earthquakes often cause land shifts that can lead to soil erosion or alter water flow, impacting local ecosystems and wildlife. These changes can have both immediate and long-term repercussions for the area's natural resources.

Finally, the costs associated with emergency response and recovery can be considerable. Local governments may face a financial burden as they mobilize emergency services and resources to address the aftermath of an earthquake. This financial strain could affect their budgets, limiting available funding for other community needs and long-term recovery efforts.

VULNERABLE POPULATIONS

In the Reno-Sparks Indian Colony in Nevada, several populations are particularly vulnerable to earthquakes. One of the most at-risk groups is the elderly. Older adults often face mobility challenges and may have health conditions that make it more difficult for them to respond quickly to an emergency. Their need for assistance during such events highlights the importance of establishing support systems within the community.

Children are another vulnerable demographic. In the event of an earthquake, young children may not have the understanding or ability to respond effectively on their own. Having proper safety measures and clear communication tailored to their needs can help protect this group during seismic events.

Individuals with disabilities also require special consideration. Those with physical or cognitive impairments might face significant challenges during an evacuation or when attempting to find safe shelter. Ensuring that emergency plans are inclusive and accessible is essential for safeguarding their well-being.

Low-income families represent another population that can be disproportionately affected by earthquakes. Limited financial resources may hinder their ability to secure safe housing or access to necessary emergency supplies. This economic vulnerability can greatly increase their risk and susceptibility to disaster impacts.

Additionally, non-English speakers may struggle to comprehend emergency instructions or alerts. Language barriers can inhibit their ability to respond effectively, making it crucial for the community to provide resources and information in multiple languages.

Finally, residents living in substandard or older housing are at heightened risk during seismic events. Structures that do not meet safety standards can collapse or incur significant damage, leading to injury or loss of life.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 221 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 221: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 222 provides the Calculated Priority Risk Index (CPRI) for earthquake impacts in the Reno-Sparks Indian Colony (RSIC) based on the current plan's hazard risk assessment results. The RSIC assigned earthquake impacts a risk factor value of 2.9, reflecting high magnitude, long duration, and medium frequency impacts. This risk factor value falls in the range of 2.5 to 4.0, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 222: Calculated Priority Risk Index for Earthquake in the Reno-Sparks Indian Colony

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Earthquake	2	4	1	4	3	2.9	High

Flood

LOCATION

RSIC owns several parcels along the Truckee River and some of these parcels are located within the 500-year flood hazard zone.

The Hungry Valley community is not located in a flood zone. However, rainstorms and flash flooding can make Hungry Valley's evacuation routes impassable.

The Colony owns a 24-acre parcel in Spanish Springs at 7655 Pyramid Way. A stormwater ditch was constructed along the site's western boundary, directing stormwater flows into the Washoe County stormwater channel at the parcel's north end. The stormwater channel is in the 100-year floodplain. Culverts installed where these drainage ditches cross over roads are substantially undersized for water that drains to this area, resulting in recurring flooding.

The burn scar from the Hungry Fire in September 2019 represents an area of increased flood risk until vegetation is re-established. The burn scar is in a canyon in the Hungry Range above the Colony's cemetery. The Colony plans to install signage warning the public that the area is a burn scar and flooding is a possibility and to install concrete barriers to divert runoff back into natural areas. When storms are forecasted, the Colony will monitor drainage areas to ensure they are debris-free.

PREVIOUS OCCURRENCES/HISTORY

In January 2017, northern Nevada experienced significant flooding from a storm that dropped 3 to 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, impacting local travel and causing small structure damage. There was also localized flooding in places near irrigation ditches designed to carry water from the Truckee River to agricultural areas south of Reno.

RSIC members have also mentioned incidents of flooding near the Eagle Canyon smoke shop and road flooding in the Hungry Valley community.

EXTENT

Severe flooding may cause serious injuries and deaths and damage public facilities and private property. The river's height can determine the extent of flooding flows compared with flood stages determined by U.S. Geological Survey stream gauges throughout the area. Reno may experience limited localized flooding on an annual basis. Anywhere it rains it can flood so all areas of the RSIC may be at risk but risk would likely be limited.

PROBABILITY OF FUTURE EVENTS

Based on a potential increase in high-intensity precipitation events and an increased probability of wildland fires, Reno may be impacted by an increase in the probability of flooding and flash flooding particularly following wildfires. Hungry Valley may experience an increase in flash flooding due to changing conditions.

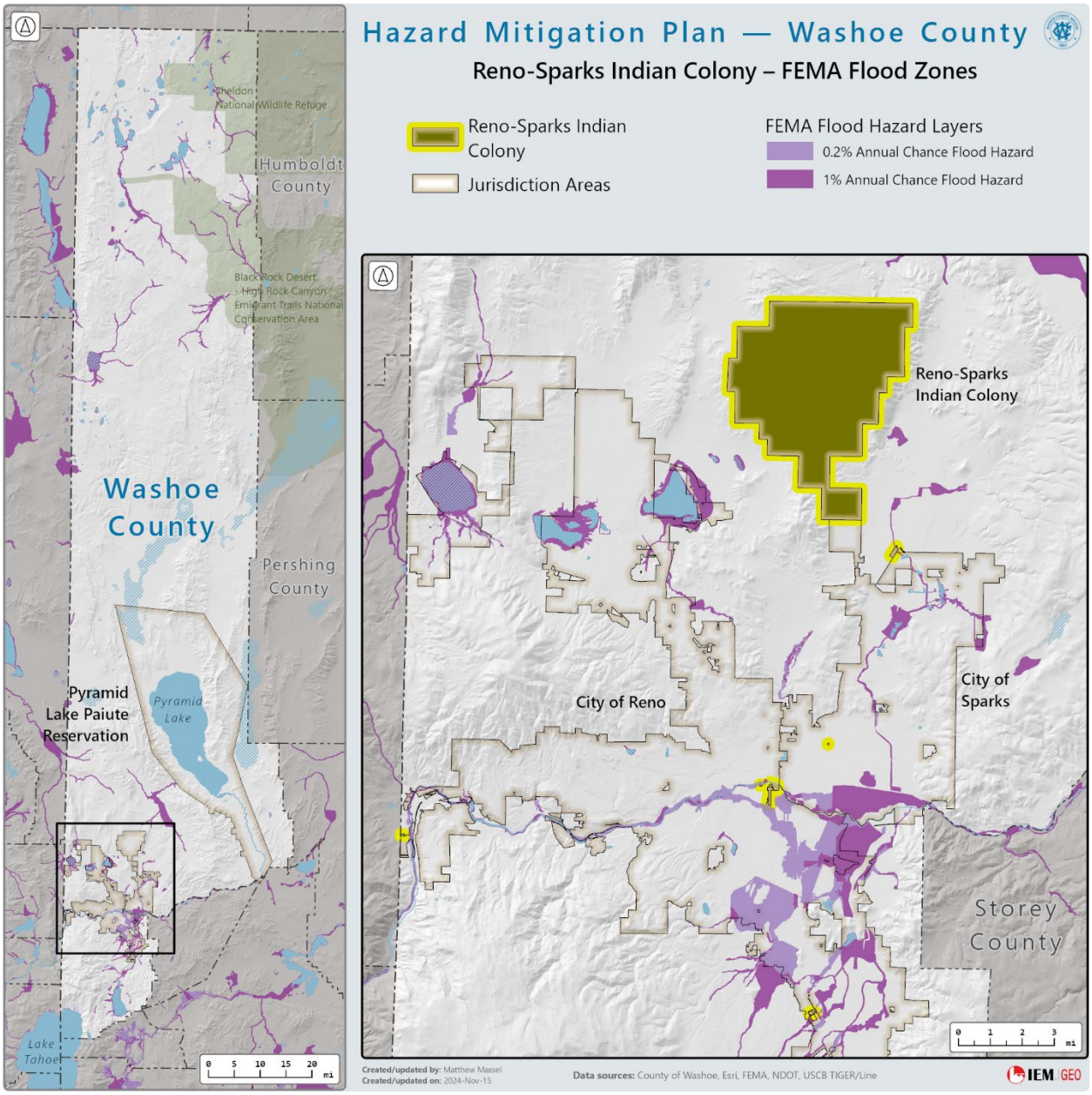


Figure 89: Reno-Sparks Indian Colony Flood Map

VULNERABILITY

The probability of flooding risk is low because the Colony is not located in a 100-year flood zone. However, given the proximity of the Reno RSIC campus to the Truckee River, the Colony should be prepared for a flooding event. The Colony's Public Works Department has a weekly, monthly, and annual preventative maintenance program for infrastructure maintenance and repair. Part of this is cleaning out drainage ditches monthly, which reduces flooding risk.

The evacuation route for Hungry Valley is vulnerable, as rainstorms and snowstorms can make the route impassable. The RSIC is considering paving an all-weather road to help address this issue.

REPETITIVE LOSS PROPERTIES

The Colony does not maintain a repetitive loss property inventory that meets the Repetitive Loss or Severe Repetitive Loss criteria. There are no NFIP insured structures.

ESTIMATED IMPACT AND POTENTIAL LOSSES

The impacts of flooding on the Reno-Sparks Indian Colony can be significant, affecting both the physical environment and the community's overall well-being. One of the most immediate consequences is property damage, which can range from structural destruction of homes to the loss of personal belongings and community facilities. These damages can lead to prolonged displacement for affected families and disrupt the fabric of daily life within the colony.

In addition to property impacts, infrastructure damage can severely hinder movement and access to essential services. Flooded roads and damaged utilities can impede emergency response efforts and complicate recovery processes. Economic loss is also a significant concern, as local businesses may suffer due to operational interruptions and decreased patronage, potentially leading to job losses and a decline in overall community economic activity.

The environmental implications of flooding cannot be overlooked. Erosion and contamination may threaten local ecosystems and water sources, undermining the community’s reliance on these resources for both sustenance and cultural practices. Health risks are also heightened in flooded areas, with standing water posing threats such as waterborne diseases and increasing stress factors that can impact mental health.

Cultural loss is another poignant aspect, as flooding can endanger culturally significant sites and artifacts, erasing vital elements of the community's heritage. Recovery from such events can be financially taxing and time-consuming, often requiring substantial investments in rebuilding and restoration efforts. Many community members may face challenges with insurance claims, which can result in additional financial strain. This multifaceted impact highlights the importance of community resilience planning in enhancing preparedness and response to future flooding events.

VULNERABLE POPULATIONS

The Reno-Sparks Indian Colony in Nevada has several populations that may be vulnerable to floods, particularly those living in low-lying areas near rivers. Elderly residents are at risk due to mobility challenges that complicate evacuation during flooding.

Children are also vulnerable, as they rely on adults for safety and guidance during emergencies. Individuals with disabilities face additional difficulties, and emergency plans should specifically address their needs.

Low-income families may lack safe housing and resources, increasing their vulnerability, while transient populations might not be fully aware of local flood risks. Additionally, single-parent households face unique challenges during evacuations, as one adult manages multiple children.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 223 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 223: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 224 provides the Calculated Priority Risk Index (CPRI) for flood impacts in the Reno-Sparks Indian Colony (RSIC) based on the current plan's hazard risk assessment results. The RSIC assigned flood impacts a risk factor value of 2.5, reflecting medium duration, medium frequency, and quick onset impacts. This risk factor value falls in the range of 2.5 to 4.0, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 224: Calculated Priority Risk Index for Flood in the Reno-Sparks Indian Colony

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Flood	2	2	4	3	3	2.5	High

EXISTING MITIGATION CASE STUDY

RSIC participated in developing the floodwall and levee along the south bank of the Truckee River before the construction of Walmart on East Second Street in Reno. That undertaking involved the RSIC partnering with the Washoe County Flood Control Project, the Washoe County Public Works Department, the Nevada Department of State Lands, and Walmart.

At the Colony's expense, the RSIC completed a $1.3 million environmental cleanup of the site, assisted by a Brownfields Loan administered by the Nevada Division of Environmental Protection.

In 2017, the RSIC completed an abatement project—a flood wall protecting the Glendale Avenue and I-580 area—to mitigate potential rising waters in the Truckee River.

Extreme Weather (Extreme Heat)

LOCATION

Extreme heat occurs when summertime temperatures are much hotter and/or more humid than average. Historically, the seasonal maximum heat index is 90.17 degrees. It may occur anywhere in Washoe County. However, urban areas are more likely to experience extreme heat conditions because of the heat island effect, in which the impervious surfaces concentrated in cities increase the surrounding area's temperature higher than in more rural areas.[223] The areas with the highest heat island severity in Washoe County include Reno and parts of the Hungry Valley area where heat island severity can range from mild to severe.

PREVIOUS OCCURRENCES/HISTORY

The National Weather Service issues advisories, watches, and warnings for "Excessive Heat."[224] Heat watches and warnings were issued in Washoe County in 2021[225] and 2023.[226] These warnings included information to help individuals avoid heat-related illnesses and the locations of cooling centers. No specific impacts were reported for RSIC for this hazard, but extreme heat

[223] United States Environmental Protection Agency, "Heat Island Effect." https://www.epa.gov/heatislands#:~:text=Heat%20islands%20are%20urbanized%20areas,as%20forests%20and%20water%20bodies

[224] National Weather Service, "Heat Watch vs. Warning." https://www.weather.gov/safety/heat-ww

[225] Reno Gazette Journal, "Excessive heat Warning Issued for Reno Area Beginning Sunday." https://www.rgj.com/story/news/2021/06/26/excessive-heat-warning-reno-area-beginning-sunday/5357958001/

[226] Reno Gazette Journal, Reno Experiencing 102-Degree Temps this Weekend; Excessive heat Watch into Next Week." https://www.rgj.com/story/news/2023/07/10/reno-expecting-102-degree-temps-this-weekend-heat-watch-through-monday-july-17-evening/70398343007/

coupled with an energy emergency or planned power outage would be of concern, especially for seniors.

EXTENT

The heat index is what the temperature feels like to the human body when relative humidity is combined with air temperature. There is a direct relationship between air temperature and relative humidity and the heat index. As air temperature and relative humidity increase, the heat index increases (see Figure 90).[227] When the heat index is high, the body has more difficulty cooling itself through evaporation of perspiration to maintain a comfortable temperature. The potential for negative health consequences increases with higher heat index values.

PROBABILITY OF FUTURE OCCURRENCES

While there have not been a significant number of historic events, the probability of extreme heat events is considered medium as they do happen and will likely continue to happen at an increased rate in the future. Climate projections indicate that there will be more incidents of extreme heat in Nevada. In particular, recent studies conducted by the Desert Research Institute conclude that climate change and an intense urban heat island have made Reno the fastest-warming city in the United States. As the duration and severity of heat waves become more extreme, extreme heat may become a greater concern for the RSIC in the future.

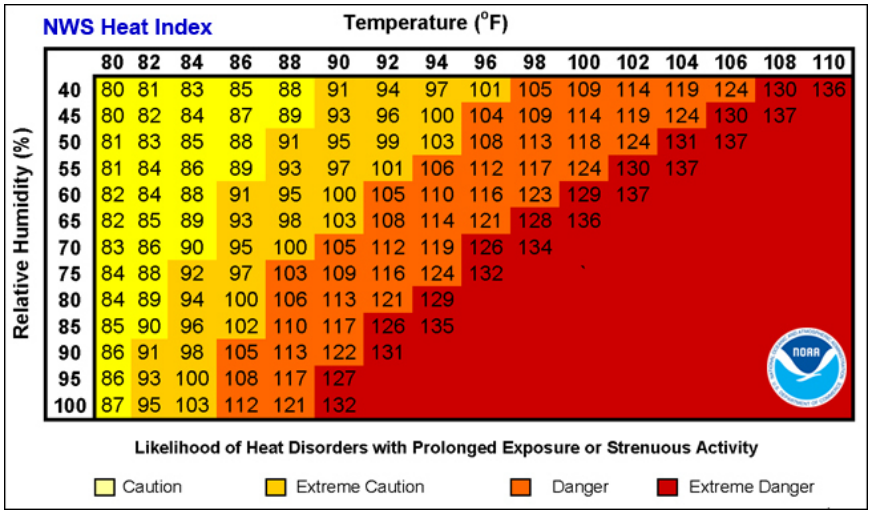


Figure 90: National Weather Service Heat Index

[227] National Weather Service, "What is the Heat Index?" https://www.weather.gov/ama/heatindex

VULNERABILITY

Extreme heat is associated with more fatalities than any other severe weather event in the United States. During extreme heat events, a person's body temperature may rise faster than it can cool itself, leading to heat-related illnesses such as heat exhaustion or heat stroke. Older adults, young children, pregnant women, and individuals with chronic diseases, such as cardiovascular or respiratory conditions, are at the highest risk. Outdoor workers and unhoused populations are also particularly vulnerable. People who live in social isolation are also at higher risk. Social factors, including race and ethnicity, income, and educational attainment, are correlated with many health outcomes, including heat-related illness. Lower-income individuals who live in housing without air conditioning may be at risk. Those living and working near urban heat islands may be more vulnerable.

Extreme heat is also related to wildfire risk. High temperatures contribute to the drying out of vegetation, which may burn more rapidly once ignited. These conditions are exacerbated if they occur during times of drought. This could worsen the risk in already wildfire-susceptible areas, such as Hungry Valley.

ESTIMATED IMPACT AND POTENTIAL LOSSES

The Reno-Sparks Indian Colony is likely to face significant impacts due to extreme heat, which can pose various challenges and potential losses for the community. One major concern is health risks, particularly for vulnerable populations such as the elderly, children, and individuals with pre-existing health conditions. Higher temperatures can lead to heat-related illnesses, such as heat exhaustion and heat stroke, straining medical resources and increasing healthcare costs for the community.

Extreme heat can also have detrimental effects on local agriculture. Prolonged high temperatures may damage crops and reduce yields, thereby threatening food security for the community. Those who rely on farming for their livelihood could experience substantial economic losses, which could ripple throughout the local economy. Additionally, water supply issues may arise as high temperatures exacerbate water scarcity, increasing competition for limited resources. This situation can impact both the availability of drinking water and irrigation, further straining agricultural efforts.

Moreover, the infrastructure of the Reno-Sparks Indian Colony may experience increased stress due to extreme heat. As temperatures rise, demand for electricity for cooling is expected to surge, potentially leading to power outages if the existing infrastructure is inadequate to handle peak demands. Such outages not only disrupt the comfort and safety of residents but can also have broader implications for community services and emergency responses.

On an economic level, extreme heat may deter tourism and outdoor activities, leading to decreased revenue for local businesses. The costs incurred in adapting community infrastructure to cope with heat—such as establishing cooling centers or upgrading energy sources—can also strain budgets. Environmental changes, including shifts in local ecosystems,

may further disrupt traditional practices and cultural values tied to the land, challenging the community's connection to its heritage.

Finally, the mental health effects of prolonged extreme heat should not be overlooked. Increased stress and anxiety can stem from the hardships associated with rising temperatures, particularly in communities already dealing with socioeconomic challenges. Addressing these multifaceted impacts will require a coordinated effort that emphasizes planning, resource management, and community engagement to build resilience against the ongoing threats posed by climate change.

VULNERABLE POPULATIONS

Vulnerable populations on the Reno-Sparks Indian Colony in Nevada facing risks from extreme heat include the elderly and young children. Older adults may have reduced physiological responses to heat, while young children struggle to regulate their body temperature, making both groups susceptible to heat-related illnesses.

Individuals with chronic health conditions, such as diabetes or heart disease, are also at higher risk due to exacerbated symptoms during extreme heat. Low-income families often lack access to essential resources, such as air conditioning, making them particularly vulnerable.

Homeless individuals face significant risks without access to safe, cool environments, while people with disabilities may encounter barriers that limit their ability to cope with high temperatures. Additionally, outdoor workers are exposed to extreme heat for extended periods, thereby increasing their risk of heat-related injuries.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 225 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 225: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**

Risk Factor Value	Overall Risk
0 – 1.9	**Low**

Table 226 provides the Calculated Priority Risk Index (CPRI) for extreme weather impacts (including extreme heat) in the Reno-Sparks Indian Colony (RSIC) based on the current plan's hazard risk assessment results. The RSIC assigned extreme weather impacts a risk factor value of 3.4, reflecting high probability, long duration, and high frequency impacts. This risk factor value falls in the range of 2.5 to 4.0, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 226: Calculated Priority Risk Index for Extreme Weather in the Reno-Sparks Indian Colony

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Extreme Weather	4	3	1	4	4	3.4	High

EXISTING MITIGATION CASE STUDY

Several municipal, county, and tribal governments and community groups based in the Reno-Sparks area are teaming up to map the hottest parts of Reno, Sparks, and adjacent portions of Washoe County. The National Oceanographic and Atmospheric Administration (NOAA) is partnering with the U.S. Departments of Health and Human Services and Housing and Urban Development to map urban heat islands.[228]

The City of Reno has been awarded a $500,000 grant from the United States Department of Agriculture and the U.S. Forest Service as part of the federal government's efforts to plant and maintain trees, combat extreme heat, and improve access to nature in cities nationwide.[229]

[228] Desert Research Institute, 2024, Reno-Sparks selected to be part of Urban Heat Mapping Campaign – DRI

[229] MyNews4, Alyssa Beck, September 21, 2023, Reno named fastest-warming city in the United States from Climate Center (mynews4.com)

Drought

LOCATION

Nevada is the driest state in the nation. The RSIC has experienced near annual droughts. These long periods of droughts have led to conservation of water in both the Hungry Valley and Reno Tribal community.

PREVIOUS OCCURRENCES/HISTORY

Drought conditions occur frequently in Washoe County and impacts the RSIC. On average over the last five years, severe drought has occurred every two years. While drought has not resulted in any reported damages to the RSIC, it does require consistent conservation of water use.

EXTENT

The overall magnitude and potential severity of drought could range from an abnormally dry to exceptional drought. Drought impacts are wide-reaching and may be economic, environmental, and/or societal. Long-term drought could impact RSIC infrastructure.

PROBABILITY OF FUTURE OCCURRENCES

Drought is one of the least predictable hazards. In the current state of seasonal weather prediction, it is nearly impossible to predict the beginning or the ending of droughts with meaningful confidence levels. Climate projections suggest that there is potential for greater year-to-year variability in precipitation. This may further complicate drought planning in the future. With that said, periods of drought have regularly occurred in the recent history of Washoe County and Nevada; therefore, drought can be expected to occur with some regularity in the future with an approximately 50% chance of occurrence in a given year.

VULNERABILITY

Rural communities typically rely on groundwater resources for municipal Although groundwater sources tend to be more resilient to short-term droughts than surface water sources, the intensity and length of droughts may increase under changing climate conditions. Under these conditions, rural water supplies may be more vulnerable to drought conditions. The most significant impact to the RSIC may be to the environment, including through the secondary hazard of wildfire. Water resources are also considered a vital cultural resource of the tribe. The effects of drought can last from one to multiple years, and the economic and social impacts of drought are likely to be compounded as prolonged drought conditions persist.

ESTIMATED IMPACT AND POTENTIAL LOSSES

The impacts of drought on the Reno-Sparks Indian Colony could be significant, affecting various aspects of life and the environment. One of the most immediate concerns is the reduction in water supply, which is crucial for both drinking water and agricultural irrigation. This limitation could severely impact the community's ability to sustain crops and livestock, resulting in food insecurity and economic hardship for families that rely on agriculture for their livelihoods.

Economic losses from drought can extend beyond the agricultural sector. If farming yields decline, families may face financial challenges, which could, in turn, affect local businesses that depend on the community's purchasing power. As residents struggle to make ends meet, overall economic activity within the colony could decline, creating a cycle of hardship and reduced resilience.

Drought conditions can also have a profound cultural impact on the Reno-Sparks Indian Colony. Many Native American communities emphasize their connection to the land and natural resources, which are integral to traditional practices and ceremonies. A decrease in available resources can lead to a disconnection from these cultural practices, affecting the community's identity and heritage.

Health risks associated with drought are another critical concern. Limited access to clean water can lead to health issues, including dehydration and the spread of waterborne diseases. Additionally, dry air conditions may contribute to respiratory problems, further exacerbating health challenges within the community.

The ecological consequences of drought cannot be overlooked either. Reduced water availability can lead to habitat loss for various species, negatively impacting local biodiversity. This, in turn, can disrupt traditional hunting and foraging practices that are vital for cultural sustainability.

Finally, drought may place additional strain on existing infrastructure. Effective management of water resources becomes increasingly essential during these times, which may require costly updates and repairs.

VULNERABLE POPULATIONS

In the Reno-Sparks Indian Colony in Nevada, several populations are particularly vulnerable to drought. Elderly residents often face mobility challenges and health issues that impede their access to essential resources, such as water and food. Low-income families also struggle during drought conditions, as they may not be able to afford bottled water or other essential supplies, which creates significant stress.

Young children are at higher risk for dehydration and heat-related illnesses, making their protection a priority during such times. Individuals with pre-existing health conditions, including

chronic illnesses, face greater dangers due to limited access to healthcare and resources under drought conditions.

Moreover, populations dealing with substance use disorders may find it even harder to access care during droughts, adding to their vulnerability. Lastly, those tied to traditional agricultural practices may see their cultural traditions threatened by water shortages.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 227 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 227: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 228 provides the Calculated Priority Risk Index (CPRI) for drought impacts in the Reno-Sparks Indian Colony (RSIC) based on the current plan's hazard risk assessment results. The RSIC assigned drought impacts a risk factor value of 3.1, reflecting long duration and high frequency impacts. This risk factor value falls in the range of 2.5 to 4.0, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 228: Calculated Priority Risk Index for Drought in the Reno-Sparks Indian Colony

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Drought	3	3	1	4	4	3.1	High

EXISTING MITIGATION CASE STUDY

Groundwater is used for drinking water by more than 50% of people in the United States. In Truckee Meadows, groundwater is a vital component of the community's water supply. Much of the local water demand is met using surface water from the Truckee River. However, during times of low river flows (such as under drought conditions) or times when Truckee River water is heavy with sediment or otherwise unavailable, the community may be entirely dependent on groundwater. In Truckee Meadows, up to 30% of drinking water is currently derived from groundwater in a given year. Groundwater wells must be protected or abandoned per state regulations to keep them from becoming conduits for groundwater contamination. The Washoe County Health District (WCHD) also regulates activities to protect the environment from contamination.[230]

Volcano

LOCATION

No active volcanoes are in Washoe County. The three closest, potentially active volcanoes are in California.

PREVIOUS OCCURRENCES/HISTORY

The 2023 Enhanced SHMP noted that Nevada has had a long history of volcanism and, "Small eruptions from the Mono Craters area near Lee Vining and Mono Lake in eastern California have sent ash into Nevada as recently as about 260 years ago; an eruption from these volcanoes presents the most likely current volcanic hazard for Nevada. Other volcanoes that have erupted in recent history and could deposit ash in Nevada include Lassen Peak, Mount Shasta, the Long Valley Caldera in California, and volcanoes in the Cascade Mountains in Oregon."[231]

Volcanic activity from surrounding states, particularly California and Oregon, has created ash clouds that have drifted over Nevada, as evidenced by many young ash beds in western Nevada. An eruption from these volcanoes presents the most likely current volcanic hazard for Nevada. Other volcanoes that have erupted in recent history and could deposit ash in Nevada include Lassen Peak, Mount Shasta, the Long Valley Caldera in California, and volcanoes in the Cascade Mountains in Oregon. Ash from the 1915 eruption of Lassen Peak traveled at least 200 miles northeast to Winnemucca. The eruption of Mount St. Helens in 1980 deposited up to several centimeters of ash several hundred kilometers away from the volcano. The biggest threat to Nevada from eruptions in California and Oregon is damage to flying aircraft.

[230] WashoeCounty.gov, 2024, Groundwater & Our Local Water Supply (washoecounty.gov)
[231] 2023 Enhanced SHMP, Section Three, "Volcano (Low Risk)"

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

Seismic and geodetic data at the north end of Lake Tahoe have been interpreted by researchers at the University of Nevada, Reno (UNR).[232] These data indicate active magma at a depth of approximately 19 miles (30 kilometers). There does not appear to be a near-term threat of volcanic eruptions from this area, partly because the last documented eruption in the area was approximately one million years ago.

The eruption of Lassen Peak in 1915 caused localized debris flows and a pyroclastic cloud that caused damage and deforestation in a 3-square-mile area and flooding and debris flows up to 10 miles from the volcano in Hat Creek. Ash from the eruption traveled at least 200 miles northeast to Winnemucca, Nevada.

EXTENT

The magnitude and potential severity of impacts of a volcanic eruption is considered Medium for Washoe County. However, Washoe County is close enough to the Long Valley Caldera to be impacted by ashfall less than 5 centimeters thick, based on a small to moderate eruption.

PROBABILITY OF FUTURE OCCURRENCES

The 2023 Enhanced SHMP notes that Nevada's most likely volcanic hazard is an eruption from Mono Craters, Inyo Craters, and Mammoth Mountain. Active volcanoes within approximately 150 miles of Reno have erupted four times in the past 304 years. This indicates a 1.3% chance of these volcanoes erupting in a year. Therefore, the probability of occurrence with direct consequences for the planning area is considered Very Low.

Volcanic risk is Low, but it could increase if a volcano becomes active. The probability is low, but the consequences could have a severe local impact. Mitigation actions are limited to public awareness and evacuation procedures at the local level. No significant impacts are expected of the volcanic hazard in Nevada from climate change.

There are no direct connections between future climate conditions and volcanic activity.

[232] K. D. Smith and others, 2004, Evidence for deep magma injection beneath Lake Tahoe, Nevada–California: Science, v. 305, p. 1277–1280

VULNERABILITY

Volcanic hazards, particularly ashfall, have a very low probability of occurring. If they were to occur, the RSIC may experience some ashfall. Given the limited evacuation routes particularly around Hungry Valley, the tribal community may have to shelter in place.

ESTIMATED IMPACT AND POTENTIAL LOSSES

Estimating the impacts and potential losses to the Reno-Sparks Indian Colony due to volcanic activity encompasses several important considerations. First, health impacts could be significant. Volcanic eruptions often release ash, gases, and other pollutants into the air, which can lead to respiratory problems and other health complications. Vulnerable populations within the community, including the elderly and individuals with pre-existing health conditions, may face heightened risks, which adds a layer of concern for the well-being of residents.

Property damage is another critical issue. Should an eruption occur nearby, it could result in damage to residential and commercial properties within the colony. Ashfall, lava flows, and mudflows can wreak havoc, leading to substantial financial losses for both homeowners and local businesses. The cost of repairs and rebuilding could strain resources and significantly impact the community's economic stability.

Displacement is a potential consequence of a major volcanic event. In the face of such an emergency, evacuation may be necessary, which could displace residents temporarily or even permanently. This disruption has the potential to affect community cohesion, cultural practices, and the economic activities that sustain livelihoods. Additionally, the strain on local infrastructure, including roads, utilities, and emergency services, is a concern. Volcanic activity could compromise these essential services, requiring costly repairs and upgrades that could take considerable time and resources to implement.

The broader economic impacts should also be considered. The local economy may suffer as industries like tourism and agriculture are adversely affected by volcanic activity. Businesses might face temporary closures, leading to job losses and reduced income for residents, further exacerbating financial challenges within the community. Lastly, the cultural implications are significant; volcanic eruptions can alter sacred sites, traditional lands, and cultural heritage, impacting the community's identity and practices in profound ways.

VULNERABLE POPULATIONS

Populations on the Reno-Sparks Indian Colony in Nevada that may be vulnerable to volcanic activity include elderly residents, children, and those with pre-existing health conditions. Elderly individuals often have mobility challenges that complicate evacuation during emergencies, while young children are particularly at risk from health issues related to volcanic ash and gases.

Individuals with chronic conditions, such as asthma, may face serious complications from ash inhalation. Low-income families may struggle to access necessary resources and safe housing during a crisis, heightening their vulnerability. Additionally, the cultural significance of the land adds another layer of concern, as volcanic activity can threaten both safety and heritage.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 229 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 229: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 230 provides the Calculated Priority Risk Index (CPRI) for volcano impacts in the Reno-Sparks Indian Colony (RSIC) based on the current plan's hazard risk assessment results. The RSIC assigned volcano impacts a risk factor value of 1.6, reflecting long duration and quick onset impacts. This risk factor value falls in the range of 0 to 1.6, which is considered a low-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 230: Calculated Priority Risk Index for Volcano in the Reno-Sparks Indian Colony

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Volcano	1	1	4	4	1	1.6	Low

Criminal Acts and Terrorism

LOCATION

Any populated area can be impacted by acts of violence or terrorism. These areas include shopping centers, business centers, financial districts, clinics and hospitals, schools, and government offices and buildings. Tribal economic facilities, tribal government buildings, the Reno health clinic, water treatment plant, other government buildings, and the Tuscarora pipeline that runs across approximately 6 miles of Tribal property are the primary concerns for the Colony in preventing criminal acts and acts of terrorism. In particular, those assets that are available to the public may be at greater risk to criminal acts and terrorism.

PREVIOUS OCCURRENCES/HISTORY

While there have not been any recent active threat events that have directly impacted the Colony, there have been several active shooter events in the Reno-Sparks area, including the following:

- **March 29, 2024** – Three officers in the City of Spark, NV, were shot by a gunman in a standoff that lasted for hours.
- **April 8, 2024** – Three people were killed, including the gunman, in an office building shooting in Summerlin, Nevada.
- **November 28, 2017** – A 30-year-old male gunman rained gunfire down onto Sierra Street from the eighth 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 one minor injury was reported from a passerby.
- **October 29, 2015** – A Reno Walmart employee shot and wounded three Walmart employees.
- **September 6, 2011**: A gunman opened fire at an International House of Pancakes Restaurant (IHOP), killing four people and wounding seven others.
- **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.
- **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.
- **November 28, 2013**: A gunman was shot and killed by police in downtown Reno after he fired multiple shots from a hotel. A bystander reported a minor injury.

EXTENT

With no existing records of recent active threats directly impacting the Tribe, it is difficult to estimate the extent or probability of its occurrence. Nonetheless, it can be deduced that active threats could affect all areas of the RSIC; government facilities and schools may be most likely targeted.

PROBABILITY OF FUTURE OCCURRENCES

Future weather conditions have no direct connection to active threats. However, increased development and urbanization can increase the probability of an active threat in the future.

VULNERABILITY

No estimates are available to determine the potential losses associated with active threats. However, we can assume that schools and government buildings would likely be a top target if an active threat were directed at the Colony. Active threats could impact 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; declines in economic activity and hospitality; loss of commercial business after the event; and an increased need for emergency services and funding.

VULNERABLE POPULATIONS

The Reno-Sparks Indian Colony in Nevada has several populations that are particularly vulnerable to criminal acts and terrorism. Elderly residents often face physical limitations that make them targets for scams and abuse, as they may struggle to seek help or escape dangerous situations.

Children and youth are also at risk, as they may lack awareness of their surroundings and not know how to report suspicious activities. Low-income families experience economic hardships that can lead to desperation, increasing their risk of both perpetration and victimization due to limited resources.

Individuals with disabilities are another vulnerable group, as their challenges can make them easy targets for exploitation. Furthermore, marginalized community members, such as those facing discrimination, may be more susceptible to hate crimes and violence.

Lastly, those dealing with substance abuse face heightened risks of victimization due to their circumstances.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 231 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 231: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 232 provides the Calculated Priority Risk Index (CPRI) for criminal acts and terrorism impacts in the Reno-Sparks Indian Colony (RSIC) based on the current plan's hazard risk assessment results. The RSIC assigned criminal acts and terrorism impacts a risk factor value of 2.6, reflecting medium magnitude, medium duration, and medium frequency impacts. This risk factor value falls in the range of 2.5 to 4.0, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 232: Calculated Priority Risk Index for Criminal Acts and Terrorism in the Reno-Sparks Indian Colony

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Criminal Acts and Terrorism	2	3	2	3	3	2.6	High

EXISTING MITIGATION CASE STUDY

The Reno-Sparks Indian Colony received support from the Congressional delegation, including Senator Rosen, Senator Cortez Masto, and Congressman Amodei, for the award of $265,000 in the federal 2024 spending package to be used to replace outdated patrol vehicles and improve the radio and computer systems in these vehicles to better support emergencies on tribal land. All tribal communities and the Reno, Sparks, and Washoe County communities surrounding

tribal lands will benefit from the improvement in policing supported by the much-needed funds.[233]

The goal of the RSIC Police Outreach Program is to create a partnership with community members and citizens through collaborative programs and work with service providers and other agencies to reduce crime rates, protect police officers, and protect the community. Active programs include the Public Safety Cadet Program, D.A.R.E. Program, and Senior Safe Awareness Program.

Extreme Weather (Winter Storms)

LOCATION

Winter storms could impact the entire Colony.

PREVIOUS OCCURRENCES/HISTORY

NOAA's NCEI Storm Events Database records 142 Winter Weather, Winter Storms, and Heavy Snow events in Washoe County between 2019 and 2023. In 2022 and 2023, RSIC reported travel impacts as well as power outages with some outages lasting longer than 24 hours due to winter storms lasting several days with record high snow pact.

EXTENT

Overall, the possible extent of this hazard is considered low. While winter storm do occur, they are typically taken care at the local or county level. Major transportation routes, such as I-80, are more likely to be impacted by winter storm events.

PROBABILITY OF FUTURE OCCURRENCES

The probability of a winter storm in Washoe County is High, based on an average frequency of three events per year according to the NRI. There is mixed research on whether winter precipitations are likely to increase or decrease in the coming decades due to climate change. However, it can be assumed the RSIC will be impacted by winter weather again in the future.

VULNERABILITY

RSIC's vulnerability to winter storms includes disruption of transport routes, power outages, and potential infrastructure impacts. Residential homes, Tribal health center, Tribal senior center, and recreational facilities may not be equipped to withstand extreme weather events or

[233] Jack Rosen US Senator for Nevada, March 2024, Law Enforcement Leaders Across Nevada Praise Critical Project Funding Secured by Senators Rosen, Cortez Masto – Jacky Rosen (senate.gov)

long-term power outages due to winter weather. Winter storms are dangerous and could potentially result in the loss of life of injury, especially to community members who are elderly, have a disability, or are unprepared for power outages. Additionally, community activities including annual craft years, annual tribal health fairs, and the New Year Powwow could be impacted by winter conditions.

ESTIMATED IMPACT AND POTENTIAL LOSSES

The Reno-Sparks Indian Colony faces various potential impacts and losses due to winter storms, which can significantly disrupt the community's daily life and economy. One of the primary concerns is infrastructure damage, as heavy snowfall and ice can affect roads, buildings, and essential utilities. This disruption can lead to costly repairs and limit access to necessary services, such as water and electricity, potentially leaving residents vulnerable during harsh winter conditions.

Economic losses are another critical consideration, as local businesses may experience temporary closures or diminished customer traffic during severe storms. The effects can ripple through the community, impacting employment and local revenue. Additionally, the costs associated with emergency response—such as snow removal, healthcare access, and community support services—can strain the colony's budget, especially if storms are frequent or particularly severe.

Health and safety risks increase with winter storms, as residents may face hazards such as slips and falls or difficulties in accessing medical care due to transportation challenges. Vulnerable populations, including the elderly or those with mobility issues, are particularly at risk during these conditions. Agriculture, if present in the colony, can also be affected, with potential damage to crops and livestock that could lead to food insecurity.

Lastly, winter storms can place additional strain on social services, leading to increased demand for food assistance, shelter, and other forms of support.

VULNERABLE POPULATIONS

Populations on the Reno-Sparks Indian Colony in Nevada vulnerable to winter storms include elderly residents, low-income families, individuals with disabilities, single-parent households, homeless individuals, and children.

Elderly residents face risks due to mobility and health concerns, making it difficult for them to evacuate or access services during harsh weather. Low-income families may struggle to prepare adequately for storms due to financial constraints, limiting their ability to stock supplies or ensure safe heating.

Individuals with disabilities rely on caregivers and may encounter challenges during emergencies if support systems are disrupted. Single-parent households often lack the resources and support needed to navigate the difficulties posed by winter storms.

Homeless individuals are particularly vulnerable, lacking safe shelter and proper clothing to protect against the cold, while children depend on adults for guidance and protection during severe weather.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 233 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 233: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 234 provides the Calculated Priority Risk Index (CPRI) for extreme weather impacts (including winter storms) in the Reno-Sparks Indian Colony (RSIC) based on the current plan's hazard risk assessment results. The RSIC assigned extreme weather impacts a risk factor value of 3.4, reflecting high probability, long duration, and high frequency impacts. This risk factor value falls in the range of 2.5 to 4.0, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 234: Calculated Priority Risk Index for Extreme Weather in the Reno-Sparks Indian Colony

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Extreme Weather	4	3	1	4	4	3.4	High

Avalanche and Landslide

LOCATION

Regional transportation routes, including over the Sierra Nevada mountains, could be impacted by avalanches and landslides. There are no avalanche risk zones within the RSIC. Therefore, it can be assumed that this hazard is not one that the RSIC needs to profile further. There are areas where landslides may occur, particularly to the north of Hungry Valley. Landslides in Nevada are typically confined to specific areas and generally result in less severe economic consequences than hazards that affect larger regions. Landslide hazard areas include foothills and mountain areas with fractured and steep slopes.

PREVIOUS OCCURRENCES/HISTORY

While there are no records of damages to RSIC due to landslides, at least one landslide may have occurred in the northern section of the Colony.

EXTENT

With no existing records of recent impacts to the Tribe, it is difficult to estimate the extent or probability of its occurrence. Nonetheless, it can be deduced that landslides may have the RSIC. Most impacts would likely be limited to transportation routes or natural resources.

PROBABILITY OF FUTURE OCCURRENCES

The probability of future occurrence of landslides is Medium. The County may be impacted by an increase in the probability of future landslides, based on potential increases in drought and wildland fires and changes in winter precipitation. `

VULNERABILITY

RSIC does not have a great vulnerability to landslides to note. Of RSIC's assets, the Verdi Smoke Shop (Smoke Shop IV) is slightly more at risk to this hazard than others with moderate instead of low susceptibility.

ESTIMATED IMPACT AND POTENTIAL LOSSES

The Reno-Sparks Indian Colony faces significant risks from both avalanches and earthquakes, given its geographic and geological context. Areas near mountainous terrain are particularly vulnerable to avalanche activity, especially during the winter months. The potential impacts of avalanches can be profound, leading to substantial property damage as homes and infrastructure may be destroyed or severely compromised. Additionally, such events can block vital roads, isolating the community and hindering access for emergency services and essential supplies. This disruption can result in high economic costs associated with cleanup efforts and repairs, alongside the potential loss of revenue for local businesses.

In terms of earthquakes, the Reno-Sparks area is located near several fault lines, making it susceptible to seismic activity. Like avalanches, earthquakes can lead to significant structural damage. Buildings and infrastructure could be destroyed, necessitating extensive repairs or even complete relocations. The human safety aspect cannot be overlooked, as earthquakes pose risks to residents, which may lead to injuries or loss of life. The economic impact of an earthquake can be staggering, straining local resources, affecting employment, and resulting in long-term financial losses for the community.

Estimating potential losses from these natural disasters can be challenging without detailed analysis from professionals in emergency management or geology. However, it is not uncommon for the economic losses from major events to run into millions of dollars, especially if critical structures are affected. Beyond direct damages, there are also indirect costs, such as disruptions to businesses and impacts on tourism, which can further exacerbate financial challenges faced by the community.

To mitigate these risks, it is crucial for the Reno-Sparks Indian Colony to implement comprehensive preparedness strategies. This includes adopting stringent building codes to ensure structures can withstand earthquakes and are less vulnerable to avalanche threats. Developing thorough emergency response plans and conducting regular drills can significantly enhance the community's ability to respond effectively to disasters. Moreover, educating residents about the risks and preparing them for potential emergencies is vital in building resilience against avalanches and earthquakes. Overall, proactive measures and community awareness will be critical in minimizing the potential impacts and losses from these natural hazards.

VULNERABLE POPULATIONS

Certain populations on the Reno-Sparks Indian Colony in Nevada are particularly vulnerable to avalanches and landslides. Elderly residents may struggle with mobility, making quick evacuation difficult during emergencies. Children, who may not fully understand the dangers, also face increased risks without proper guidance.

Individuals with disabilities often require additional assistance, and their vulnerability can heighten in emergencies. Low-income families may lack resources for effective disaster preparedness, while those living in high-risk areas, such as steep terrains, are directly threatened by these natural events.

Transient populations, like seasonal workers or visitors, might be unaware of local hazards, leaving them unprepared.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 235 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 235: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 236 provides the Calculated Priority Risk Index (CPRI) for avalanche and landslide impacts in the Reno-Sparks Indian Colony (RSIC) based on the current plan's hazard risk assessment results. The RSIC assigned avalanche and landslide impacts a risk factor value of 1.5, reflecting medium duration and quick onset impacts. This risk factor value falls in the range of 0 to 1.9, which is considered a low-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 236: Calculated Priority Risk Index for Avalanche and Landslide in the Reno-Sparks Indian Colony

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Avalanche and Landslide	1	1	4	3	1	1.5	Low

Infectious Disease

LOCATION

The entire Colony is at-risk from infectious disease. Many potentially devastating diseases are spread through physical contact, ingestion, insect bites, and inhalation. Airborne diseases and those spread through physical contact pose higher risks to the community because they are difficult to isolate and control. Some diseases can spread quickly through food and water source

or be transmitted through animal vectors. Areas in the county that are more susceptible to infectious diseases are typically those with higher population density, such as Reno, and areas with poor sanitation and limited access to healthcare services.

PREVIOUS OCCURRENCES/HISTORY

Multiple cases of various infectious diseases have been reported in Washoe County, as described in the base plan. In March 2020, the RSIC officially declared a State of Emergency due to the COVID-19 pandemic. In order to reduce the spread of the disease, the Tribal Council enacted a mandatory curfew and stay at home order limiting unnecessary social gatherings.

EXTENT

The overall magnitude and potential severity of infectious disease outbreak impacts are considered Medium in Washoe County. Typical disease outbreaks are handled at the city or county level. Severe outbreaks may disrupt services for weeks, and economic impacts may be felt at the county level. COVID-19 was a unique exception which had worldwide impacts. While the impacts were felt globally, the reality of the pandemic was also felt close to home for the RSIC, demonstrating the need for things like additional on-reservation housing and support for multi-generational households.

PROBABILITY OF FUTURE OCCURRENCES

Climate change can have significant impacts on the spread of infectious diseases. As temperatures and precipitation patterns shift, the geographic range of disease-carrying vectors, such as mosquitoes and ticks, can expand, bringing diseases like malaria, dengue fever, and Lyme disease into new areas. Warmer temperatures can also speed up the reproduction and development of these vectors, allowing them to spread diseases more quickly. In addition, changes in precipitation can create new breeding grounds for disease-carrying organisms. Overall, climate change can create more favorable conditions for the transmission and spread of infectious diseases, posing a threat to global public health.

Cases of infectious disease occur annually in Washoe County, and the probability of future events is estimated as Medium. Based on potentially changing climate patterns, an increase in the likelihood of emerging infectious diseases may impact the RSIC. In particular, the Reno Colony may be at higher risk due to its more urban setting.

VULNERABILITY

Infectious diseases have been known to spread quickly through communities. Many spread through close contact, meaning that highly populated areas like Reno more prone to widespread outbreaks. Public gathering places where people may be together in close quarters, such as schools and childcare facilities, offices, and transportation terminals, provide more opportunities for diseases to pass from one person to another.

Vulnerable populations, including the elderly and those living with preexisting medical conditions, are at the greatest risk from an infectious disease. During the COVID-19 pandemic, the Senior Center supported vulnerable populations including elders, elders living alone, elders with grandkids living with them, disabled adult clients, elders who are not normally seen on a daily/weekly basis, and youth recommended as in need of food.

Infrastructure is unlikely to be impacted be an infectious disease, but worker productivity could be impacted by another widespread event like COVID-19 and businesses may close.

VULNERABLE POPULATIONS

Vulnerable populations on the Reno-Sparks Indian Colony in Nevada face increased risks for infectious diseases, particularly the elderly, who often have weakened immune systems and chronic health conditions. Children, especially those who are not fully vaccinated, are also at higher risk due to their developing immune systems.

Individuals with chronic illnesses, such as diabetes or respiratory diseases, and pregnant women are similarly vulnerable, as their health can be compromised by infections. Limited access to healthcare services further exacerbates these risks, preventing timely vaccinations and treatments for those in need.

Additionally, individuals who engage in substance use and the homeless population face unique challenges that heighten their susceptibility to infections. Low-income families encounter barriers related to healthcare access and nutrition, which can increase their vulnerability.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 237 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 237: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 238 provides the Calculated Priority Risk Index (CPRI) for infectious disease impacts in the Reno-Sparks Indian Colony (RSIC) based on the current plan's hazard risk assessment results. The RSIC assigned infectious disease impacts a risk factor value of 2.8, reflecting medium probability, long duration, and high frequency impacts. This risk factor value falls in the range of 2.5 to 4.0, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 238: Calculated Priority Risk Index for Infectious Disease in the Reno-Sparks Indian Colony

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Infectious Disease	3	2	1	4	4	2.8	High

EXISTING MITIGATION CASE STUDY

The Reno-Sparks Tribal Health Center (RSTHC) is a tribally-owned and operated clinic in the Reno Colony which provides health care services to American Indians and Alaska Natives. The Tribal Council is the governing body of RSTHC. During the COVID-19 pandemic in 2020, the RSTHC was the first Tribal Health Clinic in Nevada to give Tribal Health Care Workers the vaccine. As of 2023, it was offering incentives to help encourage enrolled tribal members to get the COVID vaccine and booster. The RSTHC also received a grant from FEMA for preparedness training and equipment to help prepare the RSTHC for a disaster in order to be able to maintain operations and reduce the impacts when a disaster event occurs.

Hazardous Waste

In general, the RSIC's risk of Hazardous Waste incidents does not vary significantly from the other plan participants, as described in the base plan. Within the RSIC, the Reno tribal community is a greater risk due to the close proximity of I-180. No other significant areas of concern were identified by the tribe.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 239 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a

framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 239: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 240 provides the Calculated Priority Risk Index (CPRI) for hazardous materials incident impacts in the Reno-Sparks Indian Colony (RSIC) based on the current plan's hazard risk assessment results. The RSIC assigned hazardous materials incident impacts a risk factor value of 2.3, reflecting medium duration and quick onset impacts. This risk factor value falls in the range of 2.0 to 2.4, which is considered a medium-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 240: Calculated Priority Risk Index for Hazardous Materials Incident in the Reno-Sparks Indian Colony

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Hazardous Materials Incident	2	2	4	3	2	2.3	Medium

Radiological Waste Transport

In general, the RSIC's risk of Radiological Waste Transport incidents does not vary significantly from the other plan participants, as described in the base plan. Within the RSIC, the Reno tribal community is at greater risk due to the close proximity of I-180. No other significant areas of concern were identified by the tribe.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 241 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a

framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 241: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 242 provides the Calculated Priority Risk Index (CPRI) for radiological waste transport impacts in the Reno-Sparks Indian Colony (RSIC) based on the current plan's hazard risk assessment results. The RSIC assigned radiological waste transport impacts a risk factor value of 2.4, reflecting medium probability, long duration, and medium onset impacts. This risk factor value falls in the range of 2.0 to 2.4, which is considered a medium-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 242: Calculated Priority Risk Index for Radiological Waste Transport in the Reno-Sparks Indian Colony

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Radiological Waste Transport	3	2	3	4	1	2.4	Medium

Transportation Incident (Aircraft Crash)

In general, the RSIC's risk of transportation incidents does not vary significantly from the other plan participants, as described in the base plan. Within the RSIC land, the Reno tribal community is at greater risk due to the close proximity of the Reno-Tahoe International Airport which has the greatest volume of commercial aircraft services pass through. They are also in the proximity of the Spanish Springs Airport.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 243 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging

from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 243: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 244 provides the Calculated Priority Risk Index (CPRI) for transportation incident impacts in the Reno-Sparks Indian Colony (RSIC) based on the current plan's hazard risk assessment results. The RSIC assigned transportation incident impacts a risk factor value of 1.8, reflecting medium duration and quick onset impacts. This risk factor value falls in the range of 0 to 1.9, which is considered a low-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 244: Calculated Priority Risk Index for Transportation Incident in the Reno-Sparks Indian Colony

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Transportation Incident	2	1	4	3	1	1.8	Low

Exposure Assessment

Table 245 shows the exposure of the Tribe's identified critical facilities to natural hazards that can be mapped. (Note: Address and location information for some Tribal facilities are not publicly available. Hazard risks for these facilities are not included in the table.)

Table 245: Exposure Assessment of the Reno-Sparks Indian Colony

Type	Name	Address	Flood Zone	Seismic Ground Motion Hazards		Landslide Susceptibility	Wildland Fire Hazard Potential
				with 2% Probability	with 10% Probability		
Hospital	Tribal Health Center	1715 Kuenzli St, Reno, NV 89502	–	48–64	32–48	Low	1
Police Station	Tribal Police Station	405 Golden Ln, Reno, NV 89502	–	48–64	48–64	Low	1
Fire Station	Hungry Valley Fire Station	9075 Eagle Canyon Dr, Sparks, NV 89441	–	48–64	32–48	Low	1
School	Hungry Valley Gym/Rec Center	9055 Eagle Canyon Dr, Sparks, NV 89441	–	48–64	32–48	Low	1–2
School	Reno Gym	34 Reservation Rd, Reno, NV 89502	–	48–64	48–64	Low	1
Social Services	Hungry Valley Child Care Center	9055 Eagle Canyon Dr, Sparks, NV 89441	–	48–64	32–48	Low	1–2
Social Services	Reno Child Care Center	34 Reservation Rd, Reno, NV 89502	–	48–64	48–64	Low	1
School	Hungry Valley Head Start Center	9055 Eagle Canyon Dr, Sparks, NV 89441	–	48–64	32–48	Low	1–2
School	Reno Head Start Center	34 Reservation Rd, Reno, NV 89502	–	48–64	48–64	Low	1
Social Services	Reno Senior Center	34 Reservation Rd, Reno, NV 89502	–	48–64	48–64	Low	1
Government Building	Tribal Administration	34 Reservation Road, Reno, NV 89502	–	48–64	48–64	Low	1
Government Building	Records and Archives	15 Reservation Rd, Reno, NV 89502	–	48–64	48–64	Low	1

Type	Name	Address	Flood Zone	Seismic Ground Motion Hazards		Landslide Susceptibility	Wildland Fire Hazard Potential
				with 2% Probability	with 10% Probability		
Government Building	Enrollment Office	1933 Prosperity St, Reno, NV 89502	–	48–64	48–64	Low	1
Government Building	Public Works	400 Sunshine Ln, Reno, NV 89502	–	48–64	48–64	Low	1
Government Building	Planning/ Rentals	1925-1939 Prosperity St, Reno NV 89502	–	48–64	48–64	Low	1
Government Building	Housing	9055 Eagle Canyon Rd, Sparks, NV 89441	–	48–64	32–48	Low	1
Government Building	Tribal Court	1900 Prosperity St, Reno, NV 89502	–	48–64	48–64	Low	1
Water Treatment Plant	Hungry Valley Water Treatment Plant	272 Loop Rd, Sparks, NV 89441	–	48–64	32–48	Low	1–2
Wastewater Treatment Plant	Wastewater Lagoons	272 Loop Rd, Sparks, NV 89441	–	48–64	32–48	Low	1
Water	Water Storage Tank	272 Loop Rd, Sparks, NV 89441	–	48–64	32–48	Low	1
Enterprise	Smoke Shop I	2001 E. 2nd St, Reno, NV 89502	–	48–64	48–64	Low	1
Enterprise	Smoke Shop II	901 Golden Ln, Reno, NV 89502	–	64+	48–64	Low	1
Enterprise	Smoke Shop III	90 Auto Center Dr, 89511	–	48–64	32–48	Low	1
Enterprise	Verdi Smoke Shop (Smoke Shop IV)	420 Old Hwy 40, Verdi, NV 89439	–	48–64	32–48	Moderate	1

Type	Name	Address	Flood Zone	Seismic Ground Motion Hazards		Landslide Susceptibility	Wildland Fire Hazard Potential
				with 2% Probability	with 10% Probability		
Enterprise	Smoke Shop V	1962 Pyramid Way, Sparks, NV 89431	–	48–64	32–48	Low	1
Enterprise	Smoke Shop (Smoke Shop VI)	7655 Pyramid Hwy, Spanish Springs, Sparks, NV 89441	–	48–64	32–48	Low	1
Enterprise	Walmart Site	2425 East Second St, Reno, NV 89502	500-year flood zone	48–64	48–64	Low	1
Social Services	Hungry Valley Community Center	9055 Eagle Canyon Rd, Sparks, NV 89441	–	48–64	32–48	Low	1–2
Government Building	Facility Building – Reno	357 Golden Ln, Reno, NV 89502	–	48–64	48–64	Low	1
Enterprise	Vacant	2A Sunshine Lane, Reno, NV 89502	–	48–64	48–64	Low	1
Enterprise	Joe Scalia Motors, Car Dealership	690 Sunshine Lane, Reno, NV 89502	–	64+	48–64	Low	1

Key: N/A = Information not available, – = Critical facility is not in a mapped flood zone

Note: Hazard exposure for assets on the Hungry Valley reservation has been estimated based on hazards present within the reservation boundary.

Land Use and Development Trends

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

The RSIC has no commercial development intentions for its Hungry Valley community; however, residential development will increase, including plans for an RV park. This growing residential population will be at an increased risk of wildland fire and faces concerns about the impact of weather events on seasonal roads that may become impassable during an emergency.

The vulnerability subsection of each hazard profile in Section 3.3 outlines recent development trends to illustrate how the vulnerability might have changed over the past five years. Vulnerability changes have been measured for cultural resources, economic interests, and land use trends. Each measure has been identified as having increased, decreased, or unchanged vulnerability. Table 246 provides a snapshot of how recent vulnerability has changed.

Table 246: Recent Development Trends

Type of Hazard Event	Changes in Land Use	Changes in Population	Changes in Conditions (e.g., climate change)	Overall Vulnerability
Avalanche and Landslide	N/A	N/A	N/A	Same
Criminal Acts and Terrorism	N/A	N/A	N/A	Same
Drought	N/A	N/A	N/A	Same
Earthquake	N/A	N/A	N/A	Same
Energy Emergency	N/A	N/A	N/A	Same
Flood	N/A	N/A	N/A	Same
Hazardous Materials Incident	N/A	N/A	N/A	Same
Infectious Disease	N/A	N/A	N/A	Same

Type of Hazard Event	Changes in Land Use	Changes in Population	Changes in Conditions (e.g., climate change)	Overall Vulnerability
Radiological Waste Transport	N/A	N/A	N/A	Same
Extreme Weather (Winter Storm, Windstorms, Extreme Heat)	N/A	N/A	N/A	Same
Transportation Incident	N/A	N/A	N/A	Same
Volcano	N/A	N/A	N/A	Same
Wildland Fire	N/A	N/A	N/A	Same

Capability Assessment

FEMA	**C1.** Does the plan include a discussion of the tribal government's pre- and post-disaster hazard management policies, programs, and capabilities to mitigate the hazards in the area, including an evaluation of tribal laws and regulations related to hazard mitigation as well as to development in hazard-prone areas? 44 CFR §§ 201.7(c)() and 201.7(c)(3)(iv) **C2.** Does the plan include a discussion of tribal funding sources for hazard mitigation projects and identify current and potential sources of Federal, tribal or private funding to implement mitigation activities?

Planning and Regulatory

Planning and regulatory capabilities are the plans, policies, codes, and ordinances that prevent and reduce the impacts of hazards. Table 247 lists the RSIC's human and technical capabilities to engage in and improve mitigation planning and program implementation.

Table 247: Planning Capabilities of the Reno-Sparks Indian Colony

Plan	Do you have this? (Y/N)	Does the plan address hazards? (Y/N)	How can the plan be used to implement mitigation actions?	When was it last updated? When will it be updated next?
General Plan	Yes	Yes	Strengthen infrastructure, improve communications equipment, public education and awareness, policy regulation changes	2000, 2040 Comprehensive Plan Underway
Capital Improvement Plan	Yes	Yes	resilient construction designs, upgrade sewer infrastructure, implementation of green infrastructure	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.
Climate Change Adaptation Plan	No	N/A	N/A	N/A
Community Wildfire Protection Plan	No	N/A	N/A	N/A
Economic Development Plan	No	N/A	N/A	N/A

Plan	Do you have this? (Y/N)	Does the plan address hazards? (Y/N)	How can the plan be used to implement mitigation actions?	When was it last updated? When will it be updated next?
Land Use Plan	Yes	Yes	With the adoption of the 2018 building codes	In draft form, January 2024
Local Emergency Operations Plan	Yes	Yes	Qualitative and quantitative risk assessment plans, emergency response resources and multi-agency coordination	2017, working on updating the current plan
Storm-water Management Plan	No	N/A	N/A	N/A
Transportation Plan	Yes	Yes	The tribe has 2 collaborative plans of Reno and BIA (Bureau of Indian Affairs) to secure safe and secure passages on roadways and evacuation routes by addressing an all need for an all-weather road for evacuation routes.	Adopted in 2021, Must be updated in 2025
Substantial Damage Plan	No	N/A	N/A	N/A
Other? (Describe)	Washoe County has a Damage Assessment Plan that serves the	N/A	N/A	N/A

Plan	Do you have this? (Y/N)	Does the plan address hazards? (Y/N)	How can the plan be used to implement mitigation actions?	When was it last updated? When will it be updated next?
	same intent and covers all jurisdictions			

Table 248: Regulations and Ordinances of the Reno-Sparks Indian Colony

Plan	Does this regulation/ ordinance effectively reduce hazard impacts?	Is it adequately administered and enforced?	When was it last updated? When will it be updated next?
Building Code	Yes, when adopted	Not yet.	Tribal Council adopted the 2018 Model Codes in June 2024
Flood Insurance Rate Maps	Not Adopted	N/A	N/A
Floodplain Ordinance	Not Adopted	N/A	N/A
Subdivision Ordinance	Not Adopted	N/A	N/A
Zoning Ordinance	Not Applicable	N/A	N/A
Natural Hazard Specific Ordinance (Stormwater,	Not Adopted	N/A	N/A

Plan	Does this regulation/ ordinance effectively reduce hazard impacts?	Is it adequately administered and enforced?	When was it last updated? When will it be updated next?
Steep Slope, Wildfire)			
Acquisition of Land for Open Space and Public Recreation Use	Not Applicable	N/A	N/A
Prohibition of Building in At-Risk Areas	No	N/A	N/A
Other? (Describe)			

Administrative and Technical

Administrative and technical capabilities include staff and their skills. They also include tools that can help you carry out mitigation actions.

Table 249: Administrative Capabilities of the Reno-Sparks Indian Colony

Administrative Capability	Do you have this? (Y/N)	Is staffing adequate?	Is staff trained on hazards and mitigation?	Is coordination between agencies and staff effective?
Chief Building Official	Yes, on contract	Yes	No	Interdepartmental is effective, unsure about outside agencies, they are trained for hazards but not mitigation
Civil Engineer	No	N/A	N/A	N/A

Administrative Capability	Do you have this? (Y/N)	Is staffing adequate?	Is staff trained on hazards and mitigation?	Is coordination between agencies and staff effective?
Community Planner	Yes	No	Yes	Yes
Emergency Manager	Yes	No	Yes	Yes
Floodplain Administrator	No			
Geographic Information System (GIS) Coordinator	Yes	Yes	Yes	Yes
Planning Commission	No	N/A	N/A	N/A
Fire Safe Council	No	N/A	N/A	N/A
CERT (Community Emergency Response Team)	Yes	No	No	Interdepartmentally yes, no coordination with outside tribal agencies
Active VOAD (Voluntary Agencies Active in Disasters)	No	N/A	N/A	N/A
Other? (Please describe)				

Table 250: Technical Capabilities of the Reno-Sparks Indian Colony

Technical Capability	Do you have this? (Y/N)	How has the capability been used to assess/mitigate risk in the past? (Answer or N/A)	How can the capability be used to assess/mitigate risk in the future?
Mitigation Grant Writing	Yes	Through identified risks and applying for grant funding to mitigate hazards	Through interdepartmental collaboration to strengthen community resilience and address known hazards
Hazard Data and Information	Yes	Identified geographical areas and potential hazards	Allowing the tribe to mitigate new hazards has allowed them to reduce hazards in new geographical areas.
GIS	Yes	Prior GIS didn't focus on in the past	The current GIS coordinator is versed in hazard mitigation and has collaborated with emergency management to identify and update known hazards and engaged in information sharing between departments.
Mutual Aid Agreements	Yes	For additional emergency resources	Area-wide community collaboration and unified response during a disaster

Financial Resources

Financial capabilities are the resources to fund mitigation actions. Talking about funding and financial capabilities is important to determine what kinds of projects are feasible, given their cost. Mitigation actions like outreach programs are lower cost and often use staff time and existing budgets. Other actions, such as earthquake retrofits, could require substantial funding from local, state, and federal partners. Partnerships can be included, including partners willing to donate land, supplies, or an in-kind match and cash. The RSIC maintains many fiscal and financial resources to support its mitigation program. Table 251 identifies the specific resources accessible for use.

Table 251: Financial Capabilities of the Reno-Sparks Indian Colony

Funding Resource	Do you have this?	Has this funding resource been used in the past and for what types of activities?	Could this resource be used to fund future mitigation actions?	Can this be used as the local cost match for a federal grant?
Capital Improvement Project Funding	Yes	Yes, for tribal department improvements	Yes, but has to be a buy-in with tribal leadership	Yes, as long as there is a buy-in
General Fund	Yes	Yes, for tribal-wide improvements and contracts	No	No
Hazard Mitigation Grant Program (HMGP/404)	No	N/A	N/A	N/A
Building Resilient Infrastructure & Communities (BRIC)	No	N/A	N/A	N/A
Flood Mitigation Assistance (FMA)	No	N/A	N/A	N/A

Funding Resource	Do you have this?	Has this funding resource been used in the past and for what types of activities?	Could this resource be used to fund future mitigation actions?	Can this be used as the local cost match for a federal grant?
Public Assistance Mitigation (PA Mitigation/ 406)	No	N/A	N/A	N/A
Community Development Block Grant (CDBG)	Yes	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.
Natural Resources Conservation Services (NRCS) Programs	Yes	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.
U.S. Army Corps (USACE) Programs	No	N/A	N/A	N/A
Property, Sales, Income, or Special Purpose Taxes	Yes	No	No	No

Funding Resource	Do you have this?	Has this funding resource been used in the past and for what types of activities?	Could this resource be used to fund future mitigation actions?	Can this be used as the local cost match for a federal grant?
Stormwater Utility Fee	No	N/A	N/A	N/A
Fees for Water, Sewer, Gas, or Electric Services	No	No	No	No
Impact Fees from New Development and Redevelopment	N/A	N/A	N/A	N/A
General Obligation or Special Purpose Bonds	No	No	No	No
Federal-funded Programs (Please describe)	No	No	No	No
Other state-funded Programs (Please describe)	No	No	No	No
Private Sector or Nonprofit Programs	No	No	No	No
Other?	Bureau of Indian Affairs (BIA) (e.g., BIA's	Yes, Police, and Judicial services	No	No

Funding Resource	Do you have this?	Has this funding resource been used in the past and for what types of activities?	Could this resource be used to fund future mitigation actions?	Can this be used as the local cost match for a federal grant?
	Emergency Management Program or Tribal Climate Resilience Program)	and road maintenance		

Education and Outreach

Education and outreach capabilities are programs and methods that could communicate about and encourage risk reduction. These programs may be run by a participant or a community-based partner. Partners, especially those who work with underserved communities, can help identify additional education and outreach capabilities.

Table 252: Education and Outreach Capabilities of the Reno-Sparks Indian Colony

Education and Outreach Capability	Do you have this? (Y/N)	Does this resource currently incorporate hazard mitigation?	Notes
Community Newsletter(s)	Yes – Camp News	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	N/A
Hazard Awareness Campaigns (such as Firewise, Storm Ready, Severe Weather	Yes	Yes	They provide training specific to severe weather awareness, fire risk, HazMat, and Health Preparedness.

Education and Outreach Capability	Do you have this? (Y/N)	Does this resource currently incorporate hazard mitigation?	Notes
Awareness Week, School Programs)			
Public Meetings/Events (Please Describe)	Yes – Senior Center, UNITY Youth Council	No	Primarily, do tribal community engagement events only
Emergency Management Listserv	Yes – RAVE	Yes	Utilized during emergency events as well as public health events
Local News	No	No	Do have a PIO
Distributing Hard Copies of Notices (e.g., public libraries, door-to-door outreach)	Yes	No	Door to Door outreach is focused on special events for the tribe
Insurance Disclosures/ Outreach	No	No	No
Organizations that Represent, Advocate for, or Interact with Underserved and Vulnerable Communities (Please Describe)	Yes, Senior Center	No	The senior center is the elderly designated lunch area for seniors
Social Media (Please Describe)	Yes	No	Public awareness, office uses for cultural

Education and Outreach Capability	Do you have this? (Y/N)	Does this resource currently incorporate hazard mitigation?	Notes
			awareness, tribal activities, and education

National Flood Insurance Program Participation

The National Flood Insurance Program (NFIP) is a FEMA program that provides flood insurance to millions of policyholders across the country. The mitigation plan describes each participant's participation in the NFIP, as applicable, in accordance with NFIP regulatory requirements. The RSIC currently does not participate in the NFIP.

Table 253: Floodplain Management, Mapping, and Insurance for the Reno-Sparks Indian Colony

Question	Response
Why does the tribe not participate in the NFIP?	No, the tribe does not currently participate in the NFIP; however, we are interested and have reached out to FEMA.
Is the tribe interested in joining the NFIP?	Yes, Reno-Sparks Indian Colony is interested and has contacted FEMA Region 9 to set up a meeting.

Plan Integration

FEMA

C6. Does the plan describe a process by which the tribal government will incorporate the requirements of the mitigation plan into other planning mechanisms, when appropriate? 44 CFR § 201.7(c)(4)(iii)

An updated plan must explain how participants incorporated the previous mitigation plan, when appropriate, into other planning mechanisms over the last 5 years. This demonstrates progress in local mitigation efforts. Planning mechanisms refer to the governance structures used to manage local land use development and community decision-making, such as budgets, comprehensive plans, capital improvement plans, or other long-range plans, codes, and ordinances. Additional FEMA programs could be cited, but we were not applicable during this plan update.

Table 254: Plan Integration by the Reno-Sparks Indian Colony

Plan Name (or "none," if applicable)	Description
Plans that have already been integrated include: the General Plan, Capital Improvement Plan, Land Use Plan, Local Emergency Operations Plan, Transportation Plan, and Damage Assessment Plan.	These plans have been integrated into the Regional Hazard Mitigation Plan. The RSIC will look for other methods of integration.

The plan must also identify the planning mechanisms where and how the updated hazard mitigation information/actions may be integrated.

Table 255: Future Plan Integration Opportunities for the Reno-Sparks Indian Colony

Plan Name	Description
Plans that the RSIC does not have to date will be examined to address compatibility and viability for the RSIC. These plans include the Climate Change Adaptation Plan, the Community Wildfire Protection Plan, the Economic Development Plan, the Stormwater Management Plan, and the Substantial Damage Plan.	As new plans are executed, opportunities for integration will be addressed within the Regional Mitigation Hazard Plan.



C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure?

Mitigation Strategy

Mitigation Goals and Objectives

Mitigation goals are broad, policy-type statements which represent what the County and its partners seek to achieve by implementing their mitigation plan. The goals are general guidelines and provide a framework for identifying more detailed objectives and actions. In developing these goals, the MPT reviewed the goals from the 2023 SHMP and the goals and objectives from the 2020 RHMP update. Overall, the MPT thought that the goals and objectives continued to reflect its approach to hazard mitigation. There has been progress on some objectives since the last plan update, but those objectives remain important considerations

which should be noted in the current plan. A few changes were identified, including clarifying the intent of Goal 1, removing Objective 1.3, and adding a new objective to Goal 4. Both long-term and short-term goals and objectives were identified. Long-term initiatives may take longer the duration of the planning cycle (five years) to completely realize, while short-term initiatives may be accomplished in the next five years.

Therefore, the County and its partners have selected the following goals and objectives for this plan update:

Goal 1: Study, maintain, upgrade, and expand transportation routes, including evacuation routes across the County, to ensure function and public awareness during emergencies. (Long-term)

- **Objective 1.1:** Study, establish, upgrade, and maintain evacuation routes. (Short-term)
- **Objective 1.2:** Plan for continuity of operations of critical transportation facilities in the county in the event of a disaster or emergency. (Short-term)

Goal 2: Maintain emergency services capabilities by providing redundancies. (Long-term)

- **Objective 2.1:** Provide redundant lifeline utilities and services to allow medical and emergency response services to continue to operate following a disaster or emergency. (Long-term)
- **Objective 2.2:** Establish evacuation centers and provide redundant lifeline utilities to serve communities at risk from all identified hazards. (Long-term)

Goal 3: Maintain key communications to ensure connectivity during and after key hazard events. (Short-term)

- **Objective 3.1:** Provide methods for notification, warning, and emergency communications. (Short-term)
- **Objective 3.2:** Establish an additional emergency operations center (EOC) to serve the RSIC community. (Long-term)
- **Objective 3.3:** Harden electrical infrastructure in moderate to high-risk areas for wildland fire. (Long-term)
- **Objective 3.4:** Establish procedures for communication between the Governor's Office on Radiological Waste and Washoe County before transport of radiological waste. (Short-term)
- **Objective 3.5:** Develop a response plan for clean-up and disposal of ash fall from a volcanic eruption. (Short-term)

Goal 4: Maintain the reliability of utilities (electricity, gas, drinking water, sewer) during and after key hazard events. (Long-term)

- **Objective 4.1:** Provide redundant or hardened utility lifelines to areas at risk of energy emergencies, loss of communications, or loss of service. (Long-term)
- **Objective 4.2:** Identify vulnerable facilities and establish procedures for clean-up and disposal of ash fall from a volcanic eruption to minimize risk to lifeline utilities. (Short-term)
- **Objective 4.3:** Protect utility infrastructure from hazards like winter storms and high winds including acquiring resources ahead of time and hardening infrastructure. (Long-term)

Goal 5: Minimize property damage and reduce repetitive losses to property from key hazards. (Long-term)

- **Objective 5.1:** Provide additional emergency services resources to reduce response times. (Short-term)
- **Objective 5.2:** Adopt current international building and fire codes. (Short-term)
- **Objective 5.3:** Develop plans and provide resources to reduce risk in moderate to high-risk areas for wildland fire. (Short-term)
- **Objective 5.4**: Update flood maps to incorporate changes in conditions and flood risk. (Short-term)
- **Objective 5.5:** Complete improvements to storm water drainage infrastructure to address areas of localized Flooding (including closed-basin flooding), or insufficient capacity. (Long-term)
- **Objective 5.6:** Standardize Emergency Action Plans for dams in the City of Sparks. (Short-term)
- **Objective 5.7:** Complete infrastructure improvements identified as part of the Truckee River Flood Management Project. (Long-term)
- **Objective 5.8:** Elevate or mitigate flood risks to homes in neighborhoods identified by the TRFMA as being at a high risk of Flooding (including closed-basin flooding). (Long-term)
- **Objective 5.9:** Identify and complete retrofits to unreinforced masonry buildings and other facilities at increased risk of damage from earthquakes. (Long-term)
- **Objective 5.10:** Implement measures to prepare first responders for active shooter incidents or acts of terrorism. (Long-term)

- **Objective 5.11:** Purchase equipment to minimize the risk of and protect emergency responders in the event of criminal acts or terrorism. (Long-term)
- **Objective 5.12:** Purchase additional equipment to perform immediate containment of hazardous materials spills. (Long-term)
- **Objective 5.13:** Address risks to properties in the runway protection zones at Reno-Tahoe International Airport and airport-critical areas at Reno-Stead Airport, and along the railway. (Long-term)
- **Objective 5.14: Identify inundation areas for high hazard dams in Washoe County.**

Goal 6: Increase public participation and responsibility in reducing their risks. (Short-term)

- **Objective 6.1:** Educate members of the public on hazards that may affect their communities. (Short-term)
- **Objective 6.2:** Provide building requirements and standards to guide property owners and developers in reducing risk. (Short-term)
- **Objective 6.3:** Provide resources to involve residents in disaster preparedness, response, and recovery. (Short-term)

Review of 2020 Hazard Mitigation Actions

As part of the mitigation strategy update, all mitigation actions identified in the 2020 plan were evaluated to determine the status of the action and whether any ongoing or incomplete actions should be included as actions in the 2025 plan update.

Prioritizing Mitigation Actions

The identified mitigation actions were then prioritized based on the following terms:

- **S – Social:** The public must support the overall mitigation implementation strategy and specific mitigation actions. Consider, will the action disrupt housing or cause the relocation of people? Will the proposed action adversely affect one segment of the population? Is the action compatible with present and future community/agency values?
- **T – Technical:** It is important to determine if the proposed action is technically feasible, will help reduce losses in the long term, and has minimal secondary impacts. How effective is the action in avoiding or reducing future losses? Does the action solve the problem or only a symptom? Will the action create more problems than it solves? Consider the root cause of the issue at hand to determine whether the action is a whole or partial solution, or not a solution at all.

- **A – Administrative:** This category examines the expected staffing, funding, time, and maintenance requirements for the mitigation action to determine if the jurisdiction/special district has the personnel and administrative capabilities to implement the action or whether outside help will be necessary. Consider, a) Staffing (enough staff and training): Does the jurisdiction/special district have the capability (staff, technical experts) to implement the action? b) Funding allocated: does the jurisdiction/special district have the funding to implement the action or can it readily be obtained? c) Time: can it be accomplished in a timely manner? d) Maintenance/Operations: can the jurisdiction/special district provide the necessary maintenance? It is important to remember that most federal grants will not provide funding for maintenance.
- **P – Political:** This considers the level of political support for the mitigation action. Is there political support to implement and maintain this action? Have political leaders participated in the planning process so far? Is there a local champion willing to help see the action to completion? Is there enough public support to ensure the success of the action? Have all stakeholders been offered an opportunity to participate in the planning process?
- **L – Legal:** The jurisdiction/special district must have the legal authority to implement the action or consider what new laws or regulations would be needed to carry out the mitigation action. Evaluate, are the proper laws, ordinances, and resolutions in place to implement the action? Are there any potential legal consequences? Is the action likely to be challenged by stakeholders who may be negatively affected?
- **E – Economic:** Economic considerations must include an evaluation of the present economic base and projected growth. Cost-effective mitigation actions that can be funded in current or upcoming budget cycles are more likely to be implemented than actions requiring general obligation bonds or other instruments that would incur long-term debt in a jurisdiction/special district. Consider benefits and costs at the planning level. A detailed benefit–cost analysis will be performed as project-specific funding becomes available. What financial benefits will the action provide? Does the cost seem reasonable for the size of the problem and the likely benefits? What burden will be placed on the tax base or local economy to implement this action? Does the action contribute to community economic goals, such as capital improvements or economic development? Are there currently sources of funding that can be used to implement the action?
- **E – Environmental:** The impact on the environment is an important consideration because of public desire for sustainable and environmentally healthy communities. Also, statutory considerations, such as the National Environmental Policy Act (NEPA), must be kept in mind when using federal funds. How will this action impact land/water? Impact on endangered species: How will this action impact endangered species? How will this action impact hazardous materials and waste sites? Is this action consistent with community environmental goals? Is the action consistent with federal laws, such as NEPA?

Table 256: Status of Previous Mitigation Actions by the Reno-Sparks Indian Colony

ID	Mitigation Action	Lead Department	Status for Plan Update	Should this action be retained in the plan update? (Yes/No)
MH-6	Adopt current International Building Code (2018) (Reno-Sparks Indian Colony [RSIC])	RSIC Planning Department	Tribal Council approved a first reading, and a second reading of the Building Code Ordinance is scheduled for June 12, 2024	Complete
MH-7	Install audible community warning system (sirens) (RSIC)	RSIC Emergency Manager	Project is still ongoing	No
MH-8	Implement and activate a Tribal Emergency Operations Center (EOC). Provide emergency generators for the designated EOC and alternate facilities (RSIC)	RSIC Emergency Manager	Tribal Emergency Operations Center (EOC) was established in Hungry Valley, but a second location is still TBD. Emergency generators for the designated EOC facilities will be an ongoing project.	Yes
MH-10	Improve electric and broadband service (by installing fiber optic cable from Spanish Springs) to the RSIC's Hungry Valley reservation to support emergency communications (RSIC)	RSIC Emergency Manager	Tribal IT Department completed the installation for broadband to Hungry Valley Reservation. However, the Tribal IT Department stated that bandwidth and internet speed were at capacity and might have a need for improvement.	Yes

ID	Mitigation Action	Lead Department	Status for Plan Update	Should this action be retained in the plan update? (Yes/No)
WF-13	Adopt 2018 wildland fire code County-wide (All Partners)	Regional Fire Protection Districts	The 2018 WUI was adopted with the Building Code Ordinance in June 2024.	No
WF-17	Create a fuels mitigation and management program to create and incentivize defensible space in housing developments by increasing community space between homes and managing/encouraging management of fuels (RSIC)	RSIC Emergency Manager Hungry Valley Fire	Coordinating and collaborating with Hungry Valley Fire for this ongoing project.	Yes
FL-9	Complete drainage ditch improvements (Washoe County, City of Reno, City of Sparks, RSIC, PLPT)	All Jurisdictions: • Public Works	As of Nov 2023: Steamboat Ditch preliminary evaluation completed. Other ditches not started.	Yes
FL-14	Complete improvements to address undersized drainage ditches and systems County-wide (Washoe County, City of Reno, City of Sparks, RSIC, PLPT)	All Jurisdictions: • Public Works • Engineering	As of Nov 2023: CoS – in progress	Yes
FL-16	Replace/improve culvert near the Eagle Canyon Smoke Shop on Eagle Canyon Road to increase capacity and address recurring flooding (RSIC)	RSIC Public Works	RSIC to meet in March/ April of 2024 and discuss. Project is ongoing due to a funding issue.	Yes
EQ-9	Complete seismic strength evaluations of critical facilities in all jurisdictions, including schools, community colleges, public infrastructure, and other critical facilities, to identify vulnerabilities for mitigation to	Washoe County, City of Sparks, RSIC, PLPT – Public Works Engineering School Districts	No seismic evaluations completed for RSIC.	Yes

ID	Mitigation Action	Lead Department	Status for Plan Update	Should this action be retained in the plan update? (Yes/No)
	meet current seismic standards. Mothball or demolish life-threatening buildings, particularly unreinforced masonry buildings (Washoe County City of Sparks, RSIC, PLPT)			
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)	All Jurisdictions: • Public Works • Engineering	Nothing completed within the last 5 years.	Yes
EQ-12	Improve evacuation routes out of the Hungry Valley reservation (Winnemucca Ranch and Chickity roads) to ensure that they are passable in all weather conditions (RSIC)	RSIC Public Works RSIC Emergency Manager	Planning department has addressed this in the draft 2040 comprehensive plan under public safety. Ongoing project [*can you clarify what does ongoing mean?]*	Yes
EQ-13	Continue to provide straps and related tools to encourage non-structural mitigation of earthquake hazards and provide assistance to help property owners install these improvements (RSIC)	RSIC Public Works RSIC Housing Department	This is a continuous project and is provided when requested and during new tenant walk-throughs.	No
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)	All Jurisdictions: • Emergency Management	In progress/ongoing	Yes

ID	Mitigation Action	Lead Department	Status for Plan Update	Should this action be retained in the plan update? (Yes/No)
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)	• Law Enforcement Agencies • Facility Managers	In progress, working with vendor	Yes
DT-2	Implement current TMWA Conservation Plan including encouraging transition to less water-intensive landscaping on both public and private properties (City of Reno, City of Sparks, RSIC, PLPT)	City of Reno, City of Sparks, RSIC, PLPT – Water Utilities Planning Departments	No progress since last plan update.	No
DT-3	Identify alternate water supplies for Tribal properties and housing in Hungry Valley, potentially including a tie-in to the County's water system in Lemmon Valley and new water tanks (RSIC)	RSIC Public Works	Research is ongoing, but it is not a priority.	Yes

2025–2029 Mitigation Implementation Plan

FEMA	**C4.** Does the plan identify and analyze a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? 44 CFR § 201.7(c)(3)(ii) (Requirement §201.6(c)(3)(ii)) **C5.** Does the plan contain an action plan that describes how the actions identified will be prioritized, implemented, and administered by the tribal government? **D3.** Was the plan revised to reflect changes in priorities? 44 CFR § 201.7(d)(3) 44 CFR § 201.7(c)(2)(ii)

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 Tribe. The implementation plan includes both short-term strategies that focus on planning and assessment activities and long-term strategies that will cause ongoing capability or structural projects to reduce vulnerability to hazards.

Updated Mitigation Action Plan

Table 257 presents the mitigation action plan for the next five years.

Table 257: 2025–2029 Mitigation Implementation Plan of the Reno-Sparks Indian Colony

#	Project Title	Hazard Addressed	Vulnerability Addressed*	Responsible Agency	Potential Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
1	Fuel Reduction	Wildland Fire	Fire, the community at large	RSIC Fire Department	WCEM, RFD, Living with Fire	Hungry Valley Fire Department	HMA Post Fire Grant, Existing fire departmen t Budget	$1M	Fuel reduction in an area challenging to control with any other means. Focus on Hungry Valley Dr/Chickadee Dr. In RSIC area due to large amounts of cheatgrass and high fire hazard.	Long term	Annually	High*
Description: Complete Wildland Fire Fuels Reduction through efforts such as grazing goats/sheep.												
2	Flood insurance study	Flooding	People and infrastructur e	RSIC Flood Plain Management Department	Washoe County	RHMP, existing partner plans and protocols	FMA Grant, General Fund	$50,000	Studying areas lacking flood insurance can pinpoint vulnerable regions and guide policy decisions, enhancing community preparedness	5-10 years	1-2 Years	Medium

#	Project Title	Hazard Addressed	Vulnerability Addressed*	Responsible Agency	Potential Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
									and economic resilience. It raises awareness about the need for adequate coverage and supports stronger disaster mitigation efforts.			
Description: This study aims to identify gaps in flood insurance coverage in the county by assessing accessibility, awareness, and mitigation efforts. Through data analysis and community engagement, it highlights areas lacking insurance and offers recommendations to improve community resilience against flooding.												
~~**MH -7**~~	~~Warning Systems~~	~~All Hazards~~	~~Community at large~~	~~RSIC Emergency Management~~	~~RSIC Tribal Council~~	~~Emergency services~~	~~Existing EM Budget, HMA Grant~~	~~$50,000~~	~~Early warning system for the community~~	~~Long-term~~	~~Upon funding availability~~	~~Medium~~
~~**Description**: Install audible community warning system (sirens) (RSIC)~~ REMOVED												
MH -8	Tribal EOC	All Hazards	Community	RSIC Emergency Management	RSIC Tribal Council, RSIC Public Works	Emergency management	Existing EM Budget, HMA Grant	$1 million	Resource acquisition and multi-agency response	Long-term	Current	High
Description: Implement and activate a Tribal Emergency Operations Center (EOC). Provide emergency generators for the designated EOC and alternate facilities. (RSIC)												

#	Project Title	Hazard Addressed	Vulnerability Addressed*	Responsible Agency	Potential Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
MH-9	RSIC tribal CERT	All Hazards	Community	RSIC Emergency Management, Fire Department, Police Departments	Washoe County CERT	Emergency Management	Existing EM Budget	Minimal, administrative staff already budgeted for	Additional personnel to respond in a disaster	Long-term	1–5 years	medium
Description: 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)												
MH-10	Broadband	All Hazards	Community	RSIC Emergency Management	RSIC Tribal Council NV Energy Broadband providers	Emergency management and IT	Hazard Mitigation Grant Program, Existing EM Budget	$1,000/ 1,000 linear feet	To continue open communication during emergencies	Long-term depending on additional funding sources	1–5 years	medium
Description: Improve electric and broadband service (by installing fiber optic cable from Spanish Springs) to the RSIC's Hungry Valley reservation to support emergency communications. (RSIC)												
WE-13	County wide fire code	Wildland Fire	Community	RSIC Fire Department, Regional Fire Protection Districts	N/A	Emergency management and fire department	Existing FD Budget	No/minimal cost	Wildfire protection	Long-term	1–5 years	medium
Description: Adopt 2018 wildland fire code County-wide. (All Partners)												
WF-16	Wildland evacuation drills	Wildland Fire	Community	RSIC Fire Department,	Washoe County	Emergency management	Existing EM Budget	$10,000/plan $50,000/year	Community awareness ,	Long-term	1–5 years	medium

#	Project Title	Hazard Addressed	Vulnerability Addressed*	Responsible Agency	Potential Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
				Regional Fire Protection Districts	Emergency Management and Homeland Security	and fire department, tribal health center			reliable transportation of community members and in furtherance of building resilience			
Description: 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)												
WF-17	Create and incentivize defensible space	Wildland Fire	Community	RSIC Emergency Management	RSIC Planning Department, RSIC Public Works Department, RSIC Housing Department	Emergency management	HMA Grant Existing EM Budget	$1,000,000	Community resilience	Long-term	1–5 years	medium
Description: Create a fuels mitigation and management program to create and incentivize defensible space in housing developments by increasing community space between homes and managing/encouraging the management of fuels. (RSIC)												
FL-9	Draining Improvements	Flooding	Community	RSIC Public Works	N/A	RSIC Public works and emergency management	HMA Grant Existing PW Budget	$1M	Mitigate flooding threat to RSIC infrastructure	Long-term	5+ years	high
Description: Complete drainage ditch improvements. (Washoe County, City of Reno, City of Sparks, RSIC, PLPT)												

#	Project Title	Hazard Addressed	Vulnerability Addressed*	Responsible Agency	Potential Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
FL-14	Area-wide drainage improvement	Flooding	Community	RSIC Public Works Engineering	N/A	RSIC Public works and emergency management	HMA Grant Existing PW Budget	$20/linear foot of drainage ditch	Mitigate flooding threat to RSIC infrastructure	Long-term	5+ years	high
Description: Complete improvements to address undersized drainage ditches and systems countywide. (Washoe County, City of Reno, City of Sparks, RSIC, PLPT)												
FL-16	Culvert Enlargement	Flooding	Community	RSIC Public Works	RSIC Emergency Manager, RSIC Tribal Council	RSIC Public works and emergency management	HMA Grant Existing PW Budget	$200,000	Mitigate flooding threat to RSIC infrastructure	Long-term	5+ years	high
Description: Replace/improve culvert near the Eagle Canyon Smoke Shop on Eagle Canyon Road to increase capacity and address recurring flooding. (RSIC)												
EQ-9	Seismic Infrastructure improvement	Earthquake	Community	RSIC Public Works, Engineering, School Districts	N/A	UNR seismic department, emergency management	HMA Grant Existing PW Budget	$2M	Mitigate seismic threat to RSIC infrastructure	Long-term	5+ years	high
Description: Complete seismic strength evaluations of critical facilities in all jurisdictions, including schools, community colleges, public infrastructure, and other critical facilities, to identify vulnerabilities for mitigation to meet current seismic standards. Mothball or demolish life-threatening buildings, particularly unreinforced masonry buildings. (Washoe County, City of Reno, City of Sparks, RSIC, PLPT)												
EQ-10	Seismic infrastructure enhancement	Earthquake	Community	RSIC Public Works, Engineering	N/A	UNR seismic department, emergency management	HMA Grant, Existing PW Budget	Unknown	Mitigate seismic threat to RSIC infrastructure	Long-term	5+ years	high
Description: 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)												

#	Project Title	Hazard Addressed	Vulnerability Addressed*	Responsible Agency	Potential Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
EQ-12	Evacuation Routes	all hazards	Community	RSIC Public Works	N/A	Emergency management, planning, and public works	HMA Grant Existing PW Budget	Grant Existing Budget	Community resilience and protection of life and safety	Long-term	5+	high
Description: Improve evacuation routes from the Hungry Valley reservation (Winnemucca Ranch and Chickity Roads) to ensure they are passable in all weather conditions. (RSIC)												
CA-1	Prevention of an active shooter incident	Criminal Acts and Terrorism	Community	RSIC Police Department, Law Enforcement Agencies, Facility Managers	Local Elected Officials, Federal Agencies	Emergency management, tribal police, and the FBI	Existing PD Budget HMA Grant	$50,000/year $120,000/ officer	Protection of community life and safety from malicious threats	Medium	1–5 years	high
Description: 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)												
DT-3	Alternate tribal water supplies	Drought	Community	RSIC Public Works	RSIC Tribal Council	Emergency management, county emergency management, and public works	HMA Grant Existing PW Budget	$25,000 (identifying alternative water supplies). $1,000,00 (tie-in and install new water tanks)	Critical infrastructure resilience through a redundant water source	Long-term	5+ years	medium
Description: Identify alternate water supplies for Tribal properties and housing in Hungry Valley, potentially including a tie-in to the County's water system in Lemmon Valley and new water tanks. (RSIC)												

#	Project Title	Hazard Addressed	Vulnerability Addressed*	Responsible Agency	Potential Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
EE 1	EV Ready	Energy Emergency	Children, older adults, those with heart/lung disease, low-income and underserved communities	RSIC Emergency Management	Washoe County, NNPH AQMD	Building code amendment recommendation to be adopted by municipalities	EPA grant, HMA Grant	Unsure	Better air quality	Beneficial	In the next 5 years	Low
Description: Code change												
W 1	Tree Maintenance and Management	Wind	All populations	RSIC Public Works	None	Unsure	Local operating budget	Staff time	Decreased property damage	Life of plan	1-2 years	Medium
Description: Regularly prune trees and remove dead or weakened branches to reduce the risk of falling debris during severe wind events. Consider replacing high-risk trees with more wind-resistant species, and ensure trees are planted at appropriate distances from structures.												
EH 1	Themed Months/ Days per Hazard (Including proclamations)	Extreme Heat	Residents and visitors	RSIC Emergency Management	Subject matter experts/ agencies for specific hazards (USGS, fire agencies, LEO, NWS/NOAA, etc.)	RHMP	RSIC EM, EMPG, SERC funds	$500.00 + staff time	Increased community awareness and resilience	Life of the plan	1-2 years	High
Description: Public awareness campaign												

#	Project Title	Hazard Addressed	Vulnerability Addressed*	Responsible Agency	Potential Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
VC 1	Evacuation Routes in the area	Volcano	Residents and visitors; LEO, Fire, etc.	RSIC Emergency Management, Fire Department, Police Department	LEO, Fire, first responder	Unsure	Local, FHA	$135K – cost of completed study in Nevada County tor a starting point	Loss of life, property, time spent by responders guiding persons out of area	Immediate and continuous. There are always additional persons due to tourism and general residents. Also, there is never not a time when evacuation might be necessary.	3-5 Years	Medium
Description: Study of evacuation routes												
WS 1	Themed Months/ Days per Hazard (including Proclamations)	Winter storms	Residents and visitors	RSIC Emergency Management	Subject matter experts/ agencies for specific hazards (USGS, fire agencies, LEO,	RHMP	RSIC EM, EMPG, SERC funds	$500.00 + staff time	Increased community awareness and resilience	Life of the plan	1-2 years	High

#	Project Title	Hazard Addressed	Vulnerability Addressed*	Responsible Agency	Potential Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
					NWS/NOAA, etc.)							
Description: Public awareness campaign												
AV 1	Comprehensive avalanche/landslide atlas	Avalanche/landslide	Geographical awareness, historical data, decision-making support, education and training, emergency planning, wildlife management	RSIC Emergency Management	National Parks Dept., Forestry Depart., Geological Survey Department, Meteorological Services, Washoe County	Regional	Federal Grants - HMA	$50,000-	Enhanced safety,	Life of plan	1-3 years	medium
Description: Create a comprehensive avalanche/landslide atlas												
ID 1	Vaccination campaigns	Infectious disease	Health and medical	RSIC Health Services, RSIC Emergency Management	WCHD	Unsure	Federal Grant, EMPG, SERC funds	$100,000	Decreased illness	Life of plan	1-2 years	Medium
Description: Implement widespread vaccination programs to build herd immunity and reduce the spread of infectious diseases. This includes encouraging vaccines for vulnerable populations and ensuring accessibility in underserved areas.												

#	Project Title	Hazard Addressed	Vulnerability Addressed*	Responsible Agency	Potential Partners	Existing Planning Mechanism(s)**	Potential Funding Source	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
HW 1	Training	Hazardous Material	All populations, employees, and ecosystems	RSIC Emergency Management	LEO, first responders	Unsure	RSIC, EMPG, SERC funds	$500.00 + staff time	Reduction in loss of life and injury	Life of plan	1-2 years	Medium
Description: Provide comprehensive training programs for employees on hazardous material handling, emergency response procedures, and proper use of personal protective equipment (PPE). Educating workers helps to reduce accidents and exposure.												
RW 1	Training	Radiological Waste Transport	All populations, employees, and ecosystems	RSIC Emergency Management	LEO, first responders	Unsure	RSIC, EMPG, SERC funds	$500.00 + staff time	Reduction in loss of life and injury	Life of plan	1-2 years	Medium
Description: Provide comprehensive training programs for employees on radiological material handling, emergency response procedures, and proper use of personal protective equipment (PPE). Educating workers helps to reduce accidents and exposure.												
TI 1	Maintenance protocols	Transportation incident/aircraft	All populations and passengers	RSIC Emergency Management, Reno-Tahoe County Airport Authority	None	Unsure	FAA grants	Staff time	Decreased loss of life and property	Life of plan	3-5 years	Low
Description: Implement rigorous pre-flight safety checks and maintenance protocols												

Notes: *Includes vulnerable populations; **Through which the action will be implemented.

BLM = Bureau of Land Management, BRIC = Building Resilient Infrastructure & Communities, CDC = Centers for Disease Control and Prevention, CERT = Community Emergency Response Team, CHSC = Citizens

Homeland Security Council, DOE = Department of Energy, EMPG = Emergency Management Preparedness Grant; EOC = Emergency Operations Center, EPA = Environmental Protection Agency, FAA=Fedral Aviation Administration, FBI = Federal Bureau of Investigation, FHA = Federal Highway Administration, HMA = Hazard Mitigation Assistance, IT = Information Technology, LEO = Law Enforcement Organizations, NDOT = Nevada Department of Transportation, NNPH – AQMD = Northern Neveda Public Health – Air Quality Management Division, NOAA = National Oceanic and Atmospheric Administration, NWS = National Weather Service, PA = Public Assistance, RFD = Reno Fire Department, RSIC = Reno-Sparks Indian Colony; SERC = State Emergency Response Commission; TMWA = Truckee Meadows Water Authority, UNR = University of Nevada, Reno, USGS = United States Geological Service, WCEM = Washoe County Emergency Management, WCHD = Washoe County Health District

THIS PAGE INTENTIONALLY LEFT BLANK

References

Assistant Secretary – Indian Affairs, IEED (Assistant Secretary – Indian Affairs Office of Indian Energy and Economic Development. Not dated. Loan Guarantee Program Success Story. Reno-Sparks Indian Colony (RSIC). https://www.bia.gov/sites/bia_prod.opengov.ibmcloud.com/files/assets/as-ia/ieed/ieed/pdf/DCI_Story-015-RSIC_R3web.pdf Accessed August 9, 2019.

FEMA (Federal Emergency Management Agency). 2019. OpenFEMA – Declaration Data Set as of: 3/15/19. https://www.fema.gov/media-library/assets/documents/28318. Accessed September 19, 2019.

Hendry, Terri. 2016. The "Big One" Could Be Bigger Than You Ever Thought. News 4. May 2, 2016. https://mynews4.com/on-your-side/the-big-one-could-be-bigger-than-you-ever-thought Accessed August 24, 2019.

Mosebach, Jesseca. 2007. Indian Country. Reno-Sparks Tribe Tries to Preserve Hungry Valley. December 20, 2007. https://www.indiancountrynews.com/index.php/news/politcs-business/2127-reno-sparks-tribe-tries-to-preserve-hungry-valley Accessed September 19, 2019.

NV Energy. 2019. Public Safety Outage Management. https://www.nvenergy.com/safety/psom. Accessed September 23, 2019.

Regional Water Planning Commission. 2003. RWPC Regional Floodplain Management Strategy. http://documents.wrwc.us/files/2368-00036.pdf Accessed September 19, 2019.

Soil Ecology Restoration Group. 1997. Hungry Valley – Restoration. Last updated April 24, 1997. http://www.sci.sdsu.edu/SERG/restorationproj/woodlandgrassland/hvsr.html Accessed September 19, 2019.

U.S. Census Bureau. No date (a). S0101 Age and Sex, 2013-2017 American Community Survey 5-Year Estimates. https://factfinder.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t. Accessed June 25, 2019.

U.S. Census Bureau. 2017. American Community Survey 5-Year Estimates. Retrieved from Census Reporter Profile page for Reno-Sparks Indian Colony. http://censusreporter.org/profiles/ 25200US313OR-reno-sparks-indian-colony/. Accessed June 25, 2019.

Acronyms

EOC	Emergency Operations Center
FEMA	Federal Emergency Management Agency
GIS	Geographic Information System
HMP	Hazard Mitigation Plan
MPT	Mitigation Planning Team
NCEI	National Centers for Environmental Information
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
PG&E	Pacific Gas and Electric Company
PHMSA	Pipeline and Hazardous Materials Safety Administration
PLPT	Pyramid Lake Paiute Tribe
RHMP	Regional Hazard Mitigation Plan
RNO	Reno–Tahoe International Airport
RPZ	runway protection zone
RSIC	Reno-Sparks Indian Colony
RTS	Reno-Stead Airport
SHMP	State Hazard Mitigation Plan
TMWA	Truckee Meadows Water Authority
TRFMA	Truckee River Flood Management Authority
UNR	University of Nevada, Reno
WCHD	Washoe County Health District
WUI	Wildland–Urban Interface
RV	recreational vehicle

Truckee Meadows Fire Protection District Annex

Introduction

The Truckee Meadows Fire Protection District (TMFPD) has a fully integrated approach to hazard mitigation planning and program implementation. Throughout the 2025 update process, the following Regional Hazard Mitigation Plan (RHMP) participation roles were recorded:

Name	Position	Department
August Isernhagen	Division Chief, Wildland Fuels	Truckee Meadows Fire Protection District
Joseph R. Kammann	Division Chief, EMS	Truckee Meadows Fire Protection District
Adam Mayberry	Fire Communications Officer, Public Information Outreach	Truckee Meadows Fire Protection District
Derek T. Reid	Battalion Chief	Truckee Meadows Fire Protection District
Ryan Rizzuto	Battalion Chief	North Lake Tahoe Fire Protection District
Joe Schum	Division Chief, Operations	Truckee Meadows Fire Protection District
Brett Taylor	Community Coordinator, Wildland Urban Interface	Truckee Meadows Fire Protection District

What's New in the 2025 Update?

Since the prior plan, the Truckee Meadows Fire Protection District (TMFPD) has implemented several significant changes to enhance its operations and address the growing fire risks in the region. One primary focus has been on improving firefighting resources. This includes acquiring new firefighting apparatus and equipment to enhance response times and overall effectiveness during emergencies. Such upgrades ensure the district is better equipped to handle structural fires and wildfires, which have become increasingly prevalent.

In addition to resource improvements, TMFPD has strongly emphasized community engagement and education. The district has expanded its outreach programs to educate residents about fire safety, the importance of creating defensible space around properties, and strategies for home hardening against wildfires. These initiatives are crucial for fostering a community preparedness culture and helping residents understand their role in fire risk reduction.

Another significant area of focus has been wildfire risk mitigation. In response to rising wildfire incidents, TMFPD has adopted more robust strategies to prevent and mitigate fires, including fuel reduction projects and active collaboration with local and state agencies. This proactive approach addresses fire hazards before they escalate into more significant threats, ultimately protecting both lives and property.

Finally, TMFPD has improved its training programs for firefighters, ensuring that staff are well-prepared to tackle contemporary challenges. Updated training protocols incorporate new firefighting techniques and address emerging hazards, enabling a more effective response to diverse situations. The district has also strengthened collaborations with neighboring agencies and emergency management organizations, facilitating coordinated efforts during crises. These comprehensive changes reflect TMFPD's commitment to enhancing community resilience and safety amidst increasing fire risks in the area. The 2025 update of the RHMP includes the following significant revisions to the 2020 plan:

- Includes additional stakeholders and opportunities for public participation.
- Identifies all hazards that could impact the plan participant.
- Expands upon the capability assessment, including opportunities to expand and improve capabilities.
- Identifies plan integration and integration opportunities.

Plan Adoption

44 CFR §201.6(c)(5) requires that an HMP be formally adopted by elected officials from each participating jurisdiction. TMFPD formally adopted the 2025 update of the Washoe County RHMP on September 2, 2025.

This RHMP was approved by FEMA Region 9 on September 24, 2025. Once the plan is approved and signed, a copy of TMFPD’s adoption resolution will be placed in Appendix E of the Base Plan.

District Profile

The TMFPD serves most of the unincorporated areas of Washoe County south of Pyramid Lake (see Figure 91). The TMFPD provides fire suppression and advanced life support (paramedic) fire rescue service and responds to other types of emergencies. The TMFPD supports the County’s hazard mitigation program by reviewing plans for new construction for compliance with fire codes, conducting public outreach and education campaigns, assisting with community risk reduction planning, and pursuing federal hazard fuels reduction grants on behalf of communities. The district includes 200 career employees, 45 volunteers, 10 stations staffed

24/7, and 5 volunteer stations. The jurisdiction is approximately 6,000 square miles and includes unincorporated parts of Washoe County.[234]

Interstate 580/U.S. 395 (North and South) and I-80 (East and West) are major economic transportation hubs for trucking and rail. A mishap involving hazardous materials or radiological waste would cause significant economic loss and have widespread effects. If a hazard threatens life safety along these thoroughfares, closing them and redirecting traffic is the most rational response. Depending on the direction of traffic, detours could add hours or days to travel. The most common impact on these assets is wildfire, which doesn't cause considerable damage but ensures that public safety and emergency stabilization prolong the time for recovery after an event.

[234] Truckee Meadows Fire District, "About TMFR." https://tmfpd.us/about/#:~:text=The%20Truckee%20Meadows%20Fire%20Protection,square%20miles%20across%20Northern%20Nevada.

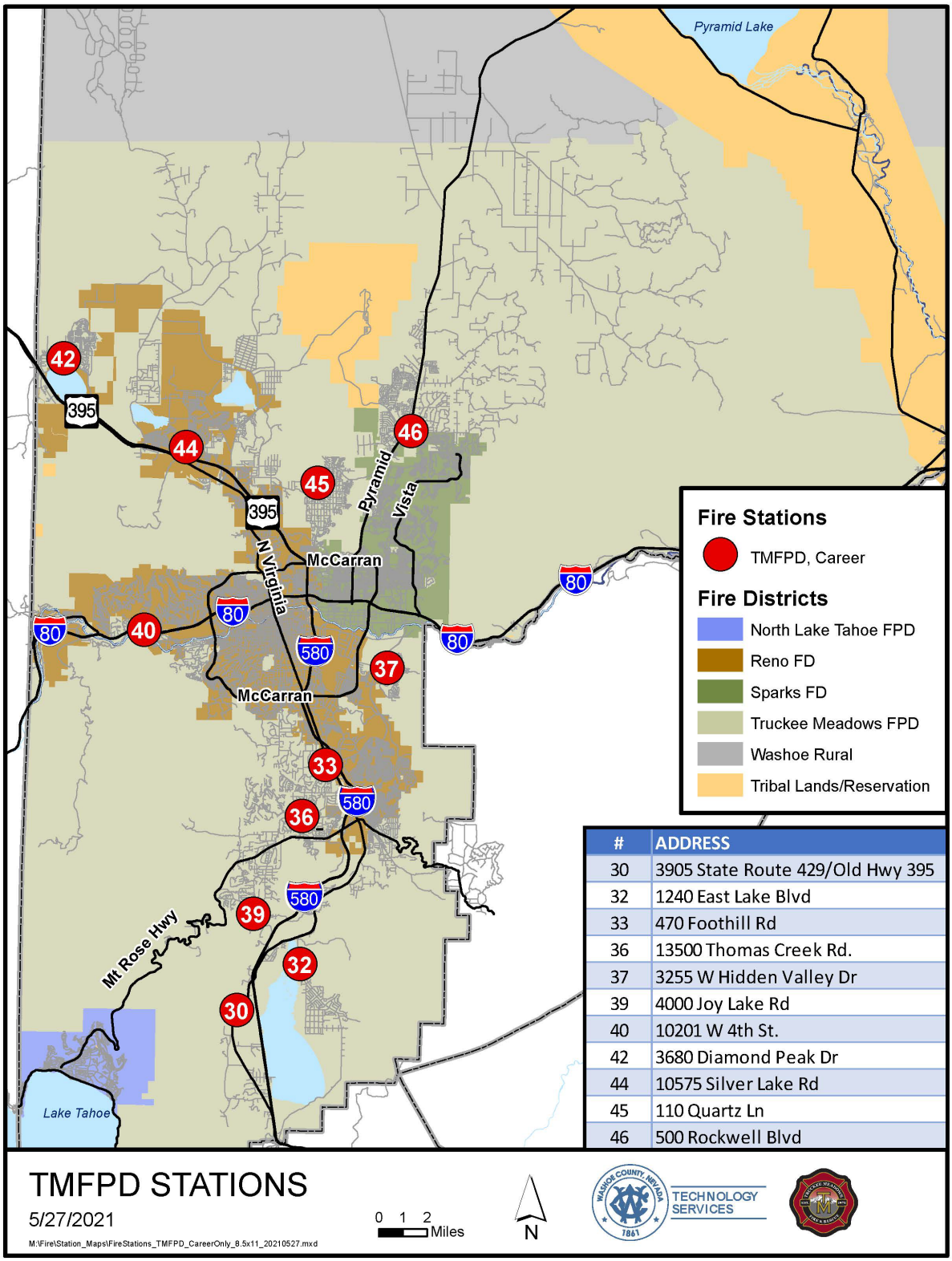


Figure 91: Fire Districts South of Pyramid Lake

Hazard Profiles and Vulnerability Assessments

This section contains hazard profiles and vulnerability assessments to determine the potential impact of hazards on the people, economy, and built and natural environments of the TMFPD. They have been streamlined to increase the effectiveness and usability of the RHMP. Additional details are contained in Appendix A of the Base Plan.

General

Washoe County has experienced several disaster declarations that have affected TMFPD's planning area. It has received 48 disaster declarations since 1965, including 15 since the previous HMP update. Table 258 identifies the declarations since 2020 that have affected the TMFPD.

Table 258: Disaster Declarations in Washoe County since 2020[235]

Disaster Number	Individual Assistance Program Declared	Public Assistance Program Declared	Hazard Mitigation Program Declared	Declaration Date	Title
FM-5602	No	Yes	Yes	8/2/2025	Peavine Fire
FM-5586	No	Yes	Yes	6/10/2025	Marie Fire
FM-5546	No	Yes	Yes	11/11/2024	Callahan Fire
FM-5533	No	Yes	Yes	9/7/2024	Davis Fire
FM-5530	No	Yes	Yes	8/12/2024	Gold Ranch Fire
FM-5495	No	Yes	Yes	6/12/2024	Sullivan Fire
FM-5494	No	Yes	Yes	6/11/2024	Trail Fire
FM-5448	No	Yes	Yes	08/14/2022	Joy Lake Fire
FM-5382	No	Yes	Yes	11/07/2020	Pinehaven Fire
FM-5328	No	Yes	Yes	08/15/2020	Loyalton Fire
FM-5326	No	Yes	Yes	08/03/2020	North Fire
FM-5322	No	Yes	Yes	07/21/2020	Rockfarm Fire
FM-5316	No	Yes	Yes	06/27/2020	Poeville Fire

[235] FEMA, "Disasters and Other Declarations." Disasters and Other Declarations | FEMA.gov

Disaster Number	Individual Assistance Program Declared	Public Assistance Program Declared	Hazard Mitigation Program Declared	Declaration Date	Title
DR-4523	Yes	No	No	04/04/2020	Biological (COVID-19)
EM-3443	No	No	No	03/13/2020	Biological (COVID-19)

The hazard profiles and vulnerability assessments contained in this annex 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. Taking into consideration the missions of the special hazard districts participating in the 2025 RHMP update, this chapter includes hazard profiles and vulnerability assessments for the following hazard types:

- Avalanche and Landslide
- Criminal Acts and Terrorism
- Drought
- Earthquake
- Energy Emergency
- Flood
- Hazardous Materials Incident
- Infectious Disease
- Radiological Waste Transport
- Extreme Weather (Winter Storm, Windstorms, Extreme Heat)
- Transportation Incident
- Volcano
- Wildland Fire

Hazard Ranking Methodology

CALCULATED PRIORITY RISK INDEX

A risk assessment result for the entire county does not mean that each municipality is at the same amount of risk for each hazard. Each jurisdiction considered how it is uniquely at risk of the hazards profiled. The Calculated Priority Risk Index (Table 259) assessment resulted in hazard rankings for the TMFPD.

Table 259: Factors for Calculating Risk

Risk Index Factor	Degree of Risk Level		Criteria	Factor Weight for Degree of Risk Level
Probability *What is the likelihood of the hazard occurring?*	1	Unlikely	Less than 1 percent probability of occurrence in the next year or a recurrence interval of greater than every 100 years.	30%
	2	Occasional	1 to 10 percent probability of occurrence in the next year or a recurrence interval of 11 to 100 years.	
	3	Likely	11 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.	
	4	Highly Likely	91 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.	
Magnitude *What will be the overall impact?*	1	Negligible	Less than 5% of the affected area's critical and non-critical facilities and structures are damaged/destroyed. Only minor property damage and minimal disruption of life. Temporary shutdown of critical facilities.	30%
	2	Limited	Greater than 5% and less than 25% of property in the affected area is damaged/destroyed. Complete shutdown of critical	

Risk Index Factor	Degree of Risk Level		Criteria	Factor Weight for Degree of Risk Level
			facilities for more than one day but less than one week.	
	3	Critical	Greater than 25%, but less than 50% of property in the affected area was damaged/destroyed. Complete shutdown of critical facilities for over a week but less than one month.	
	4	Catastrophic	Over 50% of critical and non-critical facilities and infrastructures in the affected area are damaged/destroyed. Complete shutdown of critical facilities for more than one month.	
Onset *How long will be there be between when it is recognized the hazard is approaching and when the hazard will begin affect the community?*	1	Self-defined	More than 24 hours	10%
	2	Self-defined	12 to 24 hours.	
	3	Self-defined	6 to 12 hours.	
	4	Self-defined	Less than 6 hours.	
Duration *What is the length of time the hazard will remain active, including how long emergency*	1	Brief	Up to 6 hours.	10%
	2	Intermediate	Up to one day.	
	3	Extended	Up to one week.	
	4	Prolonged	More than one week.	

Risk Index Factor	Degree of Risk Level		Criteria	Factor Weight for Degree of Risk Level
operations will have to continue after the hazard event?				
Frequency *How often has this kind of hazard resulted in an emergency or disaster?*	1	Every 10+ years	This hazard is not frequent but may still impact the area.	20%
	2	Every 5–10 years	This hazard is not as frequently occurring but it could occur in the next 10 years.	
	3	Every 1–5 years	This hazard is likely to occur relatively often. It may have occurred more or less frequently recently, but on average, it can be expected every 1–5 years.	
	4	Annually	This hazard is a frequent occurrence which the area actively has to respond to on an approximately annual basis.	

The following is the risk factor equation:

Risk Factor Equation

RF Value = [(Probability x .30) + (Magnitude x .30) + (Onset x .10) + (Duration x .10) + (Frequency x .20)]

Table 260 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 through 4.0 are considered high risk. Risk factors

ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 260: Overall Risk Scores for the CPRI

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

The Washoe County base plan is comprehensive for regional assessments and effectively addresses the calculated risk indexes. It provides a thorough evaluation that highlights its commitment to risk management and community safety, while the annexes are specific to each jurisdiction. Table 261 displays the CPRI values for the TMFPD.

Table 261: Risk Factors for Hazards in the Truckee Meadows Fire Protection District

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor	Overall Risk
Avalanche and Landslide	3	1	3	1	2	2	Medium
Criminal Acts and Terrorism	3	1	4	2	2	2.2	Medium
Drought	3	1	1	2	2	1.9	Low
Earthquake	3	4	4	3	1	3	High
Energy Emergency	3	1	4	1	3	2.3	Medium
Flood	3	1	1	3	2	2	Medium

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor	Overall Risk
Hazardous Materials Incident	1	3	4	4	1	2.2	Medium
Infectious Disease	2	1	1	4	2	1.8	Low
Radiological Waste Transport	1	4	4	4	1	2.5	High
Extreme Weather (Winter Storm, Windstorms, Extreme Heat)	3	1	1	3	3	2.2	Medium
Transportation Incident	2	1	4	2	1	1.7	Low
Volcano	1	3	1	4	1	1.9	Low
Wildland Fire	4	2	4	3	4	3.3	High

NATIONAL RISK INDEX

The National Risk Index (NRI) is not included in the local jurisdiction annexes as the dataset is developed at a county and census tract level, and it is not aggregated to individual jurisdictional boundaries. While the NRI provides useful context for understanding countywide hazard overall risk data, it does not offer the resolution needed to support jurisdictional specific assessments.

Hazard-Specific Profiles and Risk Assessment

The following risk assessment relates to TMFPD. Additional information, including general descriptions of the hazard events, is included in the Base Plan. The TMFPD indicated that no priorities for its hazard mitigation plan had changed since the last plan update. Certain hazards TMFPD has elected not to profile due to the focus and legal authority of the district. Avalanche, landslide, drought, energy emergency, hazardous materials incident, infectious disease, radiological waste transport, extreme weather (winter storms, windstorms, extreme heat), and volcano. These hazards are best addressed by another organization.

Criminal Acts and Terrorism

Criminal acts of terrorism can impact any populated area, including shopping structures, clinics and hospitals, schools, and government offices and buildings. These threats could affect all populated areas in Washoe County, and government facilities and schools may be the most likely targets.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 262 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 262: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 263 provides the Calculated Priority Risk Index (CPRI) for criminal acts and terrorism impacts in the Truckee Meadows Fire Protection District (TMFPD) based on the current plan's hazard risk assessment results. The TMFPD assigned criminal acts and terrorism impacts a risk factor value of 2.2, reflecting medium probability and quick onset impacts. This risk factor value falls in the range of 2.0 to 2.4, which is considered a medium-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 263: Calculated Priority Risk Index for Criminal Acts and Terrorism in the TMFPD

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Criminal Acts and Terrorism	3	1	4	2	2	2.2	Medium

Earthquake

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

ESTIMATED IMPACT AND POTENTIAL LOSSES

The estimated impacts and potential losses to the Truckee Meadows Fire Protection District due to earthquakes can be considerable. Infrastructure damage, including fire stations and emergency vehicles, may hinder response capabilities, leaving communities vulnerable during crises.

Service demand can surge following an earthquake as multiple incidents co-occur, overwhelming available resources and personnel. This increased workload is compounded by the potential for secondary fires from gas leaks and electrical failures, further stretching the district's capacity.

Communication systems may also be disrupted, impacting coordination among fire crews and complicating emergency responses. Additionally, the district might need to facilitate evacuations and establish temporary shelters, adding to its responsibilities.

Investing in training and preparedness is essential for effectively managing earthquake scenarios. This requires careful allocation of funding and resources, which can affect the district's budget.

Long-term, the community's trust in fire protection services may wane if residents feel unprepared for seismic events. Thus, ongoing efforts to ensure readiness are crucial for maintaining public safety and confidence.

PROBABILITY OF FUTURE EVENTS

The probability of future earthquake events in the Truckee Meadows Fire Protection District can be considered as likely. The region is situated near fault lines, making it susceptible to seismic activity.

VULNERABILITY ASSESSMENT

The Truckee Meadows Fire Protection District in Washoe County, Nevada, is at risk for earthquakes due to its seismic history. A vulnerability assessment is essential to identify at-risk populations and develop mitigation strategies.

Key vulnerable groups include elderly residents, who may need assistance during evacuations and often live in homes that lack modern seismic standards. Low-income individuals are also particularly at risk, as they tend to reside in older, less stable structures and may not afford retrofitting or insurance. Additionally, individuals with disabilities face challenges in accessing emergency services, while schools housing children need to ensure structural safety, as they are often used as shelters during disasters. The homeless population is especially vulnerable due to their lack of immediate access to shelter and support.

Geographic factors contribute to vulnerability. Areas near fault lines face higher seismic risks, and many older buildings do not comply with current safety codes. Urban areas generally have better infrastructure compared to rural communities, which can struggle with slower emergency response times.

To address these vulnerabilities, community education programs on earthquake preparedness are vital, along with routine building inspections to ensure safety standards. Emergency response plans must prioritize the needs of vulnerable populations, ensuring accessibility and support. Additionally, enhancing community shelters to accommodate diverse groups is crucial.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 264 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 264: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 265 provides the Calculated Priority Risk Index (CPRI) for earthquake impacts in the Truckee Meadows Fire Protection District (TMFPD) based on the current plan's hazard risk assessment results. The TMFPD assigned earthquake impacts a risk factor value of 3, reflecting high magnitude and quick onset impacts. This risk factor value falls in the range of 2.5 to 4.0, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 265: Calculated Priority Risk Index for Earthquake in the TMFPD

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Earthquake	3	4	4	3	1	3	High

Flooding

TMFPD itself has no history of flooding. Riverine or flash flooding in the County often results in washed-out or flooded roadways and infrastructure, such as bridges or culverts. Due to the concentration of urban development in Reno and Sparks along the Truckee River, many critical facilities in the County are located in 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 mapped floodplains may be affected.

ESTIMATED IMPACT AND POTENTIAL LOSSES

The estimated impacts and potential losses to the North Truckee Meadows Fire Protection District due to flooding can be significant. One major concern is damage to infrastructure, as flooding can compromise fire stations and critical facilities, hindering the district's emergency response capabilities.

Increased response times are another serious issue, as inundated roads may block access to affected areas, which is crucial during emergencies. Additionally, personnel may be stretched thin, as they could be diverted to manage rescues and evacuations.

Loss of equipment is a further concern; fire trucks submerged in floodwaters can lead to costly repairs and operational downtime. Insurance premiums may also rise, impacting the district's budget for resources and training.

Flooding may require the fire protection district to invest in flood mitigation strategies and develop comprehensive emergency plans. The potential impacts create significant challenges, highlighting the need for proactive measures and preparedness.

VULNERABILITY ASSESSMENT

The Truckee Meadows Fire Protection District (TMFPD) is a region characterized by diverse geographic features and demographics. Although flooding is not typically the most prevalent hazard, it poses significant risks during specific weather events, such as rapid snowmelt or intense rainfall.

Key vulnerable populations within the TMFPD area include elderly residents, low-income families, children, individuals with disabilities, and historically underserved communities. Seniors may face mobility challenges that impede their ability to evacuate quickly during emergencies. Families with limited financial resources may lack access to the necessary tools and information for preparedness and response. Children and infants require special care in emergencies, while individuals with disabilities may encounter significant obstacles during evacuation or in accessing support services.

Geographic factors play a critical role in the area's flood vulnerability. The steep terrain of the Truckee Meadows can exacerbate flooding risks, particularly in valleys and riverbeds that are prone to flash floods. Additionally, the proximity of neighborhoods to water bodies, such as the Truckee River, further elevates flood risks during periods of heavy rainfall or snowmelt. Urban development, which has modified natural drainage patterns, can increase urban flooding. These geographic characteristics necessitate comprehensive flood risk assessments and effective mitigation strategies, combined with climate variability, which may result in more intense and frequent rainfall events.

The assessment of vulnerabilities highlights several key areas for improvement. Aging infrastructure, including storm drains and levees, may be inadequate for managing sudden flood events, particularly in regions with insufficient drainage systems. Limited public awareness and preparedness regarding flood risks can increase casualty rates during emergencies. Furthermore, flooding can disrupt critical transportation routes, complicating evacuation efforts. Local health services, especially those serving vulnerable populations, may not be adequately equipped or accessible during flood events, exacerbating the risks faced by these groups.

Community education programs on flood risks and preparedness measures, specifically targeting vulnerable populations, are vital to address these vulnerabilities. Emergency planning efforts should incorporate specific provisions for those most at risk, including conducting drills that account for the needs of seniors, children, and individuals with disabilities. Investing in infrastructure improvements, such as upgrading drainage systems and reinforcing levees, can bolster resilience against flooding. Creating and maintaining detailed flood risk maps will support local planning efforts and empower residents with knowledge to improve their preparedness.

Collaboration with local organizations is crucial for ensuring resource access for low-income families and underserved communities. Establishing designated, accessible emergency shelters

that can accommodate the unique needs of vulnerable groups is another vital component of effective flood response planning. Regular assessments and monitoring of flood management strategies will be necessary for adapting to changing conditions and community feedback.

PROBABILITY OF FUTURE EVENTS

The probability of future flooding events in Truckee Meadows Fire Protection District can vary based on several factors, including weather patterns, land use, and watershed management practices. However, in general terms:

- - Flooding events can be considered unlikely to likely, depending on specific conditions such as heavy rainfall or rapid snowmelt.
- - Areas closer to rivers or in low-lying regions may have a higher likelihood of flooding, while more elevated or well-drained areas might see flooding as less probable.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 266 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 266: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 267 provides the Calculated Priority Risk Index (CPRI) for flood impacts in the Truckee Meadows Fire Protection District (TMFPD) based on the current plan's hazard risk assessment results. The TMFPD assigned flood impacts a risk factor value of 2, reflecting medium probability and medium duration impacts. This risk factor value falls in the range of 2.0 to 2.4, which is considered a medium-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 267: Calculated Priority Risk Index for Flood in the TMFPD

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Flood	3	1	1	3	2	2	Medium

Transportation Incidents (Aircraft Crash)

Washoe County has four publicly operated airports: the Reno–Tahoe International Airport (RNO), the Reno–Stead Airport (RTS), the Spanish Springs Airport (N86) in Reno, and the Empire Airport (1A8) in Empire. Aircraft crashes are typically handled at the local level and can disrupt transportation and business services nearby. The magnitude and potential severity of the impact of an aircraft crash is considered Medium in Washoe County.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 268 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 268: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 269 provides the Calculated Priority Risk Index (CPRI) for transportation incidents in the Truckee Meadows Fire Protection District (TMFPD) based on the current plan's hazard risk assessment results. The TMFPD assigned transportation incident impacts a risk factor value of 1.7, reflecting quick onset impacts. This risk factor value falls in the range of 0 to 1.9, which is considered a low-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 269: Calculated Priority Risk Index for Transportation Incidents in the TMFPD

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Transportation Incidents	2	1	4	2	1	1.7	Low

Wildland Fire

LOCATION

Wildland fires are frequent natural occurrences in the arid ecosystems of the Truckee Meadows region and the alpine forests surrounding Lake Tahoe. The risks from fires are highest for development in the WUI, which in Washoe County includes areas outside the urban centers of Reno and Sparks in the jurisdiction of the TMFPD and the communities of Incline Village and Crystal Bay on the shores of Lake Tahoe. Wildland fire potential in the TMFPD's service area ranges from Moderate to Very High. Historic suppression of fires and buildup of fuels in the forests around Lake Tahoe have made these communities high-risk areas for fires, with wildland fire potential ranging from Moderate to Very High.

- **Sun Valley –** Sun Valley is an area for concern for TMFPD, as it is surrounded by unmanaged Bureau of Land Management (BLM) jurisdiction in alignment with southwest winds and aspects contributing to faster, more extreme wildland fires. Low-income people and the elderly generally populate the area. Many properties have accumulated vegetation and debris, which will spread fire rapidly between structures.
- **Galena Forest—**Galena Forest is another area of concern for TMFPD, as it has heavy contiguous wildland fuel from adjacent Forest Service properties. Under ideal conditions, wildfire could spread uninhibited through tree canopies, making defending structures untenable. Evacuations in a fast-moving wildfire event would be considerable difficulties.
- **Addition areas of wildland fire risk-** Verdi, Caughlin Ranch, Virginia Foothills, Spanish Springs sprawl
- **General risk to older structures –** Structures built before the County adopted the 2012 International WUI Code in Sept. 2013 could be built to lower standards of resilience to wildland fire. Characteristics that lead to higher ignitability include the materials used for roofing, siding, eave coverings, windows and doors; vent meshes; and deck/balcony enclosures.
- **Bowers Mansion Regional Park –** Bowers Mansion Regional Park is an at-risk historic resource for the region. The adjacent land is unmanaged for wildfire and is susceptible to a catastrophic wildfire event. Apart from the physical damage to human improvements, the

alterations to the landscape are generational, long-term effects that, apart from emergency stabilization and rehabilitation (ESR), cannot be recovered from quickly.

PREVIOUS HISTORY/OCCURRENCES

In addition to the declared events, the following events are of note to TMFPD:

- **08/14/2022: Joy Lake Fire FM-5448-NV –** this fire burned two acres and destroyed one home. The fire threatened 2000 homes. A Fire Management Assistance Declaration was made on 8/15/2022.
- **09/07/2021: Brady Fire –** This fire in the Cold Springs area burned 15 acres but was no threat to structures.
- **07/02/2021: The Sugar Fire** started in CA, part of the Beckwourth Complex, which caused 107,075 acres to burn. The fire impacted travel on US-395 north at N. Red Rock Rd. It destroyed 33 structures in CA and threatened structures in Rancho Haven and North Red Rock.
- **06/22/2021: Petrilla Fire –** This fire in the Steamboat Hills area burned 528 acres, and 4000 homes experienced power outages. The geothermal plant was threatened. This fire was human caused.
- **11/17/2020: Pinehaven Fire FM-2973-NV** burned 512 acres, destroyed 5 homes, and damaged 3 others. A total of 1300 homes were evacuated, and power to customers was interrupted.
- **Caughlin Ranch Area:** A Fire Management Assistance Declaration was issued on 11/17/2020, releasing $162,385.01 in federal emergency work funds, related $785,047.27 Total Public Assistance Grant Dollars Obligated
- **10/06/2020: The Baccarat Fire,** West of the Red Rock fire, burned 10,456 acres and threatened 75 homes.
- **09/07/2020: The W-5 Cold Springs Fire** started in CA and spread to Nevada; 84,817 acres were burned, and over 20 structures and ranches were threatened.
- **08/16/2020: Poodle Fire,** Northwest of Gerlach: 13,600 acres were burned and energy and transportation infrastructure was threatened.
- **08/15/2020: Loyalton Fire FM-5328-NV** began ire Northwest of Bordertown and extended into the TMFPD response area. 47,029 acres burned in CA and NV. There was no damage to Nevada's interests, but in California, 5 homes and 29 outbuildings were destroyed. Nevada residents were issued an evacuation advisory, and a Management Assistance Declaration was issued on 08/15/2020.
- **08/02/2020: North Fire FM-5326-NV** occurred in Red Rock and Rancho Haven with 6300 acres burned. A federal Management Assistance Declaration was issued on 08/03/20.

- **07/21/2020: Rock Farm Fire** in the Galena Foothills/Arrowcreek area burned 120 and destroyed 2 homes, with threats to 1000+ homes, public infrastructure, roads, bridges, and power. 800 homes were evacuated. A federal Management Assistance Declaration was approved on 07/21/2020.

PROBABILITY OF FUTURE EVENTS

The probability of future wildfire events in the Truckee Meadows Fire Protection District can be categorized based on various risk assessments, taking into consideration factors such as vegetation type, weather conditions, and historical data. Given the increasing concerns around drought and climate change, it is generally expected that the likelihood of wildfires may be rated as "likely" or "highly likely," particularly in areas with moderate to high hazard ratings.

VULNERABILITY ASSESSMENT

The Truckee Meadows Fire Protection District (TMFPD), located in the Reno-Sparks metropolitan area of Washoe County, Nevada, is at significant risk from wildland fires due to its diverse ecosystems and urban development. This assessment highlights the populations and areas particularly vulnerable to these hazards.

Vulnerable populations include elderly residents who may struggle with mobility, low-income communities lacking resources for fire prevention, and individuals with disabilities who may need additional support during evacuations. Children may not fully understand evacuation procedures, while homeless populations often lack access to safe shelter during emergencies.

Geographically, the wildland-urban interface areas, where residential neighborhoods meet wildlands, are at increased risk. Regions with dense vegetation and poorly maintained properties pose additional threats due to higher fuel loads. Infrastructure vulnerabilities, such as limited access routes and inadequate water supply for firefighting, further complicate the situation. Inadequate communication systems can leave some residents uninformed about fire risks and evacuation plans.

Socioeconomic factors also contribute to vulnerability, as communities with limited access to information and resources may be ill-prepared for wildland fire events. Homeowners without sufficient insurance might hesitate to invest in critical mitigation measures, increasing their risk.

To mitigate these vulnerabilities, TMFPD should implement community education programs on fire prevention and emergency preparedness. Developing clear evacuation routes, encouraging defensible space around properties, and improving communication systems will also enhance overall preparedness.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 270 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 270: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 271 provides the Calculated Priority Risk Index (CPRI) for wildland fire impacts in the Truckee Meadows Fire Protection District (TMFPD) based on the current plan's hazard risk assessment results. The TMFPD assigned wildland fire impacts a risk factor value of 3.3, reflecting high probability, high frequency, and quick onset impacts. This risk factor value falls in the range of 2.5 to 4.0, which is considered a high-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 271: Calculated Priority Risk Index for Wildland Fire in the TMFPD

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Wildland Fire	4	2	4	3	4	3.3	High

TMFPD Strategic Action Plan

Goals and Impacts:

1. Serving the needs of the community.
2. Building a safer, more resilient community and workforce.

3. Creating a sustainable future for the Truckee Meadows Fire District.[236]

RCI 2005 WASHOE COUNTY FIRE PLAN (OLD COMMUNITY WILDFIRE PROTECTION PLAN [CWPP])

Resource Concepts, Inc. (RCI), a Carson City consulting firm, was selected to conduct community risk/hazard assessments systematically for each community. The RCI Project Teams observed and recorded the factors that significantly influenced the risk of wildfire ignition along the WUI and inventoried features that could have an influence on hazardous conditions in the event of a wildfire.[237]

LANDSCAPE-SCALE WILDLAND FIRE RISK/HAZARD/VALUE ASSESSMENT

The Landscape-Scale Wildland Fire Risk/Hazard/Value Assessment was used as a companion document to the Nevada Community Wildfire Risk/Hazard Assessment Project for Washoe County. These two documents are important sources of information and can help with setting priorities, completing plans, and implementing effective fuel-reduction projects both in and outside the WUI in Washoe County.

Vulnerability Assessment

Jurisdiction-Specific Vulnerabilities

REPETITIVE LOSS PROPERTIES

No repetitive loss properties currently exist in the TMFPD area.

EXPOSURE ASSESSMENT

Table 272 summarizes the exposure of critical facilities in the TMFPD area to hazards that can be mapped.

[236] Truckee Meadows Fire District, "Truckee Meadows Fire Protection District FY 25-27 Strategic Plan." https://tmfpd.us/wp-content/uploads/2023/12/Item-7-2025-2027-Strategic-Plan-ENTIRETY.pdf

[237] Resource Concepts Inc, "Washoe County Fire Plan." https://www.rci-nv.com/reports/washoe/section01.html#s1-1

Table 272: Exposure Assessment for the Truckee Meadows Fire Protection District

Type	Name	Address	Special Hazards District	Flood Zone	Wildland Fire Hazard Potential
Wastewater Treatment Plant (WWTP)	Lemmon Valley WWTP	11000 Lemmon Dr	TMFPD	100-year flood zone	1
Wastewater Treatment Plant	National Wild Horse and Burro Center	15780 SR 445	TMFPD	–	1
Power Plant	Steamboat Hills LP	20590 Wedge Parkway	TMFPD	–	1
Power Plant	Galena 2 Geothermal Power Plant	20590 Wedge Parkway	TMFPD	–	1
Hospital	Saint Mary's Medical Center Sun Valley Clinic	N/A	TMFPD	–	1
School	University of Nevada Farm	N/A	TMFPD	500-year flood zone	1
School	Natchez Elementary School	N/A	TMFPD	–	1
School	Hidden Valley Elementary School	N/A	TMFPD	–	1
School	Lois Allen Elementary School	N/A	TMFPD	–	1
School	Lemmon Valley Elementary School	N/A	TMFPD	–	1
School	Sun Valley Elementary School	N/A	TMFPD	–	1
School	Galena Creek School (historical)	N/A	TMFPD	–	1
School	Alice L Smith Elementary School	N/A	TMFPD	100-year flood zone	1
School	Virginia Palmer Elementary School	N/A	TMFPD	–	1

Type	Name	Address	Special Hazards District	Flood Zone	Wildland Fire Hazard Potential
School	Elizabeth Lenz Elementary School	N/A	TMFPD	–	1
School	Picollo Special Education School	N/A	TMFPD	–	1
School	Alyce Savage Taylor Elementary School	N/A	TMFPD	–	1
School	Pleasant Valley Elementary School	N/A	TMFPD	100-year flood zone	1
School	Verdi Elementary School	N/A	TMFPD	–	1
School	Brown Elementary School	N/A	TMFPD	–	1
School	Galena High School	N/A	TMFPD	–	1
School	North Valleys High School	N/A	TMFPD	–	1
School	Spanish Springs High School	N/A	TMFPD	–	1
School	Yvonne Shaw Middle School	N/A	TMFPD	–	1
School	Ester Bennett Elementary School	N/A	TMFPD	–	1
School	Ted Hunsberger Elementary School	N/A	TMFPD	–	1
School	Spanish Springs Elementary School	N/A	TMFPD	–	1
School	Bishop Manogue High School	N/A	TMFPD	–	1
School	Lighthouse Baptist Academy	N/A	TMFPD	100-year flood zone	1
School	Mountain View Montessori School	N/A	TMFPD	100-year flood zone	1
School	New Beginnings Child Development Center	N/A	TMFPD	–	1
School	Sage Ridge School	N/A	TMFPD	–	1
School	Teen Challenge of Nevada	N/A	TMFPD	–	1

Type	Name	Address	Special Hazards District	Flood Zone	Wildland Fire Hazard Potential
Dam	Hobart Creek Reservoir Dam	N/A	TMFPD	–	1
Dam	Marlette Lake Dam	N/A	TMFPD	–	1
Dam	Greil Dam	N/A	TMFPD	–	1
Dam	Incline Lake Dam	N/A	TMFPD	–	1
Dam	Herman Dam	N/A	TMFPD	–	1
Dam	Huffaker Effluent Storage Reservoir	N/A	TMFPD	–	1
Dam	Hidden Lake Dam	N/A	TMFPD	–	1
Dam	Lightning W Ranch Dams	N/A	TMFPD	–	1
Dam	Pagni Dam	N/A	TMFPD	100-year flood zone	1
Dam	Washoe Lake Dam	N/A	TMFPD	–	1
Dam	Home Ranch Canyon Dam	N/A	TMFPD	–	1
Dam	Wilcox Canyon Dam #1	N/A	TMFPD	–	1
Dam	Wilcox Canyon Dam #3	N/A	TMFPD	–	1
Dam	Jones Canyon Dam	N/A	TMFPD	–	1
Dam	Sidehill Detention Basin	N/A	TMFPD	–	1
Dam	Verdi Meadows Wastewater Disposal Dam	N/A	TMFPD	–	1
Dam	North Spanish Springs Flood Sediment Basin	N/A	TMFPD	100-year flood zone	1
Dam	North Spanish Springs Flood Detention Facility	N/A	TMFPD	100-year flood zone	1

Type	Name	Address	Special Hazards District	Flood Zone	Wildland Fire Hazard Potential
Fire Station	LTMFPD Department Station 440	130 Nectar Street	TMFPD	100-year flood zone	1
Fire Station	TMFPD Station 430 – Silver Lake Volunteers	11525 Red Rock Road	TMFPD	–	1
Fire Station	TMFPD Station 46 – Spanish Springs	500 Rockwell Boulevard	TMFPD	–	1
Fire Station	TMFPD Station 45 – Sun Valley	110 Quartz Lane	TMFPD	–	1
Fire Station	TMFPD Station 37 – Hidden Valley	3255 West Hidden Valley Drive	TMFPD	100-year flood zone	1
Fire Station	Wadsworth Volunteer Fire Department 225	400 Stampmill Road	TMFPD	–	1
Fire Station	TMFPD Station 32 – East Washoe Valley	1240 Eastlake Boulevard	TMFPD	100-year flood zone	1
Fire Station	TMFPD – BLM leased	White Lake Parkway	TMFPD	–	1
Fire Station	TMFPD Station 320 – Washoe Valley Volunteers	Lakeshore Drive	TMFPD	–	1
Fire Station	Nevada Department of Forestry Station 1 – Headquarters/ Fire Station 32	885 Eastlake Boulevard	TMFPD	–	1
Fire Station	Not a Fire Station	United States Highway 395	TMFPD	500-year flood zone	1
Fire Station	Nevada Division of Forestry – Bowers/ Fire Station 30	3905 Old United States Highway 395 South	TMFPD	–	1
Fire Station	USFS – Galena	16255 Mount Rose Highway	TMFPD	–	1
Fire Station	TMFPD Station 381 – Galena	16133 Mountain Ranch Road	TMFPD	–	1

Type	Name	Address	Special Hazards District	Flood Zone	Wildland Fire Hazard Potential
Fire Station	Historical Society – Not a Fire Station	165 Bridge Street	TMFPD	–	1
Fire Station	TMFPD Station 460 – Peavine	11005 Longview Lane	TMFPD	–	1
Fire Station	Not a Fire Station	250 South Avenue	TMFPD	–	1
Fire Station	Not a Fire Station	16175 Callahan Road	TMFPD	–	1
Fire Station	TMFPD Station 300 – Washoe Valley	345 Bellevue Road	TMFPD	100-year flood zone	1
Fire Station	TMFPD Station 39 – Joy Lake	4000 Joy Lake Road	TMFPD	–	1
Fire Station	Palomino valley Volunteer Fire Department Station 450	6015 Ironwood Road	TMFPD	–	1
Fire Station	TMFPD Station 33	470 Foothill Road	TMFPD	–	1
Fire Station	Hungry Valley Volunteer Fire Department Station 244	Eagle Canyon Drive	TMFPD	–	1

ESTIMATED IMPACT AND POTENTIAL LOSSES

The estimated impacts and potential losses to the Truckee Meadows Fire Protection District due to wildfire are considerable and varied. A primary concern is the destruction of infrastructure, which can lead to the loss of homes, commercial properties, and critical services, creating significant financial burdens for the district and its residents.

Emergency response costs are likely to rise as wildfire activity increases, requiring more resources for firefighting efforts. Furthermore, wildfires can cause long-term environmental damage, affecting local ecosystems and resulting in loss of vegetation and wildlife habitat recovery that can take years.

Economically, the tourism sector—a vital part of the local economy—may suffer due to perceived fire risks, leading to decreased visitation and revenue for businesses. Additionally, health risks from poor air quality can increase healthcare costs for residents, particularly those with respiratory issues.

The surge in insurance claims after a wildfire can create financial stress for insurers and lead to higher premiums. To reduce future risks, the district may also need to invest in proactive wildfire mitigation efforts, such as controlled burns and community education.

Lastly, the emotional and psychological impacts on residents can be significant, increasing stress and anxiety about future wildfires. These factors underscore the critical challenges facing the Truckee Meadows Fire Protection District and the need for proactive planning and resource allocation to mitigate potential losses.

Development Trends

Changes in development in hazard-prone areas can increase or decrease the vulnerability of plan participants. Since the previous plan was approved, there has been recent development (for example, construction completed since the last plan was approved), potential development (for example, development planned or under consideration by the jurisdiction), conditions that may affect the risks and vulnerabilities of the jurisdictions (for example, climate change, declining populations or projected increases in population, or foreclosures), shifts in the needs of underserved communities, or gaps in social equity. This can also include changes in local policies, standards, codes, regulations, land-use regulations, and other conditions. For example, as Reno and Sparks continue to expand beyond city limits and into the service area of the TMFPD, the demand for fire protection services will increase as vulnerable community assets increase. Table 273 Indicates how changes in development have increased, decreased, or not affected TMFPD’s overall vulnerability to the hazards profiled.

Table 273: Changes in Development at Truckee Meadows Relative to Hazards

Type of Hazard Event	Changes in Land Use	Changes in Population	Changes in Conditions (e.g., climate change)	Overall Vulnerability
Avalanche and Landslide	N/A	N/A	N/A	Same
Criminal Acts and Terrorism	N/A	N/A	N/A	Same
Drought	Increased land use can cause water scarcity in a prolonged drought. There is no potential for this in the near term.	Increased population demand can cause water scarcity in a prolonged drought. There is no potential for this in the near term.	The recent record-setting winter and the following average winter have recharged groundwater and surface water, taking the region out of the latest drought (U.S. Drought Monitor). However, 1 or 2 dry winters can cause another widespread drought.	Decreased
Earthquake	N/A	N/A	N/A	Same
Energy Emergency	New developments in WUI areas are adopting underground energy utilities. This reduces the chances of local energy disruption or wildfires from downed wires or electrical arcing.	Increased	In 2019, the NV Legislature passed SB 329 requiring electric utilities to submit natural disaster protection plans (NDPPs), required them to mitigate the risk of infrastructure to wildfires. This involves new hardening practices, such as vegetation management, insulated conductors, improved fault fuses, and	Decreased

Type of Hazard Event	Changes in Land Use	Changes in Population	Changes in Conditions (e.g., climate change)	Overall Vulnerability
			underground wiring. The 2022–2023 winter exposed a potential for shortages in heating oil and propane. Weather stressed supply chains and regional shortages/high-prices led to excessive demand and potential deleterious consequences for vulnerable populations.	
Flood	N/A	N/A	N/A	Same
Hazardous Materials Incident	N/A	N/A	N/A	Same
Infectious Disease	Northern Nevada Sierra Medical Center opened in 04/2022. An additional regional hospital could reduce the strain on existing medical services.	Increased population will lead to more demand for medical services, leading to a potential shortages of available government services.	The COVID-19 pandemic has exposed the region's areas of vulnerability, such as impacted medical facilities, broken supply chains, and conflicting state and federal policies.	Increased
Radiological Waste Transport	N/A	N/A	N/A	Same

Type of Hazard Event	Changes in Land Use	Changes in Population	Changes in Conditions (e.g., climate change)	Overall Vulnerability
Extreme Weather (Winter Storm, Windstorms Extreme Heat)	N/A	N/A	N/A	Same
Transportation Incident (Aircraft Crash)	N/A	N/A	N/A	Same
Volcano	N/A	N/A	N/A	Same
Wildland Fire	New communities that have developed around old ones have shifted wildfire risk outward across TMFPD jurisdictions. The adoption of the 2018 International WUI building code should provide increased resilience to wildfire.	Increased	Continued development and urban sprawl will increase jurisdictions' wildfire-prone areas. Cancellation of insurance because of wildfire risk is a new issue, which increases the vulnerability of certain populations.	Increased

Capability Assessment

Planning and Regulatory

Planning and regulatory capabilities are the plans, policies, codes, and ordinances that prevent and reduce the impacts of hazards. Table 274 lists TMFPD's planning capabilities, and Table 275 details the regulations and ordinances used for hazard mitigation.

Table 274: Planning Capabilities of the Truckee Meadows Fire Protection District

Plan Type	Do you have this? (Y/N)	Does the plan address hazards? (Y/N)	Can the plan be used to implement mitigation actions?	When was it last updated? When will it next be updated?
General plan	Y	N	Provide a strategic and fiscal path to make mitigation actions sustainable	2024
Capital improvement plan	Y	N	Would help with Mitigation Action # 7 to improve building security and Mitigation Action # 8 seismic impact study.	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.
Climate change adaptation plan	N	N/A	N/A	N/A
Community wildfire protection plan	Y	Y	Old Washoe County Plan from 2005, mostly irrelevant information	Will be updated 2024/2025
Economic development plan	N	N/A	N/A	N/A
Land use plan	N	N/A	N/A	N/A

Plan Type	Do you have this? (Y/N)	Does the plan address hazards? (Y/N)	Can the plan be used to implement mitigation actions?	When was it last updated? When will it next be updated?
Local emergency operations plan	N	N/A	N/A	N/A
Stormwater management plan	N	N/A	N/A	N/A
Transportation plan	N	N/A	N/A	N/A
Substantial damage plan	N	N/A	N/A	N/A
Other?	Washoe County has a Damage Assessment Plan that serves the same intent and covers all jurisdictions			

Table 275: Regulations and Ordinances Used by the Truckee Meadows Fire Protection District

Regulation or Ordinance	Does this regulation/ ordinance effectively reduce hazard impacts?	Is it adequately administered and enforced?	When was it last updated? When will it next be updated?
Building code	Y	Y	2018 International Wildland-Urban Interface Code updated in Jan. 2019
Flood insurance rate maps	N	N/A	N/A
Floodplain ordinance	N	N/A	N/A

Regulation or Ordinance	Does this regulation/ ordinance effectively reduce hazard impacts?	Is it adequately administered and enforced?	When was it last updated? When will it next be updated?
Subdivision ordinance	N	N/A	N/A
Zoning ordinance	N	N/A	N/A
Natural hazard-specific ordinance (stormwater, steep slope, wildfire)	Y	Y	Wildfire hazard map dictates level of fire rating construction to be used. Needs updating described in Mitigation Action # 6
Acquisition of land for open space and public recreation use	N	Y	Washoe County Open Space does not have adequate funding to manage the owned land for wildfire hazard
Prohibition of building in at-risk areas	N	N/A	N/A
Other? (Describe)			

Administrative and Technical

The district's human and technical capabilities to engage in and improve mitigation planning and program implementation.

Administrative Capabilities

Administrative Capability	Do you have this? (Y/N)	Is staffing adequate?	Is staff trained on hazards and mitigation?	Is coordination between agencies and staff effective?
Chief Building Official	Y	Y	Y	Y
Civil Engineer	N	N/A	N/A	N/A
Community Planner	N	N/A	N/A	N/A

Administrative Capability	Do you have this? (Y/N)	Is staffing adequate?	Is staff trained on hazards and mitigation?	Is coordination between agencies and staff effective?
Emergency Manager	N	N/A	N/A	N/A
Floodplain Administrator	N	N/A	N/A	N/A
Geographic Information System (GIS) Coordinator	N	N/A	N/A	N/A
Planning Commission	N	N/A	N/A	N/A
Fire Safe Council	N	N/A	N/A	N/A
CERT (Community Emergency Response Team)	N	N/A	N/A	N/A
Voluntary Agencies Active in Disasters (VOAD)	Y	N	Somewhat. Volunteer firefighters are trained for only some kinds of emergencies.	Yes
Other? (Describe)				

Technical Capabilities

Technical Capability	Do you have this? (Y/N)	How has the capability been used to assess/ mitigate risk in the past?	How can the capability be used to assess/ mitigate risk in the future?
Mitigation grant writing	Y	Grants are actively pursued at TMFPD	Can multiply productivity if awarded.
Hazard data and information	Y	Currently using old 2005 data to understand fire risk. Existing risk assessment platforms are insufficient to gauge risk parcel by parcel.	With updated data and more robust analytics, we can more adequately determine wildfire risk.
GIS	N	N/A	N/A

Technical Capability	Do you have this? (Y/N)	How has the capability been used to assess/ mitigate risk in the past?	How can the capability be used to assess/ mitigate risk in the future?
Mutual aid agreements	Y	Working with our neighboring agencies helps make mitigation actions contiguous	Improved relationships and agreements help existing units be more productive.
Other? (Describe)			

Financial Resources

Financial Capabilities refer to potential funding sources for mitigation actions. They are shown in Table 276.

Table 276: Financial Resources of the Truckee Meadows Fire Protection District

Funding Resource	Do you have this? (Y/N)	Has this funding resource been used in the past and for what types of activities?	Could this resource be used to fund future mitigation actions?	Can this be used as the local cost match for a federal grant?
Capital improvement project funding	Y	Building new fire stations	Thorough research revealed a lack of sufficient information to evaluate or categorize this, indicating a need for further investigation.	Yes
General funds	Y	All department operations	Y	Yes
Hazard Mitigation Grant Program (HMGP/404)	Y	Jasper and Long Valley HMGP fire mitigation projects	More applications are pending for HMGP.	No

Funding Resource	Do you have this? (Y/N)	Has this funding resource been used in the past and for what types of activities?	Could this resource be used to fund future mitigation actions?	Can this be used as the local cost match for a federal grant?
Building Resilient Infrastructure & Communities (BRIC)	Y	Being used to install solar panels on 4 TMFPD facilities	Will continue with similar plan across all fire stations	No
Flood Mitigation Assistance	N	N/A	N/A	N/A
Public Assistance Mitigation	N	N/A	N/A	N/A
Community Development Block Grant	N	N/A	N/A	N/A
Natural Resources Conservation Services Programs	N	N/A	N/A	N/A
U.S. Army Corps of Engineers Programs	N	N/A	N/A	N/A
Property, sales, income, or special purpose taxes	N	N/A	N/A	N/A

Funding Resource	Do you have this? (Y/N)	Has this funding resource been used in the past and for what types of activities?	Could this resource be used to fund future mitigation actions?	Can this be used as the local cost match for a federal grant?
Stormwater utility fee	N	N/A	N/A	N/A
Fees for water, sewer, gas, or electric services	N	N/A	N/A	N/A
Impact fees from new development and re-development	N	N/A	N/A	N/A
General obligation or special purpose bonds	N	N/A	N/A	N/A
Federally funded programs	N	N/A	N/A	N/A
Other state-funded programs	N	N/A	N/A	N/A
Private sector or nonprofit programs	Y	NV Energy funded hazard mitigation for power infrastructure	Yes	Yes
Other?				

Education and Outreach

Education and outreach capabilities are programs and methods that could communicate about and encourage risk reduction. Those for TMFPD are listed in Table 277.

Table 277: Education and Outreach Resources of the Truckee Meadows Fire Protection District

Education and Outreach Capability	Do you have this? (Y/N)	Does this resource currently incorporate hazard mitigation?	Notes
Community newsletter(s)	N	N/A	N/A
Hazard awareness campaigns (such as Firewise, Storm Ready, Severe Weather Awareness Week, school programs)	Y	Yes, focused on Wildfire	None
Public meetings/events (Please Describe)	Y	Community events/ presentation, Citizen Advisory Board (CAB) meetings	None
Emergency Management Listserv	N	N/A	N/A
Local news	N	N/A	N/A
Distributing hard copies of notices (e.g., public libraries, door-to-door outreach)	Y	Yes, focused on wildfire and smoke detectors	In coordination with the Red Cross
Insurance disclosures/ outreach	N	N/A	N/A
Organizations that represent, advocate for, or interact with underserved and vulnerable	N	N/A	N/A

Education and Outreach Capability	Do you have this? (Y/N)	Does this resource currently incorporate hazard mitigation?	Notes
communities (Please Describe)			
Social media (Please Describe)	Y	Yes	All social media platforms. Some posts reference hazards and mitigation actions when necessary.
Other? (Describe)			

Participation in the National Flood Insurance Program

The National Flood Insurance Program (NFIP) is a FEMA program that provides flood insurance to millions of policyholders nationwide. Special districts like TMFPD are not eligible to participate in the NFIP but may support floodplain management and exist in communities that participate in the NFIP. Information on TMFPD's participation in NFIP is in Table 278.

Table 278: Responses to Questions about the National Flood Insurance Program

Question	Notes
What communities does your special district operate in? Are you aware of any flood concerns in these communities?	TMFPD responds to flood emergencies when required.
Which of your assets are at-risk of flooding? List any of your structures in the high-risk flood zone if known, or list addresses, and the IEM team will check on https://msc.fema.gov/portal/home	None
Is your organization involved in floodplain management? If so, how?	No

Opportunities to Expand and/or Improve Capabilities

The capability assessment provides an opportunity to assess gaps in capabilities and to consider where additional measures could be taken to expand current mitigation capabilities.

Table 279: The Truckee Meadows Fire Protection District's Opportunities to Develop Capabilities

Capability Type	Opportunity to Expand and/or Improve
Planning and Regulations All communities with wildfire risk will have individual Community Wildfire Protection Plans (CWPPs) developed in the next 2 years and will have a plan update every 5 years.	Hiring a consulting agency with proper analytical software can help our region accurately identify risk areas which will improve CWPPs and priorities.
Administrative and Technical	Nothing additional is needed.
Financial	More county funds could be allocated to hazard mitigation actions. TMFPD Wildland Fuels Division, which exclusively does all department fuels mitigation work, is 85% externally funded (contracts, grants, etc.) Internally funding that program will allow department or county priorities to take precedence.
Education and Outreach	More communities adopting the Firewise program will make education and outreach more effective. New avenues to incentivize Firewise sites are being investigated.

Plan Integration

Plan integration is the process by which information from the hazard mitigation plan is incorporated into other planning mechanisms. Planning mechanisms refer to the governance structures used to manage local land-use development and community decision-making, such as budgets, comprehensive plans, capital improvement plans, or other long-range plans, codes, and ordinances. TMFPD reported the following:

- **Previous Plan Integration** – TMFPD did not integrate prior hazard mitigation into any planning mechanisms specifically. However, individual mitigation actions have been adopted in the strategic direction of the Wildfire and Fuels Division.
- **Future Plan Integration** – All county CWPPs must be updated and can include additional information from the current RHMP. TMFPD, including the participants in this update, will be responsible for supporting CWPP and helping to incorporate relevant information/ actions.

Mitigation Strategy

Review of 2020 Hazard Mitigation Actions

As part of the mitigation strategy update, all mitigation actions identified in the 2020 plan were evaluated to determine the status of the action and whether any ongoing or incomplete actions should be included as actions in the 2025 plan update (see Table 280).

Table 280: Previous Mitigation Actions by the Truckee Meadows Fire Protection District

ID	Mitigation Action	Lead Department	Status for Plan Update	Should this action be retained in the plan update? (Yes/No)
WF-13	Adopt 2018 wildland fire code County-wide (All Partners).	Regional Fire Protection Districts	Completed	N
WF-14	Manage fuels to mitigate wildland fire risk along the Mt. Rose corridor. (TMFPD)	TMFPD	In process. Awaiting implementation of Southern Nevada Public Land Management Act-funded project at Sky Tavern/ pursuing more funds and projects around Galena.	N
WF-15	Continue County chipping program and "junk the juniper" program, offering free chipping to property	TMFPD	Continuing program/"Junk the Junipers" has been replaced by the GreenWaste Program/ Pursuing more grant funding to expand Curbside Chipping program	Y

ID	Mitigation Action	Lead Department	Status for Plan Update	Should this action be retained in the plan update? (Yes/No)
	owners (TMFPD).			
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).	Regional Fire Protection Districts	WCEM adopted Perimeter Map application to coordinate all evacuations in case of disasters. All gated access roads in the district have had locks removed, and their signage was changed to stating that they are not evacuation routes. Rather, they are designated as "Emergency Vehicle Access Only." These roads are not considered evacuation routes in emergency planning. Evacuation drills and tabletop events are held by request from communities, as resources and scheduling allow.	y
EQ-11	Incorporate seiche warning system into the Tahoe Basin traffic control	TMFPD	Ongoing. Looking to WC EM for such a system.	No

ID	Mitigation Action	Lead Department	Status for Plan Update	Should this action be retained in the plan update? (Yes/No)
	center. (NLTFPD)			

Considered Mitigation Actions

TMFPD considered a broad range of actions, including those that benefit vulnerable populations and current and new development, as a part of this plan update. There are four main types of mitigation actions:

- Local Plans and Regulations
- Structure and Infrastructure Projects
- Natural Systems Protection
- Education and Awareness Programs

Additional actions, such as those related to preparedness, response, recovery, and prevention, were discussed as possibilities during this plan update.

Table 281: Mitigation Actions Considered by the Truckee Meadows Fire Protection District

Mitigation Action	Type of Action	Selected? (Y/N)	If not selected, why not?
Develop new Community Wildfire Protection Plans (CWPPs) for the entire county	Local Plans and Regulations	Y	N/A
Retrofit structures to harden against wildland fires	Structure and Infrastructure	Y	N/A
Firewise Community Development	Education and Awareness	Y	N/A
Crisis Landscapes Risk Reduction	Natural Systems Protection	Y	N/A
Apply the wildland–urban interface (WUI) code to older properties	Local Plans and Regulations	N	Politically unpopular/ unable to regulate

Mitigation Action	Type of Action	Selected? (Y/N)	If not selected, why not?
Establish post-fire rehabilitation policy	Local Plans and Regulations	N	Too variable and must include federal agencies
Community Hazard Fuels Reduction	Natural Systems Protection	Y	N/A
Establish GreenWaste Renewable Energy Digestion Facility	Structure and Infrastructure	N	Exorbitant cost with not enough need
Update county wildfire risk database/profile	Local Plans and Regulation	Y	N/A
Improve infrastructure security and access at fire stations	Structure and Infrastructure	Y	N/A
Examine and plan for seismic resiliency in public safety facilities	Local Plans and Regulations	Y	N/A
Improve the Truckee River and irrigation ditches to prevent flooding with increased runoff	Structure and Infrastructure	Y	Truckee River Flood Management Authority responsibility
Improve first responders' knowledge, skills, and abilities concerning aircraft crashes/emergencies	Local Plans and Regulations	Y	N/A

2025–2029 Mitigation Action Plan

Prioritizing Mitigation Actions

The identified mitigation actions were then prioritized, based on the following terms:

- **S – Social:** The public must support the overall mitigation implementation strategy and specific mitigation actions. Consider, will the action disrupt housing or cause the relocation of people? Will the proposed action adversely affect one segment of the population? Is the action compatible with present and future community/agency values?
- **T – Technical:** It is important to determine if the proposed action is technically feasible, will help reduce losses in the long term, and has minimal secondary impacts. How effective is the action in avoiding or reducing future losses? Does the action solve the problem or only a symptom? Will the action create more problems than it solves? Consider the root cause of the issue at hand to determine whether the action is a whole or partial solution, or not a solution at all.

- **A – Administrative:** This category examines the expected staffing, funding, time, and maintenance requirements for the mitigation action to determine if the jurisdiction/special district has the personnel and administrative capabilities to implement the action or whether outside help will be necessary. Consider, a) Staffing (enough staff and training): does the jurisdiction/special district have the capability (staff, technical experts) to implement the action? b) Funding allocated: does the jurisdiction/special district have the funding to implement the action or can it readily be obtained? c) Time: can it be accomplished in a timely manner? d) Maintenance/Operations: can the jurisdiction/special district provide the necessary maintenance? It is important to remember that most federal grants will not provide funding for maintenance.
- **P – Political:** This considers the level of political support for the mitigation action. Is there political support to implement and maintain this action? Have political leaders participated in the planning process so far? Is there a local champion willing to help see the action to completion? Is there enough public support to ensure that the success of the action? Have all stakeholders been offered an opportunity to participate in the planning process?
- **L – Legal:** The jurisdiction/special district must have the legal authority to implement the action or consider what new laws or regulations would be needed to carry out the mitigation action. Evaluate, are the proper laws, ordinances, and resolutions in place to implement the action? Are there any potential legal consequences? Is the action likely to be challenged by stakeholders who may be negatively affected?
- **E – Economic**: Economic considerations must include evaluation of the present economic base and projected growth. Cost-effective mitigation actions that can be funded in current or upcoming budget cycles are more likely to be implemented than actions requiring general obligation bonds or other instruments that would incur long-term debt in a jurisdiction/special district. Consider benefits and costs at a planning level. A detailed benefit-cost analysis will be performed as project-specific funding becomes available. What financial benefits will the action provide? Does the cost seem reasonable for the size of the problem and the likely benefits? What burden will be placed on the tax base or local economy to implement this action? Does the action contribute to community economic goals, such as capital improvements or economic development? Are there currently sources of funding that can be used to implement the action?
- **E – Environmental:** The impact on the environment is an important consideration because of public desire for sustainable and environmentally healthy communities. Also, statutory considerations, such as the National Environmental Policy Act (NEPA), have to be kept in mind when using federal funds. How will this action impact land/water? Impact on endangered species: how will this action impact endangered species? How will this action impact hazardous materials and waste sites? Is this action consistent with community environmental goals? Is the action consistent with federal laws, such as the National Environmental Policy Act (NEPA)?

The actions were also assigned a prioritization category of low, medium, or high, based on the following definitions:

- **Low:** Based on one to two STAPLEE criteria, the action is feasible and important, with multiple potential challenges. The action should be implemented as funding becomes available.
- **Medium**: Based on three to four STAPLEE criteria, the action is feasible and important, with some potential challenges. Its implementation is not as urgent as a high priority action item and can be implemented over time.
- **High**: Based on five or more STAPLEE criteria, the action is feasible and important, with minimal to no concerns. It is very important to the jurisdiction to implement and may be prioritized in the short term.

After careful consideration of the priorities outlined in Table 282, TMFPD ranked the priority of their proposed mitigation actions. Their responses to the prioritization criteria are detailed in Table 283.

Table 282: Truckee Meadows Fire Protection District Mitigation Action Prioritization

Action #	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Priority
1	3	3	4	4	4	4	4	High
2	2	3	3	3	2	2	4	Medium
3	2	2	3	4	4	3	4	Medium
4	3	3	4	3	2	2	2	High
5	2	3	4	3	3	2	3	High
6	3	2	2	3	3	1	3	Low
7	3	3	4	3	2	2	3	Medium
8	4	2	3	3	3	2	3	Low
9	4	3	2	3	3	2	4	Medium
10	2	2	2	3	1	2	2	Medium

Table 283: Truckee Meadows Fire Protection District 2025–2029 Mitigation Action Plan

#	Project Title	Hazard Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source(s)	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
1	County-wide CWPP	Wildland Fire	Lack of planning, lost ability to get federal funding	TMFPD	WCEM, RFD, SFD	TMFPD wildland fuels division priority	HMGP, general project funds, HMGP-PF	$100k	Evaluates community-level risk, establishes project priority	10 years	Medium term (2 years)	High
Description: Develop Community Wildfire Protection Plans (CWPPs) for all areas with wildland fire risk to establish risk profile and prioritize mitigation projects.												
2	Home Retrofit Improvement	Wildland Fire	Underserved, low-income communities	TMFPD	WCEM, Washoe County Building and Safety	Washoe County Adopted Building Code	Hazardous Materials Grants	$5M	Reduced damage/ insurance claims to homes	15+ years	Long term (5+ years)	Medium
Description: Provide funding to low income underserved communities to make retrofit changes to homes to bring older homes up to code to lower risk to wildland fire.												
3	Firewise Communities	Wildland Fire	Community wildfire risk	TMFPD	NDF	TMFPD wildland fuels division priority	General operating funds, HMA Grant	$5k	Promotes community engagement, reduces wildland fire risk	10 years	Long term (5+ years)	Medium
Description: Develop Firewise communities in areas of high fire risk.												
4	Crisis Landscapes Risk Reduction	Wildland Fire	Risk to structures and infrastructure	TMFPD	RFD, SFD, NDF, FS, BLM	Ongoing action from previous HMP and CWPP	HMGP, HMGP-PF	$2M	Protects communities/ infrastructure, creates sustainable landscapes	5 years	Long term (3 years)	High
Description: Apply targeted fuel reduction treatments to landscapes at high risk to wildland fire. Identified through CWPPs, existing HMGPs, and SNPLMA grants.												

#	Project Title	Hazard Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source(s)	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
5	Community Wildfire Risk Reduction	Wildland Fire	Risk to structures and infrastructure	TMFPD	RFD, SFD, NDF, FS, BLM	CWPPs	HMGP, HMGP-PF, Limited General funds	$2M	Protects communities/infra structure	5 years	Long term (3 years)	High
Description: Apply targeted treatments to improve defensible space among homes and open space in communities with high fire risk.												
6	County Wildfire Risk Update	Wildland Fire	Risk to structures. Improve building planning	TMFPD/Washoe County Building and Safety	RFD, SFD	Washoe County Regional Mapping,	HMGP, HMGP-PF, General operating funds	$250k	Establishes accurate risk profile	10 years	Medium term (2 years)	Low
Description: Investigate new product to reassess wildfire risk to individual parcels and expanded to communities taking into account mitigation actions.												
7	Infrastructure Security	Criminal Acts and Terrorism	Protect critical infrastructure	TMFPD	WCEM	TMFPD Strategic Plan	HMGP, General project funds	$10M	Maintains emergency services	15+ years	Long term (5 years)	Medium
Description: Provide fencing, gates and limited access to fire/police stations to protect against criminal acts and terrorism												
8	Seismic Study	Earthquake	Protect critical infrastructure	TMFPD/ Washoe County Building and Safety		ICC, Washoe County Building Code	General project funds, HMGP	$100k	Maintains emergency services	15+ years	Short term (2 years)	Medium
Description: Commission study of TMFPD buildings (or all critical infrastructure) to assess seismic resilience. Make recommendations for seismic retrofit and future design consideration.												
9	ARFF Training	Transportation Incident (Aircraft Crash)	Life safety, structures, infrastructure	TMFPD	RFD, SFD	TMFPD Strategic Plan, SFD/TMFPD Joint Operational Efforts	FAA grant or Homeland Security grant	$200k	Improves emergency services	5-8 years	3 years	Medium

#	Project Title	Hazard Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source(s)	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
Description: Train firefighters on the Knowledge Skills and Abilities to improve response, strategies and tactics on Aircraft Rescue Firefighting (ARFF) to assist with transportation incidents along with Reno–Tahoe Airport firefighters.												
10	Stormwater Management	Flooding	Structures and infrastructure	TMFPD, WCEM, TRFMA	RFD	RHMP, Partners plans	HMGP, FMA	$1M	Less potential for stormwater damage	10 years	Long term (5 years)	Medium
Description: Improve management of ditches that run through Reno to prevent overflow in flood conditions. Provide resources to nonprofits to allow for bank management, dredging, obstruction removal, etc.												
11	Flood insurance study	Flooding	People and infrastructure	TMFPD, WCEM	TMFPD	Partners plans.	HMGP, FMA	$50,000	Studying areas lacking flood insurance can pinpoint vulnerable regions and guide policy decisions, enhancing community preparedness and economic resilience. It raises awareness about the need for adequate coverage and supports stronger disaster mitigation efforts.	5-10 years	1-2 Years	Medium
Description: This study aims to identify gaps in flood insurance coverage in the county by assessing accessibility, awareness, and mitigation efforts. Through data analysis and community engagement, it highlights areas lacking insurance and offers recommendations to improve community resilience against flooding.												
12	Tree Maintenance and Management	Wind	Residents and visitors	TMFPD	None	Unsure	Operating budget	Staff time	Decreased property damage	Life of plan	1-2 years	Medium

#	Project Title	Hazard Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source(s)	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
Description: Regularly prune trees and remove dead or weakened branches to reduce the risk of falling debris during severe wind events. Consider replacing high-risk trees with more wind-resistant species, and ensure trees are planted at appropriate distances from structures.												
13	Enhancing awareness and education on extreme heat risks for vulnerable populations	Extreme Heat	Public education to reduce the loss of life and health implications	TMFPD	UNR	Public Information	General operating funds, EMPG, SERC funds	$20K	Increase public awareness of safety through information	Medi-um	1–5 years	Medium
Description: Promote education and awareness of extreme heat risk and opportunities to reduce risk, especially with the elderly, people with medical conditions, and other vulnerable populations												
14	Water Conservation During Drought Conditions	Drought	All populations and firefighters	TMFPD	WCEM	Plans for Drought	General Operating Funds, HMA Grants	$10,000	Increase to public safety	Life of the plan	1-2 years	High
Description: Adopt ordinances to prioritize and control water use, especially during emergencies like firefighting.												
15	Volcano Education and Awareness Program	Volcano	Residents and visitors	TMFPD	USGS Menlo Park, subject matter experts, Washoe County Emergency Management	RHMP itself	General operating funds, WCEM funds, EMPG, SERC funds	Possibly USGS or local. Need a better understanding from the SME about the cost and whether there are studies that could be used for reference	Increased awareness and understanding of potential impact, clean-up time, etc.	Beneficial until an update is available or needed based on volcanic activity/ occurrence	Short term	Medium
Description: Public awareness campaigns												
16	Themed Months/ Days per Hazard	Winter storm	Residents and visitors	TMFPD	Subject matter	RHMP	WCEM funded,	$500 + staff time	Increased community	Life of the plan	1-2 years	High

#	Project Title	Hazard Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source(s)	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
	(Including proclamations)				experts/ agencies for specific hazards (USGS, fire agencies, LEO, NWS/NOAA, etc.)		EMPG, SERC funds		awareness and resilience			
Description: Public awareness campaigns												
17	Comprehensive avalanche atlas	Avalanche/ Landslide	Geographical awareness, historical data, decision-making support, education and training, emergency planning, wildlife management	TMFPD	National Parks Dept., Forestry Depart., Geological Survey Department, Meteorological services	Regional Hazard Mitigation plans, Mapping & GIS resources, public outreach and education, collaboration with local experts, permitting and land use planning, state and federal guidance	Federal grants (NOAA) & USGS), State grants such as Nevada Division of Outdoor Recreations and Nevada Department of Natural Resources, Local government funding, academic partnerships, user fees, and permits	$50,000-200,000	Enhanced safety, risk assessment, education & awareness, emergency planning, data for researchers, land use planning, recreational opportunities, community engagement	Life of plan	1-3 years	medium

#	Project Title	Hazard Addressed	Vulnerability Addressed*	Responsible Agency	Partners	Existing Planning Mechanism(s)**	Potential Funding Source(s)	Cost Estimate	Benefits (Losses Avoided)	Project Useful Life	Timeframe	Priority
Description: Create an avalanche/landslide atlas												

Notes: *Includes vulnerable populations; **Through which the action will be implemented.

ARFF = Aircraft Rescue and Fire Fighting, BLM = United States Bureau of Land Management, BRIC = Building Resilient Infrastructure & Communities, CDC = Centers for Disease Control and Prevention, CERT = Community Emergency Response Team, CHSC = Citizens Homeland Security Council, CWPP = Community Wildfire Protection Plan, DOE = Department of Energy, EMPG = Emergency Management Preparedness Grant; EPA = Environmental Protection Agency, FAA = Federal Aviation Administration, FMA = Flood Mitigation Assistance, FS = United States Forest Service, GIS = Geographical Information Systems, HMGP = Hazard Mitigation Grant Program, ICC = International Code Council, LEO = Law Enforcement Organizations, NDF = Nevada Division of Forestry, NDOT = Nevada Department of Transportation, NOAA = National Oceanic and Atmospheric Administration, NWS = National Weather Service, PA = Public Assistance, RFD = Reno Fire Department, SERC = State Emergency Response Commission, SFD = Sparks Fire Department, TMFPD = Truckee Meadows Fire Protection District; TMWA = Truckee Meadows Water Authority, TRFMA = Truckee River Flood Management Authority, UNR = University of Nevada, Reno, USGS = United States Geological Service, WCEM = Washoe County Emergency Management, WCHD = Washoe County Health District; WC CSD (Washoe County CSD) = Washoe County Community Services Dept.

MITIGATION SUCCESS STORY

COMMUNITY CURBSIDE CHIPPING PROGRAM, GREEN WASTE PROGRAM

The successful program allowed residents to be engaged in reducing the wildfire hazard fuel on their properties. This program is intended to assist residents who cannot travel to chipping locations. This program accommodates Washoe County residents to dispose of their green, dry, and dead vegetation, shrubs, tree branches, etc. (see Figure 92).



Figure 92: Pictures from the Truckee Meadows Curbside Chipping Program

Truckee River Flood Management Authority Hazard Mitigation Program Annex

The Truckee River Flood Management Authority (TRFMA) has a fully integrated approach to hazard mitigation planning and program implementation. Throughout the 2025 update process, the following Regional Hazard Mitigation Plan (RHMP) participation roles were recorded:

Name	Position	Department
Danielle Henderson	Natural Resource Manager	TRFMA
George Robison	Executive Director	TRFMA

What's New in the 2025 Update?

Since the prior plan update, the Truckee River Flood Management Authority has made several significant changes to enhance flood resilience in the region. One of the primary focuses has been on improved floodplain management. This includes adjusting zoning regulations and land-use policies to account for updated flood risk data, ensuring that development does not exacerbate flooding issues. By integrating these considerations into planning, the authority aims to protect the community and the environment.

In addition to revised management practices, the authority has prioritized infrastructure improvements. Key projects involve upgrading levees, flood control channels, and drainage systems to better accommodate increased water volumes. These enhancements are crucial for minimizing flood risk, especially in areas historically vulnerable to flooding during severe weather events.

Furthermore, the Truckee River Flood Management Authority has developed actionable mitigation strategies informed by recent disasters and emerging hazards. These strategies focus on risk reduction and aim to create a more resilient community. Community engagement has also taken on greater importance in the planning process, with efforts to gather local input and foster collaboration on flood management initiatives.

Lastly, there is a growing emphasis on environmental sustainability within the flood management framework. The authority is aiming to restore natural habitats that can absorb excess floodwaters, integrating ecological considerations into their flood resilience efforts. These combined changes reflect a comprehensive approach to managing flood risks and enhancing the overall safety and well-being of the community. The 2025 update of the RHMP includes the following major revisions to the 2020 plan:

- Including additional stakeholders and opportunities for public participation.

- Identifying all hazards that could impact the plan participant.
- Expanding upon the capability assessment, including opportunities to expand and improve capabilities.
- Identifying plan integration and integration opportunities.

Plan Adoption

44 CFR §201.6(c)(5) requires that an HMP be formally adopted by elected officials from each participating jurisdiction. TRFMA formally adopted the 2025 update of the Washoe County RHMP on July 11, 2025.

This RHMP was approved by FEMA Region IX on September 24, 2025. A copy of the TRFMA's adoption resolution is included in Appendix F of the Base Plan.

District Profile

The TRFMA is a joint effort established under an Interlocal Cooperative Agreement between Washoe County and the cities of Reno and Sparks to reduce the impacts of flooding in the Truckee Meadows region. The TRFMA's primary mission is "to plan, design, build, operate, and maintain infrastructure to reduce flood damage, safeguard public health, and create a more resilient community." The agency is responsible for oversight and implementation of the Truckee River Flood Management Project, which includes mitigation projects along 33 miles of the Truckee River from downtown Reno to the town of Wadsworth near Pyramid Lake. The agency also operates and maintains a network of stream gages that are part of a regional flood warning system; provides educational resources on flood preparedness; and administers a program that provides financial assistance for home elevation.[238]

Hazard Profiles and Vulnerability Assessments

Section 4 contains hazard profiles and vulnerability assessments to determine the potential impact of hazards on the people, the economy, and the built and natural environments of the TRFMA. They have been streamlined to increase the effectiveness and usability of the RHMP.

General

Washoe County has experienced several disaster declarations that may have affected the TRFMA. In total, the county has received 48 disaster declarations since 1965, including 15 since the previous HMP update. Table 284 identifies the declarations since 2020 that have affected the Washoe County area.

[238] Truckee River Flood Management Authority, 2024, https://trfma.org/our-work/our-projects/

Table 284: Disaster Declarations in Washoe County since 2020 That Affected TRFMA

Disaster Number	Individual Assistance Program Declared	Public Assistance Program Declared	Hazard Mitigation Program Declared	Declaration Date	Title
FM-5602	No	Yes	Yes	8/2/2025	Peavine Fire
FM-5586	No	Yes	Yes	6/10/2025	Marie Fire
FM-5546	No	Yes	Yes	11/11/2024	Callahan Fire
FM-5533	No	Yes	Yes	9/7/2024	Davis Fire
FM-5530	No	Yes	Yes	8/12/2024	Gold Ranch Fire
FM-5495	No	Yes	Yes	6/12/2024	Sullivan Fire
FM-5494	No	Yes	Yes	6/11/2024	Trail Fire
FM-5448	No	Yes	Yes	08/14/2022	Joy Lake Fire
FM-5382	No	Yes	Yes	11/07/2020	Pinehaven Fire
FM-5328	No	Yes	Yes	08/15/2020	Loyalton Fire
FM-5326	No	Yes	Yes	08/03/2020	North Fire
FM-5322	No	Yes	Yes	07/21/2020	Rockfarm Fire
FM-5316	No	Yes	Yes	06/27/2020	Poeville Road Fire
DR-4523	Yes	No	No	04/04/2020	Biological (COVID-19)
EM-3443	No	No	No	03/13/2020	Biological (COVID-19)

Source: Disaster Declarations for States and Counties

The hazard profiles and vulnerability assessments contained in this annex represent a considerable amount of work performed by the Mitigation Planning Team (MPT). Planning Team members ranked hazards using several key factors, followed up by activities to validate hazard analysis results and identify specific areas of risk. Taking into account the missions of the special hazard districts participating in the 2025 RHMP update, this chapter includes hazard profiles and vulnerability assessments. The plan addresses the hazard of Flooding.

Hazard Ranking Methodology

CALCULATED PRIORITY RISK INDEX

A risk assessment result for the entire county does not mean that each participant has the same amount of risk for each hazard. Each plan participant should consider how they are uniquely at risk of the hazards profiled. The Calculated Priority Risk Index (Table 285) assessment resulted in a hazard ranking for the TRFMA.

Table 285: Factors for Calculating Risk

Risk Index Factor	Degree of Risk Level		Criteria	Factor Weight for Degree of Risk Level
Probability *What is the likelihood of the hazard occurring?*	1	Unlikely	Less than 1 percent probability of occurrence in the next year or a recurrence interval of greater than every 100 years.	30%
	2	Occasional	1 to 10 percent probability of occurrence in the next year or a recurrence interval of 11 to 100 years.	
	3	Likely	11 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.	
	4	Highly Likely	91 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.	
Magnitude *What will be the overall impact?*	1	Negligible	Less than 5% of the affected area's critical and non-critical facilities and structures are damaged/destroyed. Only minor property damage and	30%

Risk Index Factor	Degree of Risk Level		Criteria	Factor Weight for Degree of Risk Level
			minimal disruption of life. Temporary shutdown of critical facilities.	
	2	Limited	Greater than 5% and less than 25% of property in the affected area is damaged/destroyed. Complete shutdown of critical facilities for more than one day but less than one week.	
	3	Critical	Greater than 25%, but less than 50% of property in the affected area was damaged/destroyed. Complete shutdown of critical facilities for over a week but less than one month.	
	4	Catastrophic	Over 50% of critical and non-critical facilities and infrastructures in the affected area are damaged/destroyed. Complete shutdown of critical facilities for more than one month.	
Onset *How long will be there be between when it is recognized the hazard is approaching and when the hazard*	1	Self-defined	More than 24 hours	10%
	2	Self-defined	12 to 24 hours.	
	3	Self-defined	6 to 12 hours.	
	4	Self-defined	Less than 6 hours.	

Risk Index Factor	Degree of Risk Level		Criteria	Factor Weight for Degree of Risk Level
will begin affect the community?				
Duration *What is the length of time the hazard will remain active, including how long emergency operations will have to continue after the hazard event?*	1	Brief	Up to 6 hours.	10%
	2	Intermediate	Up to one day.	
	3	Extended	Up to one week.	
	4	Prolonged	More than one week.	
Frequency *How often has this kind of hazard resulted in an emergency or disaster?*	1	Every 10+ years	This hazard is not frequent but may still impact the area.	20%
	2	Every 5–10 years	This hazard is not as frequently occurring but it could occur in the next 10 years.	
	3	Every 1–5 years	This hazard is likely to occur relatively often. It may have occurred more or less frequently recently, but on average, it can be expected every 1–5 years.	
	4	Annually	This hazard is a frequent occurrence which the area actively has to respond to on an approximately annual basis.	

Risk factor values for Truckee River flooding were calculated using information from the Flood Inundation Map Series produced by TRFMA. Note that the duration factor estimates include the period of rising floodwaters, receding floodwaters, emergency response, and cleanup (e.g., flood debris, mud, damaged property). The drainage of floodwaters varies throughout the Truckee Meadows. Some areas drain more quickly than others. Modeled hydrographs at various locations and discharge levels are available from TRFMA upon request.

The following is the risk factor equation:

Risk Factor Equation

RF Value = [(Probability x .30) + (Magnitude x .30) + (Onset x .10) + (Duration x .10) + (Frequency x .20)]

Table 286 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 through 4.0 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. This provides a framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 286: Overall Risk Scores for the CPRI

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

The Washoe County base plan is comprehensive for regional assessments and effectively addresses the calculated risk indexes. It provides a thorough evaluation that highlights its commitment to risk management and community safety, while the annexes are specific to each jurisdiction. Table 287 displays the CPRI values for the TRFMA.

Table 287: Calculated Priority Risk Index of the Truckee River Flood Management Authority

Type of Hazard Event	Annual Chance of Exceedance	Maximum Discharge at Reno Gage (cfs)	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
10-Yr Flood	10%	7,500	3	1	2	2	3	2.2	Medium
20-Yr Flood	5%	9,150	2	2	2	2	3	2.2	Medium
50-Yr Flood	2%	13,700	2	2	2	3	3	2.3	Medium
75-Yr Flood	1.33%	17,300	2	3	2	4	2	2.5	High
100-Yr Flood	1%	20,700	2	3	2	4	2	2.5	High
150-Yr Flood	0.85%	23,000	1	4	2	4	2	2.5	High
200-Yr Flood	0.5%	35,800	1	4	2	4	1	2.3	Medium
500-Yr Flood	0.2%	63,500	1	4	2	4	1	2.3	Medium
Averages	**2.61%**	**23,831.25**	**1.75**	**2.88**	**2**	**3.38**	**1.75**	**2.28**	**Medium**

NATIONAL RISK INDEX

The National Risk Index (NRI) is not included in the local jurisdiction annexes as the dataset is developed at a county and census tract level, and it is not aggregated to individual jurisdictional boundaries. While the NRI provides useful context for understanding countywide hazard overall risk data, it does not offer the resolution needed to support jurisdictional specific assessments.

Hazard-Specific Profile

Based on TRFMA's mission to reduce damage caused by Truckee River floods and create more resilient communities, TRFMA evaluated this riverine flooding hazard only as that is the hazard they are legally responsible for addressing.

FLOODING

Floods are among the most frequent and costly natural disasters in terms of human hardship and economic loss. They can cause substantial damage to structures, landscapes, and utilities; and jeopardize life and safety. Specific health hazards are also expected in flooding events. Standing water and wet materials in structures can become breeding grounds for microorganisms, such as bacteria, mold, and viruses. When flooding occurs in populated areas, warnings and evacuation can reduce impacts on life and safety. TRFMA helps mitigate flooding along the Truckee River.

From 2019 to the present (July 2024), no significant flooding has occurred on the Truckee River or its main tributaries. Information on Truckee River flow is available online from the United States Geological Survey (USGS). Key streamflow gages monitored by TRFMA as part of its Flood Warning Plan include:

- Reno Gage (USGS 10348000) https://nwis.waterdata.usgs.gov/usa/nwis/peak/?site_no=10348000
- Vista Gage (USGS 10350000) https://nwis.waterdata.usgs.gov/nwis/peak?site_no=10350000&agency_cd=USGS&format=gif

Through a cooperative joint funding agreement with the USGS, TRFMA monitors streamflow at a number of other locations along the Truckee River and on its main tributaries, including Steamboat Creek.

The TRFMA is a joint effort among the cities of Reno and Sparks, Washoe County, and numerous other stakeholders to reduce the devastating impacts of flooding along the Truckee River in Washoe County, Nevada. TRFMA accomplishes this goal by planning, designing, and constructing flood impact reduction projects, maintaining existing flood infrastructure, providing information about flooding for planning and development, and providing logistical support to our first responders during actual flood events.

The agency is responsible for implementing the Truckee River Flood Management Project (Flood Project). The Flood Project has evolved over decades of study, consideration, and community involvement. The current plan represents the outcomes of countless meetings, community input, and local and federal planning. The Flood Project extends approximately 33 miles along the Truckee River, from downtown Reno (near Jones Street) to the town of Wadsworth, Nevada (near Pyramid Lake). Major elements of the Flood Project are summarized below and grouped according to project reach. Detailed information is available in the Flood Project Map Book.

The Flood Project is divided into three reaches:

Downtown & West Reno Reach

The Truckee River upstream of the I-580 Bridge consists of a confined channel with a series of bridges, floodwalls, and berms crossing and confining the river. The Flood Project elements in this reach consist of both new flood protection projects as well as maintenance for existing infrastructure. These project elements will be prioritized based on targeting (if there is a cooperative agency constructing a related project where the project element can be added and built in a cooperative fashion). For instance, TRFMA provided significant funding for the rebuilding of the Virginia Street Bridge in this reach in 2015-2016.



Figure 93: Downtown and West Reno Reach Flood Project Elements[239]

[239] Truckee River Flood Management Authority, "TRFMA-Mapbook-Flood-Project-Elemnts-Board-Approved-July-2023.pdf." https://trfma.org/wp-content/uploads/2023/12/TRFMA-Mapbook-Flood-Project-Elements-Board-Approved-July-2023.pdf

Booth Street Area

Booth Street Bridge is low to the water and gets inundated during high floods causing water to back up upstream. There is flooding along the north bank of the river with breakouts both upstream and downstream of the Booth Street Bridge.

- Upstream of the bridge a small berm or flood wall may be installed to about 1,500 feet upstream. The bridge ramp on the north side will tie in to the upstream as well as the downstream berm or floodwall.
- Downstream of the bridge a low berm is now proposed along the river that only gives partial protection up to perhaps only 14,000 cfs instead of a full 20,500 cfs flood but allows the river and the neighborhood to remain connected to the river.



Figure 94: Map of Booth Street Area

Booth to Arlington

Along Riverside Drive there is a natural or small human-made berm that keeps water from overtopping into the neighborhood just north of the bank until around 11,000 cfs, which unfortunately is a common flood event.

- The alternative being advocated here is to protect the river from smaller more frequent floods but not have the large, tall walls necessary to fully protect the river up to the 100-year flood. This low floodwall will allow almost all trees to remain and will not be so intrusive to the river view and trail. The final height of the small wall will be determined in design after full community input.

- Closer to Arlington there is an existing floodwall that will be replaced and made slightly higher to protect to a higher flood level but not 100-year flood level.



Figure 95: Map of Booth to Arlington

Arlington Area

This area has floodwalls on both banks and on the island as well. There are several bridges including the North and South Arlington Bridge and walking bridges.

- TRFMA's role is to provide advice and hydraulic models and data on river hydraulic conditions for redesign/rebuild that Regional Transportation Commission (RTC) is undergoing for Bridges.
- There are also numerous floodwalls; TRFMA may assist technically or even financially in the future depending on the timing and situation of the improvement.



Figure 96: Map of Arlington Area

Sierra to Lake Street Bridges

This reach includes the Sierra Street, Virginia Street, Center Street, and Lake Street bridges. The area is very tight to the river, and this can cause flooding into large buildings.

- Virginia Street Bridge was replaced in 2016.
- Sierra Street Bridge is under design for replacement by RTC.
- TRFMA's main role is to advise and provide technical assistance for design (e.g., models, data). TRFMA may help with future floodwall replacement projects as a cooperating agency.

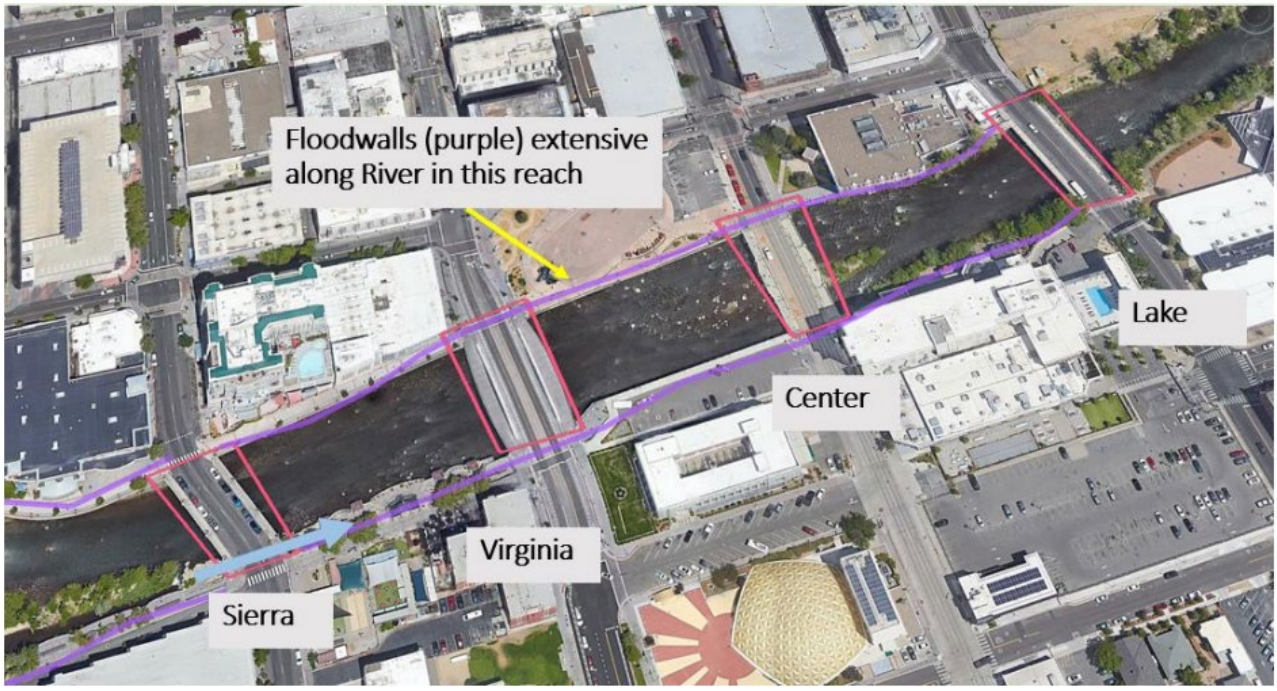


Figure 97: Map of Sierra to Lake Street Bridge Reach

Lake Street to I-580

From Lake Street to I-580 the river is less constrained but there are still buildings near the river.

- The only major project slated in this reach is the removal of the old Wells Bridge underneath the Wells Avenue overpass. The Bridge is extremely low to the river and backs up water.

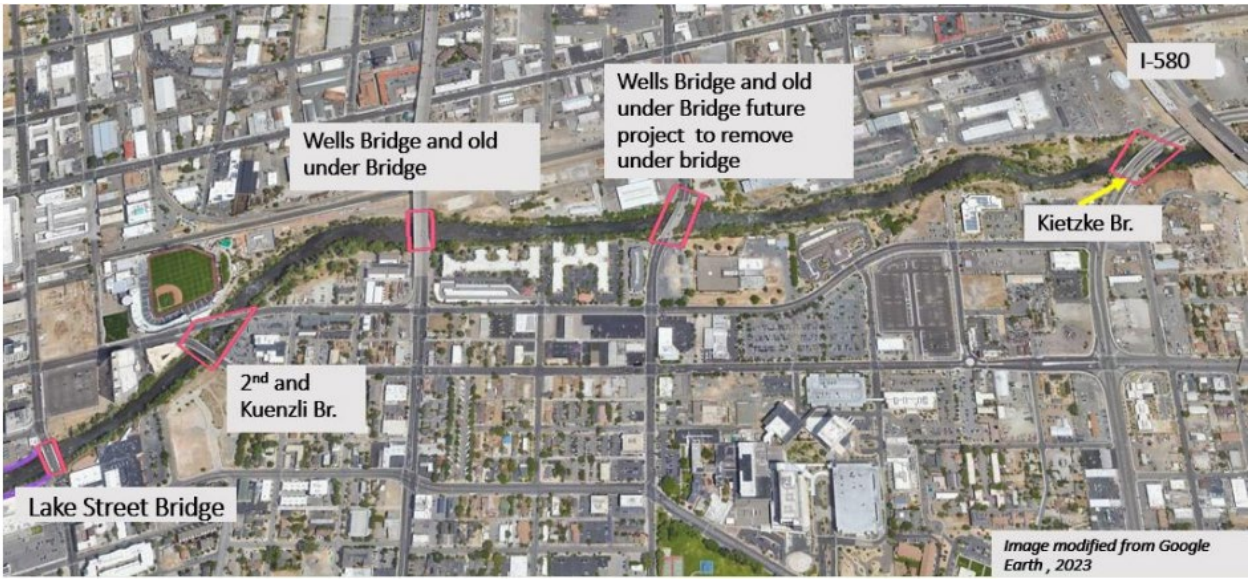


Figure 98: Map of Lake Street Bridge to I-580

The Meadows Reach (Meadows Flood Project)

This reach extends from I-580 down to Vista Narrows east of Sparks. The Meadows Flood Project includes levee, floodwalls, berms, terracing, bank stability, and stream and riparian restoration activities. The Meadows Flood Project can be broken into phases or segments which include:

- The Reno Sparks Indian Colony Levee and Floodwall – Completed in 2009
- Grand Sierra Resort – Berm and Levee (planned construction 2024-25)
- Truckee Meadows Water Authority Levee (planned construction 2026)
- Reno Tahoe International Airport Berm and terracing (planned construction 2024-25)
- Additional Levee Work North Bank Glendale to Rock (planned construction 2026)
- Mill/McCarran Levees, Terracing, Channel and Riparian Restoration (planned construction 2027-28)
- North Levee and Flood Wall – McCarran to Vista (planned construction 2029-30)
- Vista Narrows Floodplain Terracing (in permitting planned construction 2024 and/or 2025)

The cost to complete the Meadows Project was estimated to be $185 million in 2021. The Meadows Project has tremendous benefit from reducing flooding vs. cost of implementation. In an evaluation done in 2021, the Meadows Project in its entirety (not just cost to complete) has a beneficial cost ratio near $1.6 and over $10 million per year in net economic benefit. In terms of “cost to complete,” benefit cost ratio and annual net economic benefit are even greater.

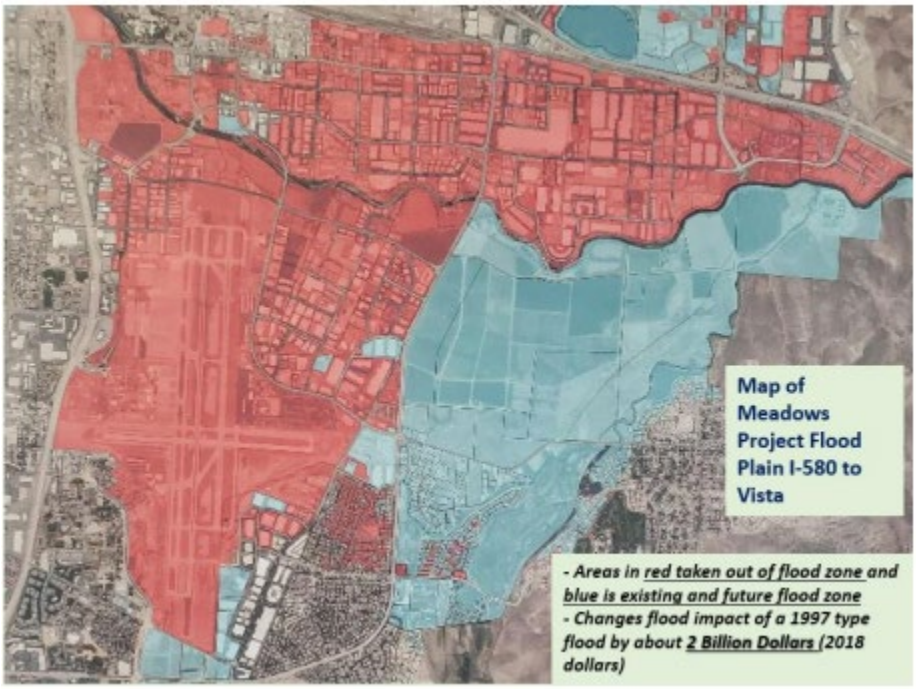


Figure 99: Map of Meadows Flood Project



Figure 100: Map of Meadows Reach

Reno Sparks Indian Colony Levee & Floodwall

The Reno Sparks Indian Colony Levee and Floodwall project is complete and represents nearly one-half mile (2,240 feet) of levee and floodwall. The levee section is approximately 1,170 feet while the floodwall was 1,070 feet. The project cost $5.8 million and was shared between the Flood Project ($1.72 million), Walmart ($2.28 million) and the Reno-Sparks Indian Colony ($1.7 million in land value). The project features a meandering trail along the river side that can be used for recreation.

Grand Sierra Resort Berm & Levee (Glendale Ave to Greg St Bridge)

The Grand Sierra Resort (GSR) Berm and Levee Project has been converted from a floodwall to a berm and levee after discussions between GSR and TRFMA staff.

- The berm allows for a gradual outslope that better connects the GSR with the river. The upstream part of the berm consists of approximately 45,000 cubic yards of material with a cost of $1.35 million in 2021 dollars. The berms will be compacted and paved back over or used for other needs. Much of the current berm area has been used for parking.
- The downstream levee across from the pond is larger and involves about 52,000 cubic yards of material with a cost of $1.56 million in 2021 dollars. The GSR levee is in a narrow area between the two berms and requires about 7-8 feet of gain in elevation. The levee section in this estimate is 350 feet long with an estimated cost of $700,000. There is another narrow area between pond and River that may require a short levee section.

Truckee Meadows Water Authority Levee

In previous plans, this was proposed as a wall. After on field discussion between TRFMA staff and in discussion with TMWA staff this was changed back to a setback levee in one section and a regular levee downstream. The reason for this change is the area that needed the wall the most was where the setback section was. There appeared to be plenty of room for a levee considering the needed elevation gains were less than 10 feet and in some cased only 5 feet.

- The length of the levee is approximately 3000 feet with a cost estimate of $4.5 million in 2021 dollars.
- In discussion it was apparent the TRFMA could get help with access if TRFMA helped TMWA with fencing and security measures, which would drive down the cost.

Reno Tahoe International Airport Berm & Terracing

The berm is an alternative to the earlier idea of a levee. Levees represent an abrupt obstacle to landing aircraft; berms can be more gradual but need to be wider.

- The amount of elevation gains necessary averages between zero and eight feet in this area to protect from a 100-year flood. The estimated fill would be approximately 90,000 cubic yards but may be lower when more detailed design done. At a cost of $30 per yard (brought from Vista Narrows excavation) this would add up to $2.7 million in 2021 dollars.
- This project also has some considerable terracing with a cost of close to $2.4 million in 2021 dollars. Plant species used for terrace need to be low growing because of aircraft safety concerns.

Mill & McCarran Levees, Terracing, River Channel and Riparian Restoration

The Mill/McCarran properties represent by far the largest investment by TRFMA; to date, this investment is over $48 million to acquire 110 acres of land along the river.

- Past plans called for mostly a floodwall on the north bank of the river and a levee on the south with considerable terracing. The new concepts call for moving the river, providing restoration instream as well as terracing and riparian restoration and the use of levees exclusively. This may attract outside funding.
- The current cost estimate for construction of the three (North, South, Intermediate South) levees is $20.4 million. The terracing and river restoration will have an approximate construction cost of near $20 million. When all work is said and done the total investment of this stretch may reach nearly $100 million dollars.
- The outcome will be a fully protected area for the North and South Industrial areas and the Reno Tahoe International Airport. In addition, this area will be ideal for both a nature and conventual park post construction. There will be grading and construction to help facilitate various forms of recreation. We anticipate transferring this area to Reno Parks or another regional park authority for recreational management.

McCarran to Vista – North Bank Levee & Floodwall

- The North Bank Levee and floodwall stretches almost 3.2 miles from the McCarran Bridge downstream to Vista.
- Past plans have had this stretch at about 70% floodwall. Going forward TRFMA staff is looking at working with stakeholders and creating plans to make most if not all of this levee. Using levee vs floodwall should reduce costs, avoid seepage problems, and allow for bike paths to be put on top of levee.
- The total cost for this based on 16,600 feet of Levee is $33 .2 million in 2021 dollars. (This part of project is the least studied and researched so cost data is most unsure.)
- The North Truckee Drain's outlet is along this stretch and represents a completed project, partially funded by TRFMA.
- No work is proposed by TRFMA on Steamboat Creek.

Vista Narrows Terracing

The Vista Narrows Floodplain terracing project as currently proposed, consists of excavating floodplain terraces at three locations just East of Sparks, Nevada on the Truckee River. Vista Narrows is key to the entire Truckee Meadows Project as it lowers water levels caused by other elements of the Meadows Project. It provides the water level lowering that allows for the project to be built while avoiding expensive mitigation in South Reno.

- It does increase peak flows downstream on the order of 730 cfs because of the opening up of the narrows which prevents some of the backwatering into South Reno and UNR farms. The larger Truckee Meadows Project which eliminates flood storage in industrial areas and the airport increases peak flows by another 1,669 cfs. This creates an increase of approximately 2,400 cfs peak flow increase.

- TRFMA has been in discussions with stakeholders downstream about mitigation because of these increased flows. It appears there are several projects in and around Wadsworth that may be useful for mitigation. TRFMA has also discussed this matter with Storey County and have a mitigation project planned for the Lockwood area.
- The cost for the terracing is approximately $42 million in 2021 dollars. Costs for downstream mitigation have not been fully worked out yet.
- These terraces are on both sides of the river and are a total of 8,600 feet long. They create low floodplain and wetlands that provide flow conveyance. The terracing occurs just above the ordinary high-water mark so that the river itself is only marginally impacted along the banks. Because of the height of the banks this means approximately 450,000 cubic yards of materials are to be removed.

Voluntary Home Elevation Program

There are three primary areas that qualify for the home elevation program: 1. Eastside subdivision, 2. Rosewood Lakes, and parts of 3. Hidden Valley Estates. (Not all homes in these subdivisions qualify for the program.)

- Home elevation makes sense only when the costs of other mitigation methods is prohibitive such as when the number of homes protected is not enough to warrant a community flood wall or levee. It also can make sense when the cost to buy out and set aside is too great.
- The current program if in and qualified for a FEMA grant allows the homeowner to get significant home benefit without having to pay income tax. FEMA pays 50-90% of base costs and TRFMA pays the remaining match.
- Currently four homes have been completed since the inception of the program in 2011. The program has delays in getting grants, difficulty in finding qualified engineers and subcontractors.

Lower Truckee River Reach

This reach extends from Vista Narrows to downstream of Wadsworth. Flood project elements in this reach consist of ecosystem restoration and mitigation of downstream impacts.

VULNERABILITY SCORE

CALCULATED PRIORITY RISK INDEX (LOCAL RANKING)

Table 288 presents the classification system for the CPRI. Risk factor values are grouped into three categories including high, medium, and low based on their composite score. Hazards with a risk factor value greater than or equal to 2.5 are considered high risk. Risk factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with a risk factor value less than 2.0 are considered low risk. The highest possible risk factor value is 4. This provides a

framework to compare and prioritize hazards by placing their numeric scores into qualitative categories.

Table 288: Overall CPRI Risk Scores

Risk Factor Value	Overall Risk
2.5 – 4.0	**High**
2.0 – 2.4	**Medium**
0 – 1.9	**Low**

Table 289 provides the Average Calculated Priority Risk Index (CPRI) for flooding impacts in the Truckee River Flood Management Authority (TRFMA) based on the current plan's hazard risk assessment results. The TRFMA assigned flooding impacts a risk factor value of 2.28, reflecting medium magnitude and long duration impacts. This risk factor value falls in the range of 2.0 to 2.4, which is considered a medium-risk hazard. These values were calculated through input from Washoe County jurisdictional agency subject matter experts.

Table 289: Average Calculated Priority Risk Index for Flooding in the TRFMA

Type of Hazard Event	Probability	Magnitude	Onset	Duration	Frequency	Risk Factor Value	Overall Risk
Flooding (Avg)	1.75	2.88	2	3.38	1.75	2.28	Medium

Goals for the Lower Truckee River Reach

The aim of TRFMA with the downstream reach is that any effects from the Meadows Flood Project are fully mitigated. That is the residents and habitat along the river are at least as well off as they were before the project started. This means all possible impacts of the Meadows Flood Project need to be minimized and mitigated. The Meadows Project increases peak flow during 100-year and to a lesser degree 50-year events on the Truckee River at Vista. The idea is to study these increases to evaluate what possible impacts are and then propose mitigation for any that may be significant. Mitigation in the downstream reach may consist of restoration projects such as floodplain restoration that can in some cases lower peak flows at least minimally. Mitigation also consists of traditional protection such as levees, floodwalls, and flood proofing vulnerable infrastructure. Other mitigation options include restoring fish passage along the lower reach of the Truckee.

ECOSYSTEM RESTORATION PROJECTS

Ecosystem restoration is a series of actions taken to reestablish the general structure, function, and dynamic but self-sustaining behavior of the ecosystem. The primary purpose of riverine ecosystem restoration projects is to restore the physical and biological functions of the river channel and floodplains; thereby improving water quality and enhancing habitat for native species of fish and wildlife. Other benefits include flood attenuation, decreased risk of developed property damage (floodplain preservation), riverbank stability, sediment retention (water quality improvement). The community's vision for the Truckee River Flood Project is to achieve flood protection goals through a combination of set-back levees, floodwalls, river terracing, bridge replacements, floodplain land acquisitions, instream and riparian restoration, and urban parkways.

- TRFMA has partnered with The Nature Conservancy and numerous other local, state, and federal agencies and non-profit organizations to restore the lower Truckee River ecosystem (from Vista to Pyramid Lake). Partners include US Fish & Wildlife, US Bureau of Land Management, Nevada Division of Environmental Protection, Washoe County, City of Reno, City of Sparks, and Pyramid Lake Paiute Tribe.
- Several high-priority restoration projects have already been completed: 1. Lockwood, 2. Lower Mustang Ranch, 3. Tracy Power Plant, and 4. 102 Ranch (total of 8 miles of river restoration and 450 acres of habitat created in/along the river). Monitoring is ongoing to ensure the projects are functioning as designed.
- To date, the partners have invested more than $28 million to create more than 450 acres of habitat and restore more than 8 miles of the lower Truckee River. An estimated 216 jobs were created because of this work (full-time equivalents).
- TRFMA has contributed about $2.1 million in sales tax funds for land acquisition, planning, and construction—less than 8% of the overall cost of restoration project implementation. In addition, TRFMA transferred through $4.775 million in State of Nevada grant funds to implement ecosystem restoration projects via Assembly Bill No. 5 (AB-5), passed by the Nevada State Legislature in 2007.
- Similar ecosystem restoration features are planned in the Truckee Meadows reach of the Flood Project. Future work may include a partnership with the Pyramid Lake Paiute Tribe to implement another Truckee River ecosystem restoration project at Wadsworth.

Lockwood & Rainbow Bend

Rainbow Bend is a small community on the south bank of the Truckee River in Storey County. The community is plagued by flooding from Long Valley Creek and to a lesser degree the Truckee River.

- To understand impacts of the Meadows Flood Project a detailed 2-dimensional model was developed by TRFMA. The model showed that the Project and the increase in peak flows could lead to some nuisance street flooding. A small wall/berm was proposed to prevent

this problem. The floodwall will be pushed forward as mitigation when the Permit for Vista Narrows is obtained.

- Another major issue is flooding from Long Valley Creek which is not related to the Meadows Project. Long Valley Creek is a large watershed prone to flash flooding. TRFMA assisted Storey County in getting a grant from FEMA regarding a feasibility study on how to control or prevent flooding from the creek.

Wadsworth Bridge Mitigation

On the east bank of the Truckee River in the center of Wadsworth the Truckee River during floods breaks out of its bank during significant flood events. It often floods into a mobile home park and floods mobile homes and some other homes nearby. It also flows downstream and floods a quarry. Because of this known problem a detailed 2-dimensional model was commissioned to supplement other modeling that was done in the area.

- The Meadows Project increases in peak flow exacerbates the problem putting more water down the side channel. A preliminary design was commissioned to look at solutions including possible levee, floodwall, and a bridge replacement to see if this helps mitigate the problem. After an alternatives study, it was found that simply replacing the bridge mitigates the difference in flow levels between the existing conditions and flows with the new project.
- The TRFMA Board of Directors has authorized the Wadsworth Bridge Mitigation to move forward immediately without waiting for the Vista Narrows permitting. The project is in design and permitting and may be let out for construction later this year if permitting gets done.



Figure 101: Map of the Truckee River from Pyramid Lake to Vista Narrows Sparks

TRFMA is now in the design and implementation phases of the Flood Project; no additional mitigation actions are being considered.

Vulnerability Assessment

No repetitive loss properties currently exist in the TRFMA area. Table 290 summarizes the exposure of critical facilities in the TRFMA area to hazards that can be mapped. All of these facilities are in TRFMA's special hazards district, and the wildland fire potential is 1.

Table 290: Exposure Assessments of the Truckee River Flood Management Authority

Type	Name	Address	Flood Zone
Wastewater Treatment Plant	Lemmon Valley WWTP	11000 Lemmon Dr	100-year flood zone
Hospital	Incline Village Community Hospital	N/A	500-year flood zone
Hospital	Eastern Sierra Medical Group	N/A	500-year flood zone
Hospital	Renown Medical Group Urgent Care Center Ryland	N/A	500-year flood zone
Hospital	Life Care Center of Reno	N/A	500-year flood zone
Hospital	Willow Springs Center	N/A	500-year flood zone
Hospital	ARC Med Center	N/A	500-year flood zone
Hospital	Regent Care Center of Reno	N/A	500-year flood zone
Hospital	Saint Mary's Family Walk-In Center	N/A	500-year flood zone
School	University of Nevada Farm	N/A	500-year flood zone
School	Alice L Smith Elementary School	N/A	100-year flood zone
School	Pleasant Valley Elementary School	N/A	100-year flood zone
School	Lighthouse Baptist Academy	N/A	100-year flood zone
School	Mountain View Montessori School	N/A	100-year flood zone
School	Home Garden School (historical)	N/A	500-year flood zone
School	Sierra Vista Children's Academy	N/A	500-year flood zone
School	Brookfield School	N/A	500-year flood zone
School	A Plus Learning Center	N/A	500-year flood zone
School	Libby C Booth Elementary School	N/A	500-year flood zone
School	Roger Corbett Elementary School	N/A	500-year flood zone
School	McKinley Park School (historical)	N/A	100-year flood zone
School	Edward L Pine Middle School	N/A	500-year flood zone
School	Huffaker Elementary School	N/A	500-year flood zone
School	Smithridge Elementary School	N/A	500-year flood zone
School	Regional Technical Institute	N/A	500-year flood zone
School	Early Basics Learning Academy	N/A	500-year flood zone
School	Koinonia Day Treatment Center	N/A	500-year flood zone
School	Little Hearts Preschool and Kindergarten	N/A	500-year flood zone

Type	Name	Address	Flood Zone
School	Truckee Meadows Christian Academy	N/A	500-year flood zone
School	Stepping Stones Children's Center	N/A	500-year flood zone
School	I Can Do Anything Charter High School	N/A	500-year flood zone
School	Team A School	N/A	500-year flood zone
School	Halima Academy	N/A	500-year flood zone
Airport	Reno/Tahoe International Airport	N/A	500-year flood zone
Dam	Pagni Dam	N/A	100-year flood zone
Dam	North Spanish Springs Flood Sediment Basin	N/A	100-year flood zone
Dam	North Spanish Springs Flood Detention Facility	N/A	100-year flood zone
Dam	IXL Ranch Dam	N/A	100-year flood zone
Dam	Captain Johnson Reservoir	N/A	100-year flood zone
Dam	Carter Reservoir	N/A	100-year flood zone
Dam	Frog Pond	N/A	100-year flood zone
Dam	Hill Dam Number 1	N/A	100-year flood zone
Dam	Wall Creek Dam Lower	N/A	100-year flood zone
Dam	Wall Creek Dam Upper	N/A	100-year flood zone
Dam	Little High Rock	N/A	100-year flood zone
Dam	Peavine Creek Upper Dam	N/A	100-year flood zone
Dam	Upper Holy Lake Reservoir	N/A	100-year flood zone
Dam	Sevier Lake	N/A	100-year flood zone
Dam	Spanish Springs Stormwater Detention Facility	N/A	100-year flood zone
Dam	Catnip Dam	N/A	100-year flood zone
Dam	Double Diamond	N/A	100-year flood zone
Dam	Rancho Haven Dam #4	N/A	100-year flood zone
Dam	Damonte Ranch Flood Control Diversion	N/A	100-year flood zone
Dam	Damonte Ranch Flood Detention Basin	N/A	100-year flood zone
Dam	Damonte Ranch Wetlands Detention Basin	N/A	100-year flood zone

Type	Name	Address	Flood Zone
Dam	Virginia Lake	N/A	100-year flood zone
Dam	IXL Ranch Dam Lower	N/A	100-year flood zone
Fire Station	Lemmon Valley Volunteer Fire Department Station 223	130 Nectar Street	100-year flood zone
Fire Station	Hidden Valley Volunteer Fire Department Station 226	3255 West Hidden Valley Drive	100-year flood zone
Fire Station	Reno Fire Department Station 16	1240 Eastlake Boulevard	100-year flood zone
Fire Station	Pleasant Valley Volunteer Fire Department 227	United States Highway 395	500-year flood zone
Fire Station	Sierra Fire Protection District Station 101 – Washoe Valley	345 Bellevue Road	100-year flood zone
Fire Station	City of Reno Fire Department Station 14	12300 Old Virginia Road	500-year flood zone
Fire Station	City of Reno Fire Department Station 6	3970 Mira Loma Drive	500-year flood zone
Fire Station	Sparks Fire Department Station 3	1750 East Greg Street	100-year flood zone
Fire Station	City of Reno Fire Department Station 18	3680 Diamond Peak Drive	100-year flood zone
Fire Station	Reno-Tahoe Airport Authority Fire Department	1802 Riley Avenue	500-year flood zone
Police Station	Reno-Tahoe Airport Authority Police Division	2001 East Plumb Lane	500-year flood zone
Police Station	Nevada Department of Public Safety – Nevada Highway Patrol – Reno Station	357 Hammill Lane	500-year flood zone
Police Station	Reno Municipal Court Marshals Division	1 South Sierra Street	500-year flood zone

Land Use and Development Trends

FEMA

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

The Truckee River Floodplain Management Authority has not provided any recent development trends related to floodplain management in the area; therefore, none are included in the plan update.

Capability Assessment

FEMA	**C1.** Does the plan document [RSIC'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))

Planning and Regulatory

Planning and regulatory capabilities are the plans, policies, codes, and ordinances that prevent and reduce the impacts of hazards. Table 291 describes TRFMA's human and technical capabilities to engage in and improve mitigation planning and program implementation.

Table 291: Planning Capability of the Truckee River Flood Management Authority

Plan	Do you have this? (Y/N)	Does the plan address hazards? (Y/N)	How can the plan be used to implement mitigation actions?	When was it last updated? When will it next be updated?
General Plan	Yes. It is a conceptual plan known as the Truckee River Flood Management Project. Details are captured in the Map Book on TRFMA's website.	A series of infrastructure elements are proposed for construction to address 100-year-type flooding in the Truckee Meadows.	The plan calls for construction of more than 30 project elements that serve as mitigation actions for flood hazards.	The Map Book was approved by the TRFMA Board of Directors in July 2023. It will be updated on an as-needed basis (determined by staff & the board).
Capital Improvement Plan	Yes. A 5-year CIP for FY 2024–2025 through FY 2028–2029.	The CIP includes a list of prioritized projects and budget line items for implementation in the next 5 fiscal years.	The CIP is a guide for prioritizing projects (mitigation actions) and allocating funds from TRFMA's budget for project implementation.	The latest CIP was approved May 2024. An updated version (FY 2025–2026 through FY 2029–2030) will be prepared for approval in May 2025.
Climate Change Adaptation Plan	No	N/A	N/A	N/A
Community Wildfire Protection Plan	No	N/A	N/A	N/A

Plan	Do you have this? (Y/N)	Does the plan address hazards? (Y/N)	How can the plan be used to implement mitigation actions?	When was it last updated? When will it next be updated?
Economic Development Plan	No	N/A	N/A	N/A
Land Use Plan	No	N/A	N/A	N/A
Local Emergency Operations Plan	Yes, a Truckee River Flood Response Plan and a Flood Warning Plan.	These plans include information to assist TRFMA and regional emergency managers with flood preparedness and response actions.	These plans can be used to assess potential flood threats and to issue flood alerts/ warnings to emergency managers and the public. Decisions on deploying resources, activating the EOC, and evacuations can be made using information on flooding potential and lead times.	These plans are outdated. TRFMA hopes to work with the County, Reno, Sparks, the National Weather Service, and other partners to update the plans in late 2024 or in 2025.
Stormwater Management Plan	No	N/A	N/A	N/A
Transportation Plan	No	N/A	N/A	N/A

Plan	Do you have this? (Y/N)	Does the plan address hazards? (Y/N)	How can the plan be used to implement mitigation actions?	When was it last updated? When will it next be updated?
Substantial Damage Plan	No	N/A	N/A	N/A
Other? (Describe)	Washoe County has a Damage Assessment Plan that serves the same intent and covers all jurisdictions.	N/A	N/A	N/A

Table 292: Regulations and Ordinances of the Truckee River Flood Management Authority

Plan	Does this regulation/ordinance effectively reduce hazard impacts?	Is it adequately administered and enforced?	When was it last updated? When will it next be updated?
Building Code	Not TRFMA's jurisdiction.	TRFMA relies on its member entities (Washoe County [WC], Reno, and Sparks) to administer/ enforce applicable regulations and ordinances. TRFMA is notified of various building plan proposals and permit applications. It provides technical review and comments to the planning agencies but does not have any administrative or enforcement authority.	N/A

Plan	Does this regulation/ordinance effectively reduce hazard impacts?	Is it adequately administered and enforced?	When was it last updated? When will it next be updated?
Flood Insurance Rate Maps	Not TRFMA's jurisdiction. At the request of its member entities (WC, Reno, and Sparks), TRFMA has been working on an updated hydraulic model and series of floodplain maps for the Truckee River. If approved, this Physical Map Revision (PMR) would update the FEMA floodplain modeling and mapping for the Truckee River, Steamboat Creek, and North Truckee Drain in the Greater Truckee Meadows Region and the Truckee River Lower Reach, which extends from Vista to Wadsworth, Nevada.	TRFMA relies on its member entities (WC, Reno, and Sparks) to administer/ enforce applicable regulations and ordinances.	Documentation was submitted to FEMA in March 2023 (reports and materials available on TRFMA's website). In May 2024, FEMA's technical team notified TRFMA that it had concluded its review and that TRFMA had satisfactorily addressed its comments for the Lower Truckee River, Truckee Meadows, and Steamboat Creek hydrology & hydraulics analysis. The next step is a public review process that should take about 1 year.
Floodplain Ordinance	Not TRFMA's jurisdiction.	TRFMA relies on its member entities (WC, Reno, and Sparks) to administer/ enforce applicable regulations and ordinances.	N/A

Plan	Does this regulation/ordinance effectively reduce hazard impacts?	Is it adequately administered and enforced?	When was it last updated? When will it next be updated?
Subdivision Ordinance	Not TRFMA's jurisdiction.	TRFMA relies on its member entities (WC, Reno, and Sparks) to administer/ enforce applicable regulations and ordinances. TRFMA is notified of various building plan proposals and permit applications. It provides technical review and comments to the planning agencies but does not have any administrative or enforcement authority.	N/A
Zoning Ordinance	Not TRFMA's jurisdiction	TRFMA relies on its member entities (WC, Reno, and Sparks) to administer/ enforce applicable regulations and ordinances. TRFMA is notified of various building plan proposals and permit applications. It provides technical review and comments to the planning agencies but does not have any administrative or enforcement authority.	N/A
Natural Hazard Specific Ordinance (Stormwater, Steep Slope, Wildfire)	Not TRFMA's jurisdiction.	TRFMA relies on its member entities (WC, Reno, and Sparks) to administer/ enforce applicable regulations and ordinances.	N/A

Plan	Does this regulation/ordinance effectively reduce hazard impacts?	Is it adequately administered and enforced?	When was it last updated? When will it next be updated?
Acquisition of Land for Open Space and Public Recreation Use	Not TRFMA's jurisdiction. TRFMA has acquired a series of flood-prone properties located along the Truckee River. These lands (about 126 acres) were acquired for constructing the Flood Project. More than 40 tenants were relocated out of the FEMA flood zone & floodway. Demolition was completed on 6 repetitive loss structures. (Note that acquisition of the property, relocation, and demolition occurred prior to 2020.) TRFMA has proposed recreational use of the Flood Project lands during non-flood emergency periods.	N/A	N/A
Prohibition of Building in At-Risk Areas	Not TRFMA's jurisdiction.	TRFMA relies on its member entities (WC, Reno, and Sparks) to administer/ enforce applicable regulations and ordinances. TRFMA is notified of various building plan proposals and permit applications. It provides technical review and comments to the planning agencies but does not have any administrative or enforcement authority.	N/A

Plan	Does this regulation/ordinance effectively reduce hazard impacts?	Is it adequately administered and enforced?	When was it last updated? When will it next be updated?
Other? (Describe)	TRFMA actively participates in and provides input on various regional planning efforts, including the Regional Plan Update and the Public Infrastructure Plan Update being managed by the Truckee Meadows Regional Planning Agency (TMRPA). TRFMA also serves on regional boards and committees, including the Northern Nevada Water Planning Commission and the One Truckee River Board of Directors. These activities help TRFMA stay informed about local and regional efforts related to flood hazard mitigation and floodplain management.	N/A	N/A

Administrative and Technical

Administrative and technical capabilities include staff and their skills. They also include tools that can help you carry out mitigation actions. If you do not have local staff, consider how state and regional partners can help.

Table 293: Administrative Capabilities of the Truckee River Flood Management Authority

Administrative Capability	Do you have this? (Y/N)	Is staffing adequate?	Is staff trained on hazards and mitigation?	Is coordination between agencies and staff effective?
Chief Building Official	No	N/A	N/A	N/A
Civil Engineer	Yes. The Executive Director is a licensed professional engineer.	Yes. TRFMA also uses consultants as needed. In addition, TRFMA coordinates with public works managers from its member entities (Washoe County [WC], Reno, and Sparks).	Yes	Yes
Community Planner	Yes. The Natural Resource Manager works on planning projects.	Yes. TRFMA also uses consultants as needed. In addition, TRFMA coordinates with planners from its member entities (WC, Reno, and Sparks) and other planning agencies.	Yes. However, more training would be helpful, and the staff hope to make time for this soon.	Yes
Emergency Manager	Not exactly. TRFMA coordinates with regional emergency managers at the	Maybe/yes. TRFMA staff attend monthly coordination meetings (e.g., Emergency	Yes. However, more training would be helpful, and staff hope to make time for this soon.	Yes. Updating the Flood Warning Plan and Truckee River Response Plan would

Administrative Capability	Do you have this? (Y/N)	Is staffing adequate?	Is staff trained on hazards and mitigation?	Is coordination between agencies and staff effective?
	REOC during flood emergencies. TRFMA's role is to provide technical expertise and resources to assist in emergency planning and response efforts.	Preparedness Council) and can be deployed to the REOC upon activation during a flood emergency. TRFMA is a small agency (5 full-time staff members) with a somewhat limited capacity to take on additional work.		help clarify the current roles and responsibilities of the partner agencies.
Floodplain Administrator	No	N/A	N/A	Yes
Geographic Information System (GIS) Coordinator	No	TRFMA uses consultants as needed. The agency also coordinates with WC's GIS department.	N/A	Yes
Planning Commission	Not exactly. TRFMA serves on regional boards and committees, including the Northern Nevada Water Planning Commission and	N/A	N/A	Yes

Administrative Capability	Do you have this? (Y/N)	Is staffing adequate?	Is staff trained on hazards and mitigation?	Is coordination between agencies and staff effective?
	the One Truckee River Board of Directors. These activities help TRFMA stay informed about local and regional efforts related to flood hazard mitigation and floodplain management.			
Fire Safe Council	No	N/A	N/A	N/A
CERT (Community Emergency Response Team)	Yes. Staff recently participated in CERT training to learn more about operating CB radios and flood emergency response.	Yes	Yes	Yes

Administrative Capability	Do you have this? (Y/N)	Is staffing adequate?	Is staff trained on hazards and mitigation?	Is coordination between agencies and staff effective?
Active VOAD (Voluntary Agencies Active in Disasters)	No	N/A	N/A	N/A
Other? (Please describe)	See above			

Table 294: Technical Capabilities of the Truckee River Flood Management Authority

Technical Capability	Do you have this? (Y/N)	How has the capability been used to assess/mitigate risk in the past? (Answer or N/A)	How can the capability be used to assess/mitigate risk in the future?
Mitigation Grant Writing	Yes. TRFMA staff works as a team to write grants.	TRFMA has secured funding to elevate certain high-risk homes in the Truckee Meadows, conduct environmental site assessments on flood prone properties, and restore natural floodplains.	TRFMA will continue to apply for grant funding to supplement the agency's own funding source. Flooding remains a major hazard, and continued development in the floodplain has increased the risk of property damage caused by large floods. Grant funding awards would allow TRFMA to leverage its funding (as a match) to build more elements of the Flood Project

Technical Capability	Do you have this? (Y/N)	How has the capability been used to assess/mitigate risk in the past? (Answer or N/A)	How can the capability be used to assess/mitigate risk in the future?
			in a shorter timeframe. TRFMA intends to apply for grant funding for the design of the Rock-McCarran project reach, construction of the Vista Narrows project (floodplain terraces), property acquisition, ecosystem restoration, and recreational amenities.
Hazard Data and Information	Yes	TRFMA has several robust hydrologic & hydraulic models that were developed to better understand Truckee River flood dynamics. The agency also operates and maintains a network of streamflow and precipitation gages to monitor flood conditions. A variety of technical studies/reports have been completed on Truckee River flooding, floodplain restoration, flood damage, and downstream impacts (deposition, erosion, etc.). This technical information is shared	TRFMA has prioritized this technical work and will continue to develop and share results to increase the region's capacity for resilience. Models will be refined in the future as needed; model results will inform Flood Project designs. TRFMA plans to continue monitoring flood conditions and coordinating with emergency managers to plan/respond to flood emergencies.

Technical Capability	Do you have this? (Y/N)	How has the capability been used to assess/mitigate risk in the past? (Answer or N/A)	How can the capability be used to assess/mitigate risk in the future?
		with local governments, resource agencies, developers, businesses, and the public to better understand and prepare for flood emergencies.	
GIS	Yes. TRFMA uses consultants as needed. The agency also coordinates with WC's GIS department.	GIS data are used to develop hydrologic and hydraulic models that simulate the extent and depth of Truckee River flooding. These models have been used to design Flood Project elements (mitigation actions), prepare the Physical Map Revision documentation for FEMA, and create the flood map series for emergency responders.	Models will be refined in the future as needed; model results will inform Flood Project designs.
Mutual Aid Agreements	N/A	N/A	N/A
Other? (Please describe)	N/A	N/A	N/A

Financial Capabilities

Financial capabilities are the resources to fund mitigation actions. Talking about funding and financial capabilities is important for determining what kinds of projects are feasible given their cost. Mitigation actions like outreach programs are lower cost and often use staff time and existing budgets. Other actions, such as earthquake retrofits, could require substantial funding from local, state, and federal partners. Partnerships, including partners willing to donate land, supplies, or an in-kind match and cash, can be included.

Table 295: Financial Capabilities of the Truckee River Flood Management Authority

Funding Resource	Do you have this? (Y/N)	Has this funding resource been used in the past and for what types of activities?	Could this resource be used to fund future mitigation actions?	Can this be used as the local cost match for a federal grant?
Capital Improvement Project Funding	Yes. Funding for TRFMA and the Flood Project comes from a 1/8-cent infra-structure sales tax authorized by NRS Chapter 377B imposed by Washoe County in December 1998 under Ordinance 1048 (Washoe County Code 20.914). The initial Infra-structure Tax Plan	The CIP serves as a guide for prioritizing projects (mitigation actions) and for allocating funds from TRFMA's budget for project implementation. Funding has been used to construct elements of the Flood Project, including replacement of the Virginia Street Bridge, a levee/ floodwall at the Reno-Sparks Indian Colony, relocation of the North Truckee Drain, and restoration of floodplains in the Lower Truckee	Yes – it is intended to fund capital improvement projects (i.e., Flood Project construction).	Yes, because these funds come from Washoe County (a local, nonfederal funding source).

Funding Resource	Do you have this? (Y/N)	Has this funding resource been used in the past and for what types of activities?	Could this resource be used to fund future mitigation actions?	Can this be used as the local cost match for a federal grant?
	was adopted by the Washoe County Commission in 1998 to finance a regional emergency dispatch facility, a public safety training facility, and the Flood Project. The 5-year CIP for FY 2024–2025 through FY 2028–2029 includes a list of prioritized projects and budget line items for implementation in the next 5 fiscal years.	River. CIP funding has been used for the design and permitting of the Vista Narrows project (currently at 65% design). Funds have also been used for home elevation.		

Funding Resource	Do you have this? (Y/N)	Has this funding resource been used in the past and for what types of activities?	Could this resource be used to fund future mitigation actions?	Can this be used as the local cost match for a federal grant?
General Funds	Yes. The Infrastructure Sales Tax, as above.	Besides CIP projects, TRFMA funds related efforts, such as hydraulic model development, Flood Warning System operation and maintenance, technical studies, and flood awareness education and outreach.	Yes – that is the intent of the sales tax.	Yes, because these funds come from Washoe County (a local, nonfederal funding source).
Hazard Mitigation Grant Program (HMGP/404)	No	N/A	N/A	N/A
Building Resilient Infrastructure & Communities (BRIC)	Yes	This funding has been used to implement TRFMA's voluntary Home Elevation Program.	Yes. It could be used to continue implementation of TRFMA's voluntary Home Elevation Program.	No, because it comes from a federal funding source (FEMA).
Flood Mitigation Assistance (FMA)	No	N/A	N/A	N/A

Funding Resource	Do you have this? (Y/N)	Has this funding resource been used in the past and for what types of activities?	Could this resource be used to fund future mitigation actions?	Can this be used as the local cost match for a federal grant?
Public Assistance Mitigation (PA Mitigation/406)	No	N/A	N/A	N/A
Community Development Block Grant (CDBG)	No	N/A	N/A	N/A
Natural Resources Conservation Services (NRCS) Programs	No	N/A	N/A	N/A
U.S. Army Corps (USACE) Programs	No	N/A	N/A	N/A
Property, Sales, Income, or Special Purpose Taxes	The Infrastructure Sales Tax, as above.	Yes. This funding has been used to design and build portions of the Flood Project, operate and maintain the Flood Warning System, and develop hydrologic and hydraulic models of	Yes – that is its intent.	Yes

Funding Resource	Do you have this? (Y/N)	Has this funding resource been used in the past and for what types of activities?	Could this resource be used to fund future mitigation actions?	Can this be used as the local cost match for a federal grant?
		Truckee River flooding dynamics.		
Stormwater Utility Fee	No	N/A	N/A	N/A
Fees for Water, Sewer, Gas, or Electric Services	No	N/A	N/A	N/A
Impact Fees from New Development and Redevelopment	No	N/A	N/A	N/A
General Obligation or Special Purpose Bonds	No	N/A	N/A	N/A
Federal-funded Programs (Please describe)	No	N/A	N/A	N/A
Other State-funded Programs (Please describe)	No	N/A	N/A	N/A

Funding Resource	Do you have this? (Y/N)	Has this funding resource been used in the past and for what types of activities?	Could this resource be used to fund future mitigation actions?	Can this be used as the local cost match for a federal grant?
Private Sector or Nonprofit Programs	No	N/A	N/A	N/A
Other?	N/A	N/A	N/A	N/A

Education and Outreach

Education and outreach capabilities are programs and methods that could communicate about and encourage risk reduction. These programs may be run by a participant or a community-based partner. Partners, especially those who work with underserved communities, can help identify additional education and outreach capabilities.

Table 296: Education and Outreach Capabilities of the Truckee River Flood Management Authority

Education and Outreach Capability	Do you have this? (Y/N)	Does this resource currently incorporate hazard mitigation?	Notes
Community Newsletter(s)	Yes	Yes, as related to implementation of the Flood Project.	N/A
Hazard Awareness Campaigns (such as Firewise, Storm Ready, Severe Weather Awareness Week, School Programs)	Yes. Each year, TRFMA helps to plan and participates in the Flood Awareness Week public outreach campaign.		N/A
Public Meetings/Events (Please Describe)	Yes. TRFMA holds regular public meetings: Board of Directors meetings, Technical Advisory Committee meetings, and Community Working Group meetings. The agency also hosts/ participates in public events related to Flood Project implementation and public outreach.	Yes	N/A

Education and Outreach Capability	Do you have this? (Y/N)	Does this resource currently incorporate hazard mitigation?	Notes
Emergency Management Listserv	No	N/A	N/A
Local News	TRFMA is periodically featured in local news stories (newspaper, television, radio). The agency routinely compiles flood-related newspaper clippings and includes them in its monthly board meeting packet (available on TRFMA's website).	Yes	N/A
Distributing Hard Copies of Notices (e.g., public libraries, door-to-door outreach)	Yes. TRFMA posts meeting notices for public meetings. TRFMA also holds specific outreach meetings and distributes flyers to residents/ stakeholders as applicable.	Yes	N/A
Insurance Disclosures/ Outreach	N/A	N/A	N/A
Organizations that Represent, Advocate for, or Interact with Underserved and Vulnerable Communities (Please Describe)	TRFMA has reached out to the Pyramid Lake Paiute Tribe, the Reno-Sparks Indian Colony, the Rainbow Bend neighborhood association, and other groups to provide information on specific Flood Project	Yes. TRFMA met with the Pyramid Lake Paiute Tribe (PLPT) on downstream mitigation for the Flood Project (Vista Narrows). TRFMA met with Reno-Sparks Indian Colony about the levee/floodwall project and RSIC's health center.	

Education and Outreach Capability	Do you have this? (Y/N)	Does this resource currently incorporate hazard mitigation?	Notes
	elements that may impact the group(s).	TRFMA recently held a community meeting in Wadsworth to discuss the replacement of the Wadsworth Bridge. TRFMA also met with the Rainbow Bend community (near Lockwood, NV) to discuss options for a floodwall/berm to protect homes in the area. TRFMA received feedback from the communities that helped inform the designs for these Flood Project elements.	
Social Media (Please Describe)	Yes. TRFMA has social media accounts with Facebook, Instagram, and YouTube.	Yes	N/A
Other? (Please Describe)	N/A	N/A	N/A

National Flood Insurance Program

The National Flood Insurance Program (NFIP) is a Federal Emergency Management Agency (FEMA) program that provides flood insurance to millions of policyholders across the country. The plan must describe participation in the NFIP for each participant, as applicable, in accordance with NFIP regulatory requirements.

Special districts are not eligible to participate in the NFIP but may support floodplain management and exist in communities that participate in the NFIP.

Table 297: Questions about the National Flood Insurance Program

Question	Notes
What communities does your special district operate in? Are you aware of any flood concerns in these communities?	TRFMA's member entities (Washoe County, Reno, Sparks) participate in the NFIP.
Which of your assets are at-risk of flooding? List any of your structures in the high-risk flood zone if known, or list addresses, and the IEM team will check on https://msc.fema.gov/portal/home.	N/A
Is your organization involved in floodplain management? If so, how?	Not directly. See above for information on the FEMA Physical Map Revision effort currently underway.

Opportunities to Expand and/or Improve Capabilities

Both pre- and post-disaster mitigation capabilities change over time. The intent of this Pre-Hazard Mitigation Plan is to evaluate current mitigation capabilities and identify gaps which could be addressed. TRFMA's capability assessments identified the following capabilities which could be expanded upon.

- **Administrative and Technical:** TRFMA may hire additional staff and/or consultants to assist with increasing work related to Flood Project implementation. Several large elements of the Flood Project are in the design phase, with construction planned to begin in the next few years.
- **Financial:** TRFMA plans to apply for grant funding as opportunities arise. Last year, TRFMA applied for Bureau of Reclamation funding but was not selected. TRFMA will use this as a learning opportunity to improve future application packages.
- **Education and Outreach:** TRFMA plans to increase its public outreach efforts in the coming years. The agency recently made improvements to its website (performance and security). TRFMA plans to add real-time gage data to the website for the public to view. The agency intends to increase posting on social media to engage with the public. TRFMA also has plans to create several high-quality videos to educate the public about Truckee River flooding hazards and the goals and benefits of the Flood Project.

Plan Integration

FEMA	**C6.** Does the Plan describe a process by which it will incorporate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate?

An updated plan must explain how the plan participants incorporated the previous mitigation plan, when appropriate, into other planning mechanisms over the last 5 years. This demonstrates progress in local mitigation efforts. Planning mechanisms refer to the governance structures used to manage local land use development and community decision making, such as budgets, comprehensive plans, capital improvement plans, or other long-range plans, codes, and ordinances. Table 298 lists the previous plans that have been integrated into this one.

Table 298: Integration of Previous Plans by the Truckee River Flood Management Authority

Plan Name	Description
Comprehensive Regional Water Management Plan (2021–2040 Update)	Developed by the Western Regional Water Commission
2019 Truckee Meadows Regional Plan (TMRP)	Developed by the Truckee Meadows Regional Planning Agency
Natural Resources Plan (incorporated into the 2019 TMRP)	Developed by the Truckee Meadows Regional Planning Agency

A plan must also identify the local planning mechanisms where the updated hazard mitigation information or actions may be integrated and how. Table 299 lists opportunities for future plan integration.

Table 299: Future Plan Integration Opportunities for the Truckee River Flood Management Authority

Plan Name	Description
Plans listed in Table 298	These plans are all undergoing updates (now or in the next few years). TRFMA will participate in these updates and provide input on flood hazards and the Flood Project.
Public Infrastructure Plan	Under development by the TMRPA (2024).
Truckee River Flood Response Plan & Flood Warning Plan	TRFMA intends to work with Washoe County and other partners to update these plans in the next few years.

Mitigation Strategy

The mitigation strategy serves as the regional partner's blueprint for the long-term reduction of disaster losses. The strategy is developed based upon a review of the planning area's risks and

vulnerabilities, stakeholder and public input, and the mitigation capabilities or resources available to address those risks. It has three main required components: mitigation goals and objectives, mitigation actions, and a mitigation action plan for implementation. These components provide the framework for identifying, prioritizing, and implementing actions to reduce the risk of hazards.

Mitigation Goals and Objectives

Mitigation goals are broad, policy-type statements which represent what the County and its partners seek to achieve by implementing their mitigation plan. The goals are general guidelines and provide a framework for identifying more detailed objectives and actions. In developing these goals, the MPT reviewed the goals from the 2023 SHMP and the goals and objectives from the 2020 RHMP update. Overall, the MPT thought that the goals and objectives continued to reflect its approach to hazard mitigation. There has been progress on some objectives since the last plan update, but those objectives remain important considerations which should be noted in the current plan. A few changes were identified, including clarifying the intent of Goal 1, removing Objective 1.3, and adding a new objective to Goal 4. Both long-term and short-term goals and objectives were identified. Long-term initiatives may take longer the duration of the planning cycle (five years) to completely realize, while short-term initiatives may be accomplished in the next five years.

Therefore, the County and its partners have selected the following goals and objectives for this plan update:

Goal 1: Study, maintain, upgrade, and expand transportation routes, including evacuation routes across the County, to ensure function and public awareness during emergencies. (Long-term)

- **Objective 1.1:** Study, establish, upgrade, and maintain evacuation routes. (Short-term)
- **Objective 1.2:** Plan for continuity of operations of critical transportation facilities in the county in the event of a disaster or emergency. (Short-term)

Goal 2: Maintain emergency services capabilities by providing redundancies. (Long-term)

- **Objective 2.1:** Provide redundant lifeline utilities and services to allow medical and emergency response services to continue to operate following a disaster or emergency. (Long-term)
- **Objective 2.2:** Establish evacuation centers and provide redundant lifeline utilities to serve communities at risk from all identified hazards. (Long-term)

Goal 3: Maintain key communications to ensure connectivity during and after key hazard events. (Short-term)

- **Objective 3.1:** Provide methods for notification, warning, and emergency communications. (Short-term)
- **Objective 3.2:** Establish an additional emergency operations center (EOC) to serve the RSIC community. (Long-term)
- **Objective 3.3:** Harden electrical infrastructure in moderate to high-risk areas for wildland fire. (Long-term)
- **Objective 3.4:** Establish procedures for communication between the Governor's Office on Radiological Waste and Washoe County before transport of radiological waste. (Short-term)
- **Objective 3.5:** Develop a response plan for clean-up and disposal of ash fall from a volcanic eruption. (Short-term)

Goal 4: Maintain the reliability of utilities (electricity, gas, drinking water, sewer) during and after key hazard events. (Long-term)

- **Objective 4.1:** Provide redundant or hardened utility lifelines to areas at risk of energy emergencies, loss of communications, or loss of service. (Long-term)
- **Objective 4.2:** Identify vulnerable facilities and establish procedures for clean-up and disposal of ash fall from a volcanic eruption to minimize risk to lifeline utilities. (Short-term)
- **Objective 4.3:** Protect utility infrastructure from hazards like winter storms and high winds including acquiring resources ahead of time and hardening infrastructure. (Long-term)

Goal 5: Minimize property damage and reduce repetitive losses to property from key hazards. (Long-term)

- **Objective 5.1:** Provide additional emergency services resources to reduce response times. (Short-term)
- **Objective 5.2:** Adopt current international building and fire codes. (Short-term)
- **Objective 5.3:** Develop plans and provide resources to reduce risk in moderate to high-risk areas for wildland fire. (Short-term)
- **Objective 5.4**: Update flood maps to incorporate changes in conditions and flood risk. (Short-term)
- **Objective 5.5:** Complete improvements to storm water drainage infrastructure to address areas of localized Flooding (including closed-basin flooding), or insufficient capacity. (Long-term)

- **Objective 5.6:** Standardize Emergency Action Plans for dams in the City of Sparks. (Short-term)
- **Objective 5.7:** Complete infrastructure improvements identified as part of the Truckee River Flood Management Project. (Long-term)
- **Objective 5.8:** Elevate or mitigate flood risks to homes in neighborhoods identified by the TRFMA as being at a high risk of Flooding (including closed-basin flooding). (Long-term)
- **Objective 5.9:** Identify and complete retrofits to unreinforced masonry buildings and other facilities at increased risk of damage from earthquakes. (Long-term)
- **Objective 5.10:** Implement measures to prepare first responders for active shooter incidents or acts of terrorism. (Long-term)
- **Objective 5.11:** Purchase equipment to minimize the risk of and protect emergency responders in the event of criminal acts or terrorism. (Long-term)
- **Objective 5.12:** Purchase additional equipment to perform immediate containment of hazardous materials spills. (Long-term)
- **Objective 5.13:** Address risks to properties in the runway protection zones at Reno-Tahoe International Airport and airport-critical areas at Reno-Stead Airport, and along the railway. (Long-term)
- **Objective 5.14: Identify inundation areas for high hazard dams in Washoe County.**

Goal 6: Increase public participation and responsibility in reducing their risks. (Short-term)

- **Objective 6.1:** Educate members of the public on hazards that may affect their communities. (Short-term)
- **Objective 6.2:** Provide building requirements and standards to guide property owners and developers in reducing risk. (Short-term)
- **Objective 6.3:** Provide resources to involve residents in disaster preparedness, response, and recovery. (Short-term)

Review of 2020 Hazard Mitigation Actions

As part of the mitigation strategy update, all mitigation actions identified in the 2020 plan were evaluated to determine the status of the action and whether any ongoing or incomplete actions should be included as actions in the 2025 plan update. Table 300 lists those previous actions. For all these actions, TRFMA was the lead department.

Table 300: Status of Previous Mitigation Actions by the Truckee River Flood Management Authority

ID	Mitigation Action	Lead Department	Status for plan update	Should this action be retained in the plan update? (Yes/No)
FL-1	Update flood maps to incorporate recently completed flooding mitigation projects along the Truckee River in Sparks. (Washoe County, City of Reno, City of Sparks, Truckee River Flood Management Authority [TRFMA])	Washoe County Emergency Management and Homeland Security, Reno Fire Department, Sparks Fire Department	TRFMA is not the lead for this action.	No
FL-2	Update FEMA Flood Insurance Rate Maps to incorporate recent Letter of Map Revision, Conditional Letter of Map Revision, and changes in topography and impervious surfaces using regional LiDAR data. (Washoe County, City of Reno, City of Sparks).	TRFMA	This mitigation action remains a high priority for TRFMA and its member jurisdictions (Washoe County, Sparks, and Reno). Much work has been completed since 2019. A new hydraulic modeling effort produced a series of updated floodplain maps that were submitted to FEMA for review as part of the Physical Map Revision process. The original package was submitted March 2023. In May 2024, FEMA's technical team notified TRFMA that it had concluded its review and that TRFMA had satisfactorily addressed its comments for the Lower Truckee River, Truckee Meadows, and Steamboat Creek hydrology & hydraulics	Yes

ID	Mitigation Action	Lead Department	Status for plan update	Should this action be retained in the plan update? (Yes/No)
			analysis. The next step is a public review process that should take about 1 year.	
FL-20	New floodwalls: Provide a berm with a buried floodwall, with the top of the floodwall set to the 100-year water surface elevation (TRFMA).	City of Reno	This mitigation action is confusing and should be revised to include specific location(s). Booth St to Arlington Ave: TRFMA's 2023 Map Book includes a description of a low floodwall or berm along Riverside Dr to reduce flood damages during smaller, more frequent flood events. The goal is to contain 14,000 cfs in the river channel per requirements of the Martis Creek Agreement, the Carson-Truckee Water Conservancy District (CTWCD) and the US Army Corps of Engineers (USACE). TRFMA's 377B infrastructure tax plan was recently amended by the board of directors to include "levees and floodwalls on the north bank of the Truckee River from approximately 1,000 ft upstream of Booth St to north Arlington Ave as needed to contain flood flows." The City of Reno is the lead agency for this work. TRFMA is coordinating with Reno and CTWCD on preliminary designs for the wall/berm. Note: Construction of Downtown & West Reno Flood Project elements will be prioritized based on future opportunities to	Yes

ID	Mitigation Action	Lead Department	Status for plan update	Should this action be retained in the plan update? (Yes/No)
			partner with other entities and leverage funding.	
FL-21	Booth Street Bridge: Remove Booth Street Bridge, which constricts flows and increases flood water elevations (TRFMA, City of Reno).	City of Reno	Booth Street Area: TRFMA's 2023 Map Book includes the raising or removal of Booth St Bridge, as well as the potential installation of a new pedestrian bridge just upstream of the Booth St Bridge. Note: Construction of Downtown & West Reno Flood Project elements will be prioritized based on future opportunities to partner with other entities and leverage funding.	Yes
FL-22	Jones Street Signal Improvements: Construct signal at Jones and Keystone Avenue (TRFMA, City of Reno).	City of Reno	This mitigation action is confusing and should be removed from the list (it does not specifically address flooding hazards and City of Reno would likely be the lead agency on this work).	No
FL-23	New Floodwalls (Geotechnical Recommendations): Drain trench along portions of the new floodwalls per Geo-technical Report (TRFMA).	TRFMA	This mitigation action is confusing and should be removed from the list. Drainage trenches required for new floodwalls would be included as part of the floodwall construction project(s).	No
FL-24	Pumping Station: Construct pumping station along Riverside Drive (TRFMA, City of Reno).	City of Reno	This mitigation action is not specifically mentioned in TRFMA's 2023 Map Book and may no longer be necessary. City of Reno is	No

ID	Mitigation Action	Lead Department	Status for plan update	Should this action be retained in the plan update? (Yes/No)
			the lead agency for work proposed along Riverside Drive. Note: Construction of Downtown & West Reno Flood Project elements will be prioritized based on future opportunities to partner with other entities and leverage funding.	
FL-25	Pedestrian Closure Gate Structures: Pedestrian gates are needed along the length of the floodwall to maintain the current pedestrian access points. A product, such as a flood break or approved equivalent (TRFMA, City of Reno).	City of Reno	This mitigation action is not specifically mentioned in TRFMA's 2023 Map Book and may no longer be necessary. City of Reno would likely be the lead agency for this action. Note: Construction of Downtown & West Reno Flood Project elements will be prioritized based on future opportunities to partner with other entities and leverage funding.	No
FL-26	Raise pedestrian bridge upstream and downstream of Arlington Ave (TRFMA).	City of Reno	This mitigation action is not specifically mentioned in TRFMA's 2023 Map Book. City of Reno would likely be the lead agency for this action. Note: Construction of Downtown & West Reno Flood Project elements will be prioritized based on future opportunities to partner with other entities and leverage funding.	No

ID	Mitigation Action	Lead Department	Status for plan update	Should this action be retained in the plan update? (Yes/No)
FL-27	Floodproofing: Miscellaneous structures in downtown Reno require flood-proofing—for example, the Post Office, Masonic building, courthouse and parking garage, Promenade assisted living home, and Methodist church (TRFMA).	City of Reno	This mitigation action is not specifically mentioned in TRFMA's 2023 Map Book. The City of Reno would likely be the lead agency for this action. Note: Construction of Downtown & West Reno Flood Project elements will be prioritized based on future opportunities to partner with other entities and leverage funding.	No
FL-28	Provide bridge protection at Arlington Ave. Bridge (TRFMA).	Regional Transportation Commission	This mitigation action is not specifically mentioned in TRFMA's 2023 Map Book. In this section of the Truckee River, TRFMA's role is to provide technical support to the project lead (i.e., provide hydraulic models and data to aid in the design process). RTC is contemplating some bridge work in this area. RTC and/or City of Reno would likely be the lead agency for this action.	No
FL-29	Replace Floodwalls: Replace old, inadequate floodwalls from Arlington St. to Lake St.	Regional Transportation Commission	Arlington Ave Area: TRFMA's 2023 Map Book identifies existing floodwalls from Arlington Ave to Lake St, and states that TRFMA may provide technical or possibly financial assistance to the project lead agency in the future. Note: Construction of Downtown & West Reno Flood Project elements will be	Yes

ID	Mitigation Action	Lead Department	Status for plan update	Should this action be retained in the plan update? (Yes/No)
			prioritized based on future opportunities to partner with other entities and leverage funding.	
FL-30	Sierra Street Bridge: Replace Sierra Street Bridge, which constricts flows and increases flood water elevations, with a new bridge that is hydraulically efficient and capable of passing the 100-year flood (TRFMA, City of Reno).	Regional Transportation Commission	Sierra St Bridge Replacement: This mitigation action is included in TRFMA's 2023 Map Book. However, TRFMA's role is to provide technical support to the project lead (i.e., provide hydraulic models and data to aid in the design process). The Sierra St Bridge replacement project is being led by RTC (currently under design as of 2023). Note: Construction of Downtown & West Reno Flood Project elements will be prioritized based on future opportunities to partner with other entities and leverage funding.	Yes
FL-31	Center Street Bridge: Replace Center Street Bridge, which constricts flows and increases flood water elevations, with a new bridge that is hydraulically efficient and capable of passing the 100-year flood (TRFMA, City of Reno).	City of Reno	Center St Bridge Replacement: This mitigation item is included in TRFMA's 2023 Map Book. However, TRFMA's role is to provide technical support to the project lead (i.e., provide hydraulic models and data to aid in the design process). Note: Construction of Downtown & West Reno Flood Project elements will be prioritized based on future opportunities to	Yes

ID	Mitigation Action	Lead Department	Status for plan update	Should this action be retained in the plan update? (Yes/No)
			partner with other entities and leverage funding.	
FL-32	Lake Street Bridge: Replace Lake Street Bridge, which constricts flows and increases flood water elevations, with a new bridge that is hydraulically efficient and capable of passing the 100-year flood (TRFMA, City of Reno).	City of Reno	Lake St Bridge Replacement: This mitigation item is included in TRFMA's 2023 Map Book. Note: Construction of Downtown & West Reno Flood Project elements will be prioritized based on future opportunities to partner with other entities and leverage funding.	Yes
FL-33	Remove existing pedestrian bridge at Wells Ave. Install new pedestrian bridge upstream of Wells Ave (TRFMA, City of Reno).	City of Reno	Lake St Bridge to I-580 Reach: This mitigation action now includes the removal of the existing Wells Ave Bridge (as well as any required bank stabilization and/or protection for the Wells Ave overpass), but not installation of a new pedestrian bridge. Previous plans included installation of a pedestrian bridge to replace the Wells Ave Bridge; however, the property on the north bank of the river has changed ownership and because the Kuenzli St Bridge is only a few hundred feet upstream, TRFMA has determined that replacing the Wells Ave Bridge is not necessary.	Yes
FL-34	Bank stabilization and bridge protection around Wells Avenue at	City of Reno	Same as FL-33	Yes

ID	Mitigation Action	Lead Department	Status for plan update	Should this action be retained in the plan update? (Yes/No)
	Wells Ave. Bridge (TRFMA, City of Reno).			
FL-35	Grand Sierra Floodwall: On the south (right) bank of the Truckee River a 3,000-foot-long, 6-foot-high floodwall would be built from Glendale to Greg Street. (Costs included in Element 19 Sparks Levees and Floodwalls: Glendale to Greg) (TRFMA, City of Reno).	TRFMA	Grand Sierra Resort Berm & Levee (Glendale Ave Bridge to Greg St Bridge): Construct an earthen berm and levee along the south bank of the Truckee River at the Grand Sierra Resort location (Glendale Ave Bridge to Greg St Bridge). The proposed upstream berm would consist of approximately 45,000 cubic yards of compacted material; estimated cost is $1.35 million in 2021 dollars. The proposed downstream berm would consist of approximately 52,000 cubic yards of compacted material; estimated cost is $1.56 million in 2021 dollars. The berms would be connected by a levee section approximately 350 feet long (estimated cost $700,000 in 2021 dollars). This design concept is a shift from previous plans, which included a floodwall. The berms would be designed with gentle slopes that would allow better connection between the GSR and the river. This would also allow more options for use of the berm area (such as parking) during non-flooding conditions. Planned construction: 2026-2027 or 2027-2028.	Yes

ID	Mitigation Action	Lead Department	Status for plan update	Should this action be retained in the plan update? (Yes/No)
FL-36	Sparks Levees and Floodwalls Glendale to Greg: Replacement of the existing levee on the north bank with on-bank floodwalls to minimize construction and right-of-way impacts on the Truckee Meadows Water Authority's (TMWA's) Glendale Water Treatment Plant. Trail can be incorporated into floodwall maintenance road (TRFMA, City of Sparks)	TRFMA	Truckee Meadows Water Authority (TMWA) Levee (Glendale Ave Bridge to Greg St Bridge): Construct a levee approximately 3,000 ft long along the north bank of the Truckee River with one portion set back from the riverbank (as space allows). Estimated cost is $4.5 million in 2021 dollars. TRFMA plans to work collaboratively with TMWA on site access, fencing, and security. This design concept is a shift from the previous (2016) version of the Flood Project plan, which included a floodwall. Planned construction: 2026-2027 or 2027-2028.	Yes
FL-37	Mill Street Levee – Greg to Rock: Reduced south bank floodplain terracing with the associated levee move closer to the Truckee River. Reduces excavation costs and reduces impacts on the existing Pioneer Ditch. (Costs included in Element 19 Sparks Levees and Floodwalls: Glendale to Greg.) (TRFMA, City of Sparks)	TRFMA	Reno-Tahoe International Airport Berm & Terracing (Greg St Bridge to Rock Blvd Bridge): Excavate a floodplain terrace and construct an earthen berm along the south bank of the Truckee River near the airport (Greg St Bridge to Rock Blvd Bridge). The floodplain terrace would be revegetated with low-growing plant species because of airport safety regulations. The estimated cost to construct the floodplain terrace is $2.4 million in 2021 dollars. The amount of fill material required for the berm would be approximately 90,000 cubic yards or less; construction cost is estimated at $2.7	Yes

ID	Mitigation Action	Lead Department	Status for plan update	Should this action be retained in the plan update? (Yes/No)
			million in 2021 dollars. Cost savings may be achieved by using spoil material from the Vista Narrows Floodplain Terracing Project. If necessary to alleviate a minor rise in water level due to the airport berm, construct a small berm on the north bank of the Truckee River. This design concept is a shift from earlier plans, which included a levee. A wide berm with a gentle slope is now the preferred alternative because a levee would be more of an obstacle to landing aircraft, and therefore a safety concern. Planned construction: 2026-2027 or 2027-2028.	
FL-38	Terracing Greg to Rock: Reduced terracing to stabilize the riverbank, reduce the amount of excavation, and avoid the existing Pioneer Ditch. The terracing and associated levee are moved northward toward the Truckee River and levee ties into the McCarran Blvd. bridge (TRFMA, City of Sparks).	TRFMA	Same as FL-37	Yes
FL-39	Abutment, pier, and bank scour protection measures (as required) from Rock Blvd Bridge to Vista Narrows.	TRFMA	This mitigation action requires further analysis to determine exactly what is required along the reach.	No

ID	Mitigation Action	Lead Department	Status for plan update	Should this action be retained in the plan update? (Yes/No)
	Includes East McCarran Blvd Bridge (TRFMA, City of Reno, City of Sparks).			
FL-40	Mill Street Levee – Rock to McCarran: Reduced south bank floodplain terracing with the associated levee move closer to the Truckee River. Reduces excavation costs and reduces impact on the existing Pioneer Ditch. Pioneer Ditch will be piped to allow for use of the fill disposal area (TRFMA, City of Sparks).	TRFMA	Mill/McCarran Levees & Terracing (Rock Blvd Bridge to McCarran Blvd Bridge): Currently in 60% design phase (June 2024). Planned construction: 2027-2028. Between the Rock Blvd Bridge and the McCarran Blvd Bridge, relocate the Truckee River channel and increase its sinuosity, excavate floodplain terraces, and construct levees to reduce flood risk, restore the ecosystem, and enhance recreational opportunities. The updated conceptual design omits floodwalls and includes higher levees on both the north and south banks of the Truckee River, as well as a lower "intermediate" levee on the south side. The intermediate levee would be designed to contain a 50-year flood event. Ecosystem restoration is proposed to improve instream and riparian habitat for fish and wildlife species. Recreational enhancements may include nature-based activities along the river corridor and improved river access, as well as sports fields and park facilities on the south side in between the intermediate levee and	Yes

ID	Mitigation Action	Lead Department	Status for plan update	Should this action be retained in the plan update? (Yes/No)
			the outer, high levee. The estimated cost to construct the levees (north, south, south intermediate) is $20.4 million. Excavation of the floodplain terraces and ecosystem restoration is estimated to cost $20 million. TRFMA has already invested more than $48 million to acquire 110 acres of land in this area (more than 1.2 miles of river frontage on the south bank of the river). Implementation of this flood project element will significantly reduce flood risk for the north and south industrial areas and the airport.	
FL-41	Terracing Rock to McCarran: Reduced terracing to reduce the amount of excavation and avoid the existing Pioneer Ditch. The terracing and associated levees are moved northward toward the Truckee River and levee ties into the Rock Blvd. bridge. The land between Mill Street and the relocated levee can be used as a fill disposal site and reserved for future recreational use (TRFMA, City of Reno).	TRFMA	Same as FL-40	Yes

ID	Mitigation Action	Lead Department	Status for plan update	Should this action be retained in the plan update? (Yes/No)
FL-42	Sparks Levees and Floodwalls – Rock to McCarran: Replacement of the north bank levee with on-bank floodwalls to minimize impacts on existing properties and railroad spurs. Some minor terracing on the north bank. Fill localized low-lying areas on the landside of the floodwall. Trail can be incorporated into floodwall maintenance road (TRFMA, City of Sparks).	TRFMA	Same as FL-40	Yes
FL-43	Terracing – Rock to Steamboat: Benching on north bank at Living River Parkway. Minimized terracing on south bank along treatment plant. Remove existing buildings, as necessary (TRFMA, City of Sparks).	TRFMA	Same as FL-40	Yes
FL-44	Main Station Farm Protection: Will flood-proof select buildings and elevate the existing pads under the hay storage barns to keep hay dry. Main processing building is sufficiently elevated above flood waters (TRFMA).	TRFMA	The proposed mitigation action (described in the 2020 HMP) requires further analysis to determine what exactly is needed at UNR Main Station Farm.	Yes

ID	Mitigation Action	Lead Department	Status for plan update	Should this action be retained in the plan update? (Yes/No)
FL-45	Sparks Levees and Floodwalls – McCarran to Vista: Replacement of existing levee with on-bank floodwalls for approximately 20,000 feet east of McCarran to reduce overall footprint. Construction of levees for most of the remainder of the reach. Floodwall will be used near Larkin Circle to eliminate impacts on the roadway (TRFMA, City of Sparks).	TRFMA	North Bank Levee & Floodwall (McCarran Blvd Bridge to east edge of Sparks Industrial Area at Vista): Construct a levee and floodwall (where necessary) on the north bank of the Truckee River from the McCarran Blvd Bridge to the eastern edge of the Sparks Industrial Area at Vista. This section of levee and floodwall is approximately 3.2 miles long. Previous conceptual plans included mostly floodwall; the latest plan prioritizes levee construction to reduce costs, avoid seepage problems, and allow for recreational trail access on the levee crown (for example, a bike path). The cost of this project element is roughly estimated at $33.2 million in 2021 dollars (this portion of the flood project requires additional study). Note that this reach includes the North Truckee Drain Realignment Project, a flood hazard mitigation project partially funded by TRFMA and completed in 2018 (refer to past plans or visit trfma.org for more information). Planned construction: 2029-2030.	Yes
FL-46	Vista Narrows Widening: Expanded benching of the Narrows extending to the first railroad bridge (TRFMA).	TRFMA	Vista Narrows Floodplain Terracing (East Sparks to Truckee River canyon downstream location near the first railroad bridge):	Yes

ID	Mitigation Action	Lead Department	Status for plan update	Should this action be retained in the plan update? (Yes/No)
			Currently in permitting phase at 65% design (July 2024). Start of construction: 2025 if possible. Construct three floodplain terraces along the Truckee River from a location east of Sparks (Vista Narrows) downstream in the Truckee River canyon to a location near the first railroad bridge. This flood project element is designed to reconnect the Truckee River to a restored floodplain, thereby reducing flood risk and improving the riverine and riparian ecosystem. The Vista Narrows project is the key element of the entire Flood Project because it lowers flood water levels caused by flood risk reduction elements upstream in the Truckee Meadows reach. By constructing the floodplain terraces at Vista Narrows, the rest of the Flood Project can be implemented while avoiding the need for costly mitigation measures in south Reno. Approximately 450,000 cubic yards of material would be excavated to create the floodplain terraces, at an estimated construction cost of $42 million in 2021 dollars. The Vista Narrows project does increase peak flows downstream by approximately 2,400 cfs; TRFMA is working	

ID	Mitigation Action	Lead Department	Status for plan update	Should this action be retained in the plan update? (Yes/No)
			with downstream stakeholders to mitigate the increased flows.	
FL-47	Hidden Valley: Voluntary home elevation. An alternative may include floodproofing for certain residences in Hidden Valley. The method of flood-proofing would probably vary from structure to structure, but all would be raised to at least the 100-year flood elevation (TRFMA).	TRFMA	The voluntary home elevation program is active for certain eligible homes in the Eastside Subdivision, Rosewood Lakes, and Hidden Valley Estates areas. A total of four homes have been elevated since the program's inception in 2011. The program has experienced delays in receiving grant funding and difficulties in finding qualified engineers and subcontractors to perform the work. The program is ongoing but not a high priority for TRFMA.	Yes
FL-48	Sparks Levees and Floodwalls – Rock to McCarran: Replacement of the north bank levee with on-bank floodwalls to minimize impacts on existing properties and railroad spurs. Some minor terracing on the north bank. Fill localized low-lying areas on the landside of the floodwall. Trail can be incorporated into floodwall maintenance roads (TRFMA).	TRFMA	Same as FL-41	Yes
FL-49	Eastside Subdivision: Voluntary home elevation. Elevation of the	TRFMA	Same as FL-47	Yes

ID	Mitigation Action	Lead Department	Status for plan update	Should this action be retained in the plan update? (Yes/No)
	buildings in the East Subdivision south of the Main Station Farm to above the 100-year floodwater event level (TRFMA).			
FL-50	Non-Voluntary Home Elevation/Mitigation: as required dependent upon further analysis (TRFMA).	TRFMA	This might be an option (perhaps a last-resort option) to consider in the future if other mitigation strategies are not effective.	No
FL-51	Rainbow Bend Home Elevation: Non-Voluntary Home Elevation/Mitigation: as required dependent upon further analysis (TRFMA).	TRFMA	The proposed mitigation action is now construction of a small wall or berm to alleviate nuisance flooding in the streets at Rainbow Bend. After performing a detailed hydraulic analysis and studying several alternatives, TRFMA determined that constructing a small decorative wall or berm would effectively mitigate the increased flows from Flood Project construction upstream. At this time, no home elevation projects are anticipated.	Yes
FL-52	Wadsworth Non-Voluntary Home Elevation/Mitigation: as required dependent upon further analysis (TRFMA).	TRFMA	This mitigation action is now a bridge replacement project. Currently at 100% design and in process of finalizing bid documents. Planned construction: 2025. After performing a detailed hydraulic analysis and studying mitigation alternatives, TRFMA determined that replacing the existing	Yes

ID	Mitigation Action	Lead Department	Status for plan update	Should this action be retained in the plan update? (Yes/No)
			pedestrian bridge at Wadsworth would effectively mitigate the increased flows from Flood Project construction upstream. At this time, no home elevation projects are anticipated.	
FL-53	Update Truckee River Flood Inundation Maps (TRFMA).	TRFMA	This mitigation action was completed in 2024. TRFMA produced a static flood frequency map series to assist emergency management agencies with planning and response during Truckee River Flood events. Maps were developed representing the extent and depth of flooding along the Truckee River during the following flood events: 10-yr, 20-yr, 50-yr, 75-yr, 100-yr, 117-yr (1997 flood of record), 150-yr, 200-yr, and 500-yr. Maps are available to the public on TRFMA's website at: https://trfma.org/resources/flood-map-series/.	No

Considered Mitigation Actions

TRFMA considered a broad range of actions, including actions that benefit vulnerable populations and current and new development, as a part of this plan update. There are four main types of mitigation actions:

- Local plans and regulations
- Structure and infrastructure projects
- Natural systems protection
- Education and awareness programs

Additional actions, such as those related to preparedness, response, recovery, and prevention, were discussed as a possibility during this plan update. However, TRFMA primarily considered public input and FEMA's Mitigation Ideas document, which contain additional suggestions for mitigation actions, during this plan update.

In the 2020 Hazard Mitigation Plan, TRFMA's priorities were described under the following goals and objectives:

Goal 1: Maintain and expand transportation routes across the County, during and after key hazard events.

Objective 1.3: Address risks of damage to high-priority bridges identified by TRFMA from flooding through stabilization, repair, or replacement.

Goal 3: Maintain key communications to ensure connectivity during and after key hazard events.

Objective 3.1: Provide methods for notification, warning, and emergency communications.

Goal 5: Minimize property damage and reduce repetitive losses to property from key hazards (top priority in 2024).

Objective 5.4: Update flood maps to incorporate changes in conditions and flood risk.

Objective 5.7: Complete infrastructure improvements identified as part of the Truckee River Flood Management Project.

Objective 5.8: Elevate or mitigate flood risks to homes in neighborhoods identified by the TRFMA as being at a high risk of flooding.

Goal 6: Increase public participation and responsibility in reducing their risks.

Objective 6.1: Educate members of the public on hazards that may affect their communities.

These goals and objectives remain top priorities for TRFMA. However, since the last HMP update, some mitigation actions (FL-1, FL-2, and FL-20 through FL-53) have been refined and/or completed. The agency's board of directors approved an updated version of the Truckee River Flood Management Project in July 2023. Some elements of the project have been revised and reorganized based on the latest hydraulic modeling results provided by TRFMA's consultants. Please refer to the text below for a revised list of Flood Project elements. A copy of TRFMA's FY2025 5-year capital improvement plan is available upon request.

Table 301: Changes to Previous Plans by the Truckee River Flood Management Authority

2020 Plan Priorities	Any change in priority? (Yes/No)	Description
FL-1	No	This mitigation action for the North Truckee Drain is in-progress.
FL-2	No	This mitigation action remains a high priority for TRFMA and its member jurisdictions (Washoe County, Sparks, and Reno). Much work has been completed since 2019. A new hydraulic modeling effort produced a series of updated floodplain maps that were submitted to FEMA for review as part of revising the Physical Map. The original package was submitted in March 2023. In May 2024, FEMA's technical team notified TRFMA that had concluded its review and that TRFMA had satisfactorily addressed its comments for the Lower Truckee River, Truckee Meadows, and Steamboat Creek hydrology & hydraulics analysis. The next step is a public review process that should take about 1 year.
FL-20	Yes	**Booth St to Arlington Ave:** TRFMA's 2023 Map Book includes a description of a low floodwall or berm along Riverside Dr to reduce flood damage during smaller, more frequent flood events. The goal is to contain 14,000 cfs in the river channel per the requirements of the Carson–Truckee Water Conservancy District (CTWCD) and the US Army Corps of Engineers (USACE). TRFMA's 377B infrastructure tax plan was recently amended by the board of directors to include "levees and floodwalls on the north bank of the Truckee River from approximately 1,000 ft upstream of Booth St to North Arlington Ave., as needed, to contain flood flows." The City of Reno is the lead agency for this work. TRFMA is coordinating with Reno and CTWCD on preliminary designs for the wall/berm. **Note:** Construction of Downtown & West Reno Flood Project elements will be prioritized based on future opportunities to partner with other entities and leverage funding.
FL-21	Yes	**Booth Street Area:** TRFMA's 2023 Map Book includes the raising or removal of Booth St Bridge and the potential installation of a new pedestrian bridge just upstream of the Booth St Bridge. **Note:** Construction of Downtown & West Reno Flood Project elements will be prioritized based on future opportunities to partner with other entities and leverage funding.
FL-22	Yes	This mitigation action is confusing and should be removed from the list (it does not specifically address flooding hazards and the City of Reno would likely be the lead agency on this work).

2020 Plan Priorities	Any change in priority? (Yes/No)	Description
FL-23	Yes	This mitigation action is confusing and should be removed from the list. Drainage trenches required for new floodwalls would be included as part of the floodwall construction project(s).
FL-24	Yes	This mitigation action is not specifically mentioned in TRFMA's 2023 Map Book and may no longer be necessary. The City of Reno is the lead agency for work proposed along Riverside Drive. **Note: Construction of Downtown & West Reno Flood Project elements will be prioritized based on future opportunities to partner with other entities and leverage funding.**
FL-25	Yes	This mitigation action is not specifically mentioned in TRFMA's 2023 Map Book and may no longer be necessary. The City of Reno would likely be the lead agency for this action. **Note: Construction of Downtown & West Reno Flood Project elements will be prioritized based on future opportunities to partner with other entities and leverage funding.**
FL-26	Yes	This mitigation action is not specifically mentioned in TRFMA's 2023 Map Book. The City of Reno would likely be the lead agency for this action. **Note: Construction of Downtown & West Reno Flood Project elements will be prioritized based on future opportunities to partner with other entities and leverage funding.**
FL-27	Yes	This mitigation action is not specifically mentioned in TRFMA's 2023 Map Book. City of Reno would likely be the lead agency for this action. **Note: Construction of Downtown & West Reno Flood Project elements will be prioritized based on future opportunities to partner with other entities and leverage funding.**
FL-28	Maybe?	This mitigation action is not specifically mentioned in TRFMA's 2023 Map Book. In this section of the Truckee River, TRFMA's role is to provide technical support to the project lead (i.e., to provide hydraulic models and data to aid in the design process). The Regional Transportation Commission (RTC) is contemplating some bridge work in this area. RTC and/or City of Reno would likely be the lead agency for this action.
FL-29	Yes	**Arlington Ave Area:** TRFMA's 2023 Map Book identifies existing floodwalls from Arlington Ave to Lake St, and states that TRFMA may provide technical or possibly financial assistance to the project lead agency in the future.

2020 Plan Priorities	Any change in priority? (Yes/No)	Description
		Note: Construction of Downtown & West Reno Flood Project elements will be prioritized based on future opportunities to partner with other entities and leverage funding.
FL-30	Yes	**Sierra St Bridge Replacement:** This mitigation action is included in TRFMA's 2023 Map Book. However, TRFMA's role is to provide technical support to the project lead (i.e., to provide hydraulic models and data to aid in the design process). The Sierra St Bridge replacement project is being led by RTC (currently under design as of 2023). **Note: Construction of Downtown & West Reno Flood Project elements will be prioritized based on future opportunities to partner with other entities and leverage funding.**
FL-31	Yes	**Center St Bridge Replacement:** This mitigation item is included in TRFMA's 2023 Map Book. However, TRFMA's role is to provide technical support to the project lead (i.e., to provide hydraulic models and data to aid in the design process). **Note: Construction of Downtown & West Reno Flood Project elements will be prioritized based on future opportunities to partner with other entities and leverage funding.**
FL-32	No	**Lake St Bridge Replacement:** This mitigation item is included in TRFMA's 2023 Map Book. **Note: Construction of Downtown & West Reno Flood Project elements will be prioritized based on future opportunities to partner with other entities and leverage funding.**
FL-33, FL-34	Yes	**Lake St Bridge to I-580 Reach:** This mitigation action now includes the removal of the existing Wells Ave Bridge (and any required bank stabilization and/or protection for the Wells Ave overpass), but not installation of a new pedestrian bridge. Previous plans included installing a pedestrian bridge to replace the Wells Ave Bridge. However, the property on the north bank of the river has changed ownership, and because the Kuenzli St Bridge is only a few hundred feet upstream, TRFMA has determined that replacing the Wells Ave Bridge is not necessary.
FL-35	Yes	**Grand Sierra Resort Berm & Levee (Glendale Ave Bridge to Greg St Bridge):** Construct an earthen berm and levee along the south bank of the Truckee River at the Grand Sierra Resort location (Glendale Ave Bridge to Greg St Bridge). The proposed upstream berm would consist of approximately 45,000 cubic yards of compacted material; the estimated cost is $1.35 million in 2021 dollars. The proposed downstream berm would consist of approximately 52,000 cubic yards of compacted material; the estimated cost is $1.56 million in 2021 dollars. The berms

2020 Plan Priorities	Any change in priority? (Yes/No)	Description
		would be connected by a levee section approximately 350 feet long (the estimated cost is $700,000 in 2021 dollars). This design concept is a shift from previous plans, which included a floodwall. The berms would be designed with gentle slopes that would allow a better connection between the GSR and the river. This would also provide more options for using the berm area (such as parking) during non-flooding conditions. Planned construction: 2026–2027 or 2027–2028.
FL-36	Yes	**Truckee Meadows Water Authority (TMWA) Levee (Glendale Ave Bridge to Greg St Bridge):** Construct a levee approximately 3,000 ft long along the north bank of the Truckee River with one portion set back from the riverbank (as space allows). The estimated cost is $4.5 million in 2021 dollars. TRFMA plans to work collaboratively with TMWA on site access, fencing, and security. This design concept is a shift from the previous (2016) version of the Flood Project plan, which included a floodwall. Planned construction: 2026–2027 or 2027–2028.
FL-37, FL-38	Yes	**Reno-Tahoe International Airport Berm & Terracing (Greg St Bridge to Rock Blvd Bridge):** Excavate a floodplain terrace and construct an earthen berm along the south bank of the Truckee River near the airport (Greg St Bridge to Rock Blvd Bridge). The floodplain terrace would be revegetated with low-growing plant species because of airport safety regulations. The estimated cost of constructing the floodplain terrace is $2.4 million in 2021 dollars. The amount of fill material required for the berm would be approximately 90,000 cubic yards or less; construction cost is estimated at $2.7 million in 2021 dollars. Cost savings may be achieved by using spoil material from the Vista Narrows Floodplain Terracing Project. If necessary, to alleviate a minor rise in water level because of the airport berm, construct a small berm on the north bank of the Truckee River. This design concept is a shift from earlier plans, which included a levee. A wide berm with a gentle slope is now the preferred alternative because a levee would be more of an obstacle to landing aircraft, and therefore a safety concern. Planned construction: 2026–2027 or 2027–2028.
FL-39	No	This mitigation action requires further analysis to determine exactly what is required along the reach.

2020 Plan Priorities	Any change in priority? (Yes/No)	Description
FL-40, FL-41, FL-42, FL-43, FL-48	Yes	**Mill/McCarran Levees & Terracing (Rock Blvd Bridge to McCarran Blvd Bridge):** Currently in 60% design phase (June 2024). Planned construction: 2027–2028. Between the Rock Blvd Bridge and the McCarran Blvd Bridge, relocate the Truckee River channel and increase its sinuosity, excavate floodplain terraces, and construct levees to reduce flood risk, restore the ecosystem, and enhance recreational opportunities. The updated conceptual design omits floodwalls and includes higher levees on both the north and south banks of the Truckee River and a lower "intermediate" levee on the south side. The intermediate levee would be designed to contain a 50-year flood event. Ecosystem restoration is proposed to improve instream and riparian habitats for fish and wildlife species. Recreational enhancements may include nature-based activities along the river corridor and improved river access and sports fields and park facilities on the south side between the intermediate levee and the outer high levee. The estimated cost of constructing the levees (north, south, south intermediate) is $20.4 million. Excavating the floodplain terraces and restoring the ecosystem is estimated to cost $20 million. TRFMA has already invested more than $48 million to acquire 110 acres of land in this area (more than 1.2 miles of river frontage on the south bank of the river). Implementation of this Flood Project element will significantly reduce flood risk in the north and south industrial areas and the airport.
FL-44	No	The proposed mitigation action (described in the 2020 HMP) requires further analysis to determine what exactly is needed at the University of Nevada, Reno (UNR) Main Station Farm.
FL-45	Yes	**North Bank Levee & Floodwall (McCarran Blvd Bridge to east edge of Sparks Industrial Area at Vista):** Construct a levee and floodwall (where necessary) on the north bank of the Truckee River from the McCarran Blvd Bridge to the eastern edge of the Sparks Industrial Area at Vista. This section of levee and floodwall is approximately 3.2 miles long. Previous conceptual plans included mostly floodwalls; the latest plan prioritizes levee construction to reduce costs, avoid seepage problems, and allow for recreational trail access on the levee crown (for example, a bike path). The cost of this project element is roughly estimated at $33.2 million in 2021 dollars (this portion of the Flood Project requires additional study). Note that this reach includes the North Truckee Drain Realignment Project, a flood hazard mitigation project partially funded by TRFMA

2020 Plan Priorities	Any change in priority? (Yes/No)	Description
		and completed in 2018 (refer to past plans or visit trfma.org for more information). Planned construction: 2029–2030.
FL-46	Yes	**Vista Narrows Floodplain Terracing (East Sparks to Truckee River canyon downstream location near the first railroad bridge):** Currently in permitting phase at 65% design (July 2024). Start of construction: 2025, if possible. Construct three floodplain terraces along the Truckee River from a location east of Sparks (Vista Narrows) downstream in the Truckee River canyon to a location near the first railroad bridge. This Flood Project element is designed to reconnect the Truckee River to a restored floodplain, thereby reducing flood risk and improving the riverine and riparian ecosystems. The Vista Narrows project is the key element of the entire Flood Project because it lowers flood water levels caused by flood risk reduction elements upstream in the Truckee Meadows reach. By constructing the floodplain terraces at Vista Narrows, the rest of the Flood Project can be implemented while avoiding the need for costly mitigation measures in South Reno. Approximately 450,000 cubic yards of material would be excavated to create floodplain terraces, at an estimated construction cost of $42 million in 2021 dollars. The Vista Narrows project increases peak flows downstream by approximately 2,400 cfs. TRFMA is working with downstream stakeholders to mitigate increased flows.
FL-47, FL-49	No	The **voluntary** home elevation program is active for certain eligible homes in the Eastside Subdivision, Rosewood Lakes, and Hidden Valley Estates areas. A total of four homes have been elevated since the program's inception in 2011. The program has experienced delays in receiving grant funding and difficulties finding qualified engineers and subcontractors to perform the work. The program is ongoing but not a high priority for TRFMA.
FL-50	No	This might be an option (perhaps a last-resort option) to consider in the future if other mitigation strategies are not effective.
FL-51	Yes	The proposed mitigation action is now construction of a small wall or berm to alleviate nuisance flooding in the streets at Rainbow Bend. After performing a detailed hydraulic analysis and studying several alternatives, TRFMA determined that constructing a small decorative wall or berm would effectively mitigate the increased flows from Flood Project construction upstream. At this time, no home elevation projects are anticipated.

2020 Plan Priorities	Any change in priority? (Yes/No)	Description
FL-52	Yes	This mitigation action is now a bridge replacement project. Currently at 100% design and in the process of finalizing bid documents. Planned construction: 2025. After performing a detailed hydraulic analysis and studying mitigation alternatives, TRFMA determined that replacing the existing pedestrian bridge at Wadsworth would effectively mitigate the increased flows from Flood Project construction upstream. At this time, no home elevation projects are anticipated.
FL-53	Yes	This mitigation action was completed in 2024. TRFMA produced a static flood frequency map series to assist emergency management agencies with planning and response during Truckee River flood events. Maps were developed representing the extent and depth of flooding along the Truckee River during the following flood events: 10-yr, 20-yr, 50-yr, 75-yr, 100-yr, 117-yr (1997 flood of record), 150-yr, 200-yr, and 500-yr. Maps are available to the public on TRFMA's website at: https://trfma.org/resources/flood-map-series/.

The 2025–2029 Mitigation Action Plan

After careful consideration, TRFMA has selected to pursue the actions listed in Table 302. In that table, Community Lifelines are defined at Lifelines Toolkit v2.0 (fema.gov) and include the new Water Systems lifeline. Timeframes are defined as follows:

- Short term: Less than 1 year
- Medium term: 1-3 years
- Long term: 3–5 years

THIS PAGE INTENTIONALLY LEFT BLANK

Table 302: 2025–2029 Mitigation Action Plan of the Truckee River Flood Management Authority

#	Project Title	Hazard Addressed	Vulnerability Addressed	Responsible Agency	Potential Partners	Mechanism(s) to Implement the Action	Potential Funding	Cost Estimate	Benefits	Project Useful Life	Timeframe	Priority
1	Flood insurance study	Flooding	People and infrastructure	TRFMA	WCEM, City of Reno, City of Sparks, PLPT, RSIC	Partner plans in place.	General Fund, FMA	$50,000	Studying areas lacking flood insurance can pinpoint vulnerable regions and guide policy decisions, enhancing community preparedness and economic resilience. It raises awareness about the need for adequate coverage and supports stronger disaster mitigation efforts.	5-10 years	1-2 Years	Medium

#	Project Title	Hazard Addressed	Vulnerability Addressed	Responsible Agency	Potential Partners	Mechanism(s) to Implement the Action	Potential Funding	Cost Estimate	Benefits	Project Useful Life	Timeframe	Priority
Description: This study aims to identify gaps in flood insurance coverage in the county by assessing accessibility, awareness, and mitigation efforts. Through data analysis and community engagement, it highlights areas lacking insurance and offers recommendations to improve community resilience against flooding.												
FL-2	FEMA Truckee River Physical Map Revision Effort	Flooding	People/ Structures/ Economic Assets/ Critical Facilities & Infra-structure	TRFMA	Washoe County CSD, City of Reno, City of Sparks, Storey County, FEMA	TRFMA Flood Management Project Plan (2023 Map Book) and the NRS 377B Infra-structure Tax Plan (administered by TRFMA)	Existing TRFMA operating funds	$100,000	If approved by FEMA, effort would revise the regulatory floodway, the 1% annual chance water surface elevations, and the 1% annual chance floodplain in the study area. Previous mapping from 1984 is outdated and inaccurate. Updating the Flood Insurance Rate Maps (FIRMs) will facilitate a better under-standing of	TBD	Currently in progress. Next phase of work is public outreach, expected to take about 1 year. Short term to medium term to complete	High

#	Project Title	Hazard Addressed	Vulnerability Addressed	Responsible Agency	Potential Partners	Mechanism(s) to Implement the Action	Potential Funding	Cost Estimate	Benefits	Project Useful Life	Timeframe	Priority
									current flood risk and potential flood damage in the study area.			
FL-2 Description: Develop new hydraulic models and create new floodplain maps to update the FEMA floodplain designations for the Truckee River, Steamboat Creek, and North Truckee Drain in the Greater Truckee Meadows Region, NV, and the Truckee River Lower Reach, which extends from Vista downstream to Wadsworth, NV.												
FL-20, FL-21	Booth St to Arlington Ave Floodwall/ Berm	Flooding	People/ Structures/ Economic Assets/ Natural, Historic, & Cultural Resources/ Community Activities	TRFMA, City of Reno Emergency Management	CTWCD,* RTC	TRFMA Flood Management Project Plan (2023 Map Book) and the NRS 377B Infra-structure Tax Plan (administered by TRFMA)	Funds from CTWCD for design Construction funds from City of Reno & possibly TRFMA (not yet approved)	Preliminary cost estimates prepared by J-U-B range from ~$2.2 million to $5.5 million to contain 14,000 cfs (~50-yr flood event). The cost to contain the 100-yr flow is estimated at $13.9 million. (TRFMA staff report, July 12, 2024)	Would provide a minimum flow conveyance of ~14,000 cfs (~50-yr flood event), protecting the adjoining neighbor-hoods while maintaining the community's connection to the Truckee River.	30 years	1-3 years	Medium/ low (for TRFMA)

#	Project Title	Hazard Addressed	Vulnerability Addressed	Responsible Agency	Potential Partners	Mechanism(s) to Implement the Action	Potential Funding	Cost Estimate	Benefits	Project Useful Life	Timeframe	Priority
FL-20, FL-21 Description: Construct a small berm or floodwall (approximately 1,000 long) on the north bank of the Truckee River upstream of Booth St Bridge. Construct a low berm on the north bank of the Truckee River (along Riverside Drive) downstream of the Booth St Bridge to North Arlington Ave. Project goal is to contain a minimum of 14,000 cfs in the Truckee River channel per the Martis Creek Agreement and requirements of the Carson–Truckee Water Conservancy District (CTWCD) and the US Army Corps of Engineers (USACE). The design and construction of berms or floodwalls would include additional elements, such as pumping stations and/or drainage trenches if required. Note that recent hydraulic modeling results have indicated that removing and/or raising the Booth St Bridge is not an effective solution for improving flow conveyance and reducing water levels upstream. Construction would be prioritized based on future opportunities to partner with other entities and leverage funding.												
FL-29	Replace Existing Floodwalls (Arlington Ave to Lake St)	Flooding	People/ Structures/ Economic Assets/ Natural, Historic, & Cultural Resources/ Community Activities	TFRMA, City of Reno Emergency Management	Partners share responsibility	TRFMA Flood Management Project Plan (2023 Map Book), the NRS 377B Infra-structure Tax Plan (administered by TRFMA) City of Reno CIP	Capital funds from City of Reno, grant funds, possibly some funds from TRFMA (not yet approved)	$1M	Would protect the local area from smaller, more frequent flood events while maintaining the community's connection to the Truckee River.	30 years	3-5 years	Low (for TRFMA)
FL-29 Description: TRFMA's 2023 Map Book identifies existing floodwalls from Arlington Ave to Lake St, and states that TRFMA may provide technical or possibly financial assistance to the project lead agency in the future. Construction would be prioritized based on future opportunities to partner with other entities and leverage funding.												
FL-30	Sierra St Bridge Replacement	Flooding	People/ Structures/ Economic Assets	TRFMA, RTC	City of Reno	Under design by RTC (as of July 2023)	Capital funds from RTC	$1M	Protection of people and property	30 years	1-3 years	Low

#	Project Title	Hazard Addressed	Vulnerability Addressed	Responsible Agency	Potential Partners	Mechanism(s) to Implement the Action	Potential Funding	Cost Estimate	Benefits	Project Useful Life	Timeframe	Priority
FL-30 Description: Replace Sierra St Bridge with a new bridge that improves hydraulic conditions and reduces flooding in this area. This mitigation action is included in TRFMA's 2023 Map Book. However, TRFMA's role is to provide technical support to the project lead (i.e., to provide hydraulic models and data to aid in the design process). Construction would be prioritized based on future opportunities to partner with other entities and leverage funding.												
FL-31	Center St Bridge Replacement	Flooding	People/ Structures/ Economic Assets	TRFMA	TRFMA, RTC, NDOT*	TRFMA Flood Management Project Plan (2023 Map Book), the NRS 377B Infra-structure Tax Plan (administered by TRFMA) City of Reno CIP	Capital funds from City of Reno, grant funds, possibly some funds from TRFMA (not yet approved)	$1M	Protection of people and property	30 years	3-5 years	Low
FL-31 Description: Replace Center St Bridge with a new bridge that improves hydraulic conditions and reduces flooding in this area. This mitigation action is included in TRFMA's 2023 Map Book. However, TRFMA's role is to provide technical support to the project lead (i.e., to provide hydraulic models and data to aid in the design process). Construction would be prioritized based on future opportunities to partner with other entities and leverage funding.												
FL-32	Lake St Bridge Replacement	Flooding	People/ Structures/ Economic Assets	City of Reno Public Works, Engineering Department, RTC	TRFMA	TRFMA Flood Management Project Plan (2023 Map Book), the NRS 377B Infra-structure Tax	Capital funds from City of Reno, grant funds, possibly some funds from TRFMA	$1M	Protection of people and property	30 years	3-5 years	Medium/ low (for TRFMA)

#	Project Title	Hazard Addressed	Vulnerability Addressed	Responsible Agency	Potential Partners	Mechanism(s) to Implement the Action	Potential Funding	Cost Estimate	Benefits	Project Useful Life	Timeframe	Priority
						Plan (administered by TRFMA) City of Reno CIP	(not yet approved)					
FL-32 Description: Replace Lake St Bridge with a new bridge that improves hydraulic conditions and reduces flooding in this area. This mitigation action is included in TRFMA's 2023 Map Book. TRFMA may take a more active role in this mitigation action, similar to its role in the Virginia St Bridge Replacement Project (completed in 2016). Construction would be prioritized based on future opportunities to partner with other entities and leverage funding.												
FL-33, FL-34	Wells Ave Bridge Removal (Lake St Bridge to I-580 Reach)	Flooding	People/ Structures	TRFMA, City of Reno Public Works Department	City of Reno, RTC	TRFMA Flood Management Project Plan (2023 Map Book), the NRS 377B Infra-structure Tax Plan (administered by TRFMA) City of Reno CIP	Capital funds from City of Reno, grant funds, possibly some funds from TRFMA?	$1M	Would remove the obstruction (the old Wells Ave Bridge), thereby improving flow conveyance and reducing local breakout flooding.	Lifetime	3-5 years	Medium/Low (for TRFMA)
FL-33, FL-34 Description: This mitigation action now includes the removal of the existing Wells Ave Bridge (and any required bank stabilization and/or protection for the Wells Ave overpass), but not installation of a new pedestrian bridge. The goal is to improve hydraulic conditions and reduce flooding in this area because the old Wells Ave Bridge is so low over the river that it is an obstruction to flow. Previous plans included the installation of a pedestrian bridge to replace the Wells Ave Bridge. However, the property on the north bank of the river has changed ownership and because the Kuenzli St Bridge is only a few hundred feet upstream, TRFMA has determined that replacing the Wells Ave Bridge is not necessary.												

#	Project Title	Hazard Addressed	Vulnerability Addressed	Responsible Agency	Potential Partners	Mechanism(s) to Implement the Action	Potential Funding	Cost Estimate	Benefits	Project Useful Life	Timeframe	Priority
FL-35	Grand Sierra Resort Berm & Levee (Glendale Ave Bridge to Greg St Bridge)	Flooding	People/ Structures/ Economic Assets/ Communities	TRFMA	GSR,* City of Sparks, City of Reno, Washoe County CSD, Reno-Sparks Indian Colony	TRFMA Flood Management Project Plan (2023 Map Book), the NRS 377B Infra-structure Tax Plan (administered by TRFMA), and TRFMA's 5-Year CIP (FY2024–2025)	Existing TRFMA funds Possible funding or in-kind contribution from GSR, such as easements?	Cost for design assistance to GSR and construction dirt = $2.7 million (from TRFMA's FY2024–2025 CIP)	Would provide 100-yr flood protection for the GSR and surrounding area.	30 years	Planned construction: FY2026–2027 or FY2027–2028. 1-3 years	Medium
FL-35 Description: Construct an earthen berm and levee along the south bank of the Truckee River at the Grand Sierra Resort location (Glendale Ave Bridge to Greg St Bridge). The proposed upstream berm would consist of approximately 45,000 cubic yards of compacted material. The proposed downstream berm would consist of approximately 52,000 cubic yards of compacted material. The berms would be connected by a levee section approximately 350 feet long. This design concept is a shift from previous plans, which included a floodwall. The berms would be designed with gentle slopes that would allow better connections between the GSR and the river. This would also allow more options for use of the berm area (such as parking) during non-flooding conditions. TRFMA will coordinate with GSR to provide technical design support as GSR upgrades its property/infrastructure. Construction of the flood hazard mitigation elements will be dependent on when GSR moves forward with its upgrades.											
FL-36	TMWA* Levee (Glendale Ave Bridge to Greg St Bridge)	Flooding	People/ Structures/ Economic Assets/ Critical Facilities & Infra-structure	TRFMA	TMWA	TRFMA Flood Management Project Plan (2023 Map Book), the NRS 377B Infra-structure Tax Plan	Existing TRFMA funds Possible funding or in-kind contribution	Total for design, permit-ting, construction, and contingency = $5.7 million (from TRFMA's	Would provide 100-yr flood protection for TMWA's Glendale Water Treatment Plant and	30 years	Planned construction: FY2026–2027 or FY2027–2028. 1-3 years	Medium

#	Project Title	Hazard Addressed	Vulnerability Addressed	Responsible Agency	Potential Partners	Mechanism(s) to Implement the Action	Potential Funding	Cost Estimate	Benefits	Project Useful Life	Timeframe	Priority
						(administered by TRFMA), and TRFMA's 5-Year CIP (FY2024–2025)	from TMWA, such as site access/ easements, fencing?	FY2024–2025 CIP)	surrounding area.			
FL-36 Description: Construct a levee approximately 3,000 ft long along the north bank of the Truckee River with one portion set back from the riverbank (as space allows). The estimated cost is $4.5 million in 2021 dollars. TRFMA plans to work collaboratively with TMWA on site access, fencing, and security. This design concept is a shift from the previous (2016) version of the Flood Project plan, which included a floodwall.												
FL-37, FL-38	Reno-Tahoe Inter-national Airport Berm & Terracing (Greg St Bridge to Rock Blvd Bridge)	Flooding	People/ Structures/ Economic Assets/ Critical Facilities & Infra-structure/ Community Activities	TRFMA	RTAA,* City of Reno	TRFMA Flood Management Project Plan (2023 Map Book), the NRS 377B Infra-structure Tax Plan (administered by TRFMA), and TRFMA's 5-Year CIP (FY2024–2025)	Existing TRFMA project funds Possible funding or in-kind contribution from RTAA, such as easements?	Total for design, construction, and contingency = $6.1 million (from TRFMA's FY2024–2025 CIP)	Would provide 100-yr flood protection for the Reno-Tahoe International Airport and surrounding area.	30 years	Planned construction: FY2026–2027 or FY2027–2028. 1-3 years	Medium
FL-37, FL-38 Description: Excavate a floodplain terrace and construct an earthen berm along the south bank of the Truckee River near the airport (Greg St Bridge to Rock Blvd Bridge). The floodplain terrace would be revegetated with low-growing plant species because of airport safety regulations. The amount of fill material required for the berm would be approximately 90,000 cubic yards or less. If necessary, to												

#	Project Title	Hazard Addressed	Vulnerability Addressed	Responsible Agency	Potential Partners	Mechanism(s) to Implement the Action	Potential Funding	Cost Estimate	Benefits	Project Useful Life	Timeframe	Priority
alleviate a minor rise in water level because of the airport berm, construct a small berm on the north bank of the Truckee River. This design concept is a shift from earlier plans, which included a levee. A wide berm with a gentle slope is now the preferred alternative because a levee would be more of an obstacle to landing aircraft, and therefore a safety concern. Cost savings may be achieved by using spoil material from the Vista Narrows Floodplain Terracing Project.												
FL-40–43, FL-48	Mill/ McCarran Levees & Terracing (Rock Blvd Bridge to McCarran Blvd Bridge)	Flooding	People/ Structures/ Economic Assets/ Natural, Historic, and Cultural Resources/ Critical Facilities & Infra-structure/ Community Activities	TRFMA	WCEM, City of Reno, City of Sparks, USFWS,* NDOW*	TRFMA Flood Management Project Plan (2023 Map Book), the NRS 377B Infra-structure Tax Plan (administered by TRFMA), and TRFMA's 5-Year CIP (FY2024–2025)	Existing TRFMA project funds Possible grant funding through USBR, USFWS, FEMA	Property acquisition (~$6 million) + design, permit-ting, contingency (~$7.8 million) + construction of levees, terraces, channel realignment, eco-system restoration (~$32.2 million) =Total of $46.5 million (from TRFMA's FY2024–2025 CIP)	Would provide 100-yr flood protection for extensive industrial areas in the north and south, and for RTIA.* It would restore the Truckee River ecosystem, creating habitat for federally listed fish species and improving water quality (for example, TMDL* for temperature and dissolved oxygen). It would also	30 years	Currently in 60% design phase (June 2024). Planned construction FY2027–2028 or FY2028–2029 3-5 years	High

#	Project Title	Hazard Addressed	Vulnerability Addressed	Responsible Agency	Potential Partners	Mechanism(s) to Implement the Action	Potential Funding	Cost Estimate	Benefits	Project Useful Life	Timeframe	Priority
									provide the local community (and tourists) with open space/park amenities and various outdoor recreational opportunities.			
FL-40, FL-41, FL-42, FL-43, FL-48 Description: Between the Rock Blvd Bridge and the McCarran Blvd Bridge, relocate the Truckee River channel and increase its sinuosity, excavate floodplain terraces, and construct levees to reduce flood risk, restore the ecosystem, and enhance recreational opportunities. The updated conceptual design omits floodwalls and includes higher levees on both the north and south banks of the Truckee River and a lower "intermediate" levee on the south side. The intermediate levee would be designed to contain a 50-year flood event. Ecosystem restoration is proposed to improve instream and riparian habitats for fish and wildlife species. Recreational enhancements may include nature-based activities along the river corridor and improved river access and sports fields and park facilities on the south side between the intermediate levee and the outer, high levee. TRFMA has already invested more than $48 million to acquire 110 acres of land in this area (more than 1.2 miles of river frontage on the south bank of the river). Implementation of this Flood Project element will significantly reduce flood risk in the north and south industrial areas and the airport.												
FL-44	UNR Main Station Field Lab (UNR Farm) Levee	Flooding	People/ Structures/ Economic Assets/ Natural, Historic, and Cultural Resources/ Community Activities	TRFMA	UNR	Project Plan (2023 Map Book), the NRS 377B Infra-structure Tax Plan (administered by TRFMA), and TRFMA's 5-Year	Existing TRFMA project funds	Total cost estimated at $900,000(from TRFMA's FY2024–2025 CIP, March 2024 staff report)	Would protect existing structures (such as Wolf Pack Meats) at UNR Farm from flood damage.	30 years	3-5 years	Low

#	Project Title	Hazard Addressed	Vulnerability Addressed	Responsible Agency	Potential Partners	Mechanism(s) to Implement the Action	Potential Funding	Cost Estimate	Benefits	Project Useful Life	Timeframe	Priority
						CIP (FY2024–2025)						
FL-44 Description: Construct a small levee or berm to protect existing structures from flooding. This is currently the preferred solution based on the most recent modeling results.												
FL-45	North Bank Levee & Floodwall (McCarran Blvd Bridge to east edge of Sparks Industrial Area at Vista)	Flooding	People/ Structures/ Economic Assets/ Critical Facilities & Infra-structure/ Community Activities	TRFMA	City of Sparks, Washoe County CSD	TRFMA Flood Management Project Plan (2023 Map Book), the NRS 377B Infra-structure Tax Plan (administered by TRFMA), and TRFMA's 5-Year CIP (FY2024–2025)	Existing TRFMA project funds	Estimate for design, construction, and contingency = $48.8 million (includes an estimate for inflation until actual construction) (from TRFMA's FY2024–2025 CIP)	Would provide 100-yr flood protection for the Sparks Industrial Area, a warehousing and manufacturing district that is significant to the region's economic growth and stability.	30 years	Planned construction: FY2029–2030 and FY2030–2031. Note: construction may be split into smaller projects that are prioritized based on what sections are most vulnerable. 3-5 years	High
FL-45 Description: Construct a levee and floodwall (where necessary) on the north bank of the Truckee River from the McCarran Blvd Bridge to the eastern edge of the Sparks Industrial Area at Vista. This section of levee and floodwall is approximately 3.2 miles long. Previous conceptual plans included mostly floodwalls. The latest plan prioritizes levee construction to reduce costs, avoid seepage problems, and allow for recreational trail access on the levee crown (for example, a bike path). This portion of the Flood Project requires additional study to refine designs and cost estimates. Note that this reach includes the North Truckee Drain Realignment Project, a flood hazard mitigation project partially funded by TRFMA and completed in 2018 (refer to past plans or visit trfma.org for more information).												

#	Project Title	Hazard Addressed	Vulnerability Addressed	Responsible Agency	Potential Partners	Mechanism(s) to Implement the Action	Potential Funding	Cost Estimate	Benefits	Project Useful Life	Timeframe	Priority
FL-46	Vista Narrows Floodplain Terracing (East Sparks to Truckee River canyon down-stream location near the first railroad bridge)	Flooding	People/ Structures/ Economic Assets/ Natural, Historic, and Cultural Resources/ Critical Facilities & Infra-structure/ Community Activities	TRFMA	Needs further investigation	TRFMA Flood Management Project Plan (2023 Map Book), the NRS 377B Infra-structure Tax Plan (administered by TRFMA), and TRFMA's 5-Year CIP (FY2024–2025)	Existing TRFMA project funds	Total for design, permitting, terrace construction, eco-system restoration, construction management and contingency = $43.7 million (This estimate is valid as of March 2024. Inflation until construction may increase the total cost to ~$46.5 million) (from TRFMA's FY2024–2025 CIP)	This action is the key element of the Flood Project because it allows floodwaters to be quickly and effectively conveyed from the Truckee Meadows. The overall functionality of the Flood Project relies on the Vista Narrows element. Would improve hydraulic conditions, reduce flooding, and restore the Truckee River ecosystem, creating	30 years	Currently in permitting phase at 65% design (July 2024). Start of construction: FY2025–2026, if possible. 1-3 years	High

#	Project Title	Hazard Addressed	Vulnerability Addressed	Responsible Agency	Potential Partners	Mechanism(s) to Implement the Action	Potential Funding	Cost Estimate	Benefits	Project Useful Life	Timeframe	Priority
									approximately 13 acres of wetlands.			
FL-46 Description: Construct three floodplain terraces along the Truckee River from a location east of Sparks (Vista Narrows) downstream in the Truckee River canyon to a location near the first railroad bridge. This Flood Project element is designed to reconnect the Truckee River to a restored floodplain, thereby reducing flood risk and improving the riverine and riparian ecosystems. The Vista Narrows project is the key element of the entire Flood Project because it lowers flood water levels caused by flood risk reduction elements upstream in the Truckee Meadows reach. By constructing the floodplain terraces at Vista Narrows, the rest of the Flood Project can be implemented while avoiding the need for costly mitigation measures in South Reno. Approximately 450,000 cubic yards of material would be excavated to create the floodplain terraces, at an estimated construction cost of $32.6 million in 2024 dollars (note that the total cost estimate above includes additional costs for design, permitting, construction management, and inflation). The Vista Narrows project does increase peak flows downstream by approximately 2,400 cfs. TRFMA is working with downstream stakeholders to mitigate the increased flows.											
FL-47, FL-49	Voluntary Home Elevation Program for Eastside Subdivision, Rosewood Lakes, and Hidden Valley Estates	Flooding	People/ Structures	TRFMA	Washoe County, FEMA, State of Nevada	TRFMA Flood Management Project Plan (2023 Map Book), the NRS 377B Infra-structure Tax Plan (administered by TRFMA), and TRFMA's 5-Year CIP (FY2024–2025)	Existing TRFMA project funds, FEMA grant funds	Less than $240,000 annually. Total program cost = $1.35 million (from TRFMA's FY2024–2025 CIP)	This program reduces flood damage for individual home-owners in high flood risk areas.	30 years	Ongoing; scheduled to end after FY2026–2027. 1-3 years	Low

#	Project Title	Hazard Addressed	Vulnerability Addressed	Responsible Agency	Potential Partners	Mechanism(s) to Implement the Action	Potential Funding	Cost Estimate	Benefits	Project Useful Life	Timeframe	Priority
FL-47, FL-49 Description: The voluntary home elevation program is active for certain eligible homes in the Eastside Subdivision, Rosewood Lakes, and Hidden Valley Estates areas. Four homes have been elevated since the program's inception in 2011. The program has experienced delays in receiving grant funding and difficulties finding qualified engineers and subcontractors to perform the work. The program is ongoing but not a high priority for TRFMA.												
FL-51	Rainbow Bend Hydraulic Mitigation Project	Flooding	People/ Structures	TRFMA	Storey County, Rainbow Bend Home Owners Association	TRFMA Flood Management Project Plan (2023 Map Book), the NRS 377B Infra-structure Tax Plan (administered by TRFMA), and TRFMA's 5-Year CIP (FY2024–2025)	TRFMA existing project funds	Total cost estimated at $825,000 (from TRFMA's FY2024–2025 CIP)	Effectively mitigates the increased flows from Flood Project construction upstream and alleviates nuisance flooding in the streets at Rainbow Bend.	30 years	Planned construction: FY2025–2026 through FY2027–2028. 1-3 years	Medium
FL-51 Description: Construct a small floodwall or berm to alleviate nuisance flooding in the streets at Rainbow Bend. After performing a detailed hydraulic analysis and studying several alternatives, TRFMA determined that constructing a small decorative wall or berm would effectively mitigate the increased flows from Flood Project construction upstream. At this time, no home elevation projects are expected.												
FL-52	Wadsworth Pedestrian Bridge Replacement Project	Flooding	People/ Structures/ Critical Facilities & Infrastructure/	TRFMA	Washoe County CSD, Pyramid Lake Paiute Tribe	TRFMA Flood Management Project Plan (2023 Map Book), the NRS 377B	Existing TRFMA project funds	Total cost estimated at $1.8 million (from TRFMA's FY2024–2025 CIP)	Effectively mitigates increased flows caused by the Flood Project construction	30 years	Planned construction: FY2024–2025. 1 year	High

#	Project Title	Hazard Addressed	Vulnerability Addressed	Responsible Agency	Potential Partners	Mechanism(s) to Implement the Action	Potential Funding	Cost Estimate	Benefits	Project Useful Life	Timeframe	Priority
			Community Activities			Infrastructure Tax Plan (administered by TRFMA), and TRFMA's 5-Year CIP (FY2024–2025)			upstream. It would also improve the safety of residents who cross the bridge to attend school/work.			

FL-52 Description: Replace existing pedestrian bridge at Wadsworth, NV, to effectively mitigate increased flows caused by Flood Project construction upstream.

*Note: CFS = Cubic Feet per Second, CIP = Capital Improvement Plan, CSD = Community Services District, CTWCD = Carson–Truckee Water Conservancy District, EMPG = Emergency Management Preparedness Grant, FEMA = Federal Emergency Management Agency, FY = Fiscal Year, GSR = Grand Sierra Resort, NDOT = Nevada Department of Transportation, NDOW = Nevada Department of Wildlife, NRS = Nevada Revised Statutes, PLPT = Pyramid Lake Paiute Tribe, RSIC = Reno-Sparks Indian Colony, RTAA = Reno-Tahoe Airport Authority, RTC = Regional Transportation Commission, RTIA = Reno–Tahoe International Authority, SERC = State Emergency Response Commission; TMWA = Truckee Meadows Water Authority, TMDL = Total maximum daily load, TRFMA = Truckee River Flood Management Authority, UNR = University of Nevada, Reno, USBR = United States Bureau of Reclamation, USFWS = United States Fish and Wildlife Service, WCEM = Washoe County Emergency Management

THIS PAGE INTENTIONALLY LEFT BLANK

Prioritizing Mitigation Actions

Once TRFMA's mitigation actions were identified, they were evaluated and prioritized to identify the most suitable actions. The actions were prioritized based on FEMA's Social, Technical, Administrative, Political, Legal, Economic, and Environmental (STAPLEE) criteria listed below.

- **S – Social:** The public must support the overall mitigation implementation strategy and specific mitigation actions. Consider, will the action disrupt housing or cause the relocation of people? Will the proposed action adversely affect one segment of the population? Is the action compatible with present and future community/agency values?
- **T – Technical:** It is important to determine if the proposed action is technically feasible, will help reduce losses in the long term, and has minimal secondary impacts. How effective is the action in avoiding or reducing future losses? Does the action solve the problem or only a symptom? Will the action create more problems than it solves? Consider the root cause of the issue at hand to determine whether the action is a whole or partial solution, or not a solution at all.
- **A – Administrative:** This category examines the expected staffing, funding, time, and maintenance requirements for the mitigation action to determine if the jurisdiction/special district has the personnel and administrative capabilities to implement the action or whether outside help will be necessary. Consider, a) Staffing (enough staff and training): does the jurisdiction/special district have the capability (staff, technical experts) to implement the action? b) Funding allocated: does the jurisdiction/special district have the funding to implement the action or can it readily be obtained? c) Time: can it be accomplished in a timely manner? d) Maintenance/Operations: can the jurisdiction/special district provide the necessary maintenance? It is important to remember that most federal grants will not provide funding for maintenance.
- **P – Political:** This considers the level of political support for the mitigation action. Is there political support to implement and maintain this action? Have political leaders participated in the planning process so far? Is there a local champion willing to help see the action to completion? Is there enough public support to ensure that the success of the action? Have all stakeholders been offered an opportunity to participate in the planning process?
- **L – Legal:** The jurisdiction/special district must have the legal authority to implement the action or consider what new laws or regulations would be needed to carry out the mitigation action. Evaluate, are the proper laws, ordinances, and resolutions in place to implement the action? Are there any potential legal consequences? Is the action likely to be challenged by stakeholders who may be negatively affected?
- **E – Economic:** Economic considerations must include evaluation of the present economic base and projected growth. Cost-effective mitigation actions that can be funded in current or upcoming budget cycles are more likely to be implemented than actions requiring

general obligation bonds or other instruments that would incur long-term debt in a jurisdiction/special district. Consider benefits and costs at a planning level. A detailed benefit-cost analysis will be performed as project-specific funding becomes available. What financial benefits will the action provide? Does the cost seem reasonable for the size of the problem and the likely benefits? What burden will be placed on the tax base or local economy to implement this action? Does the action contribute to community economic goals, such as capital improvements or economic development? Are there currently sources of funding that can be used to implement the action?

- **E – Environmental:** The impact on the environment is an important consideration because of public desire for sustainable and environmentally healthy communities. Also, statutory considerations, such as the National Environmental Policy Act (NEPA), have to be kept in mind when using federal funds. How will this action impact land/water? Impact on endangered species: how will this action impact endangered species? How will this action impact hazardous materials and waste sites? Is this action consistent with community environmental goals? Is the action consistent with federal laws, such as the National Environmental Policy Act (NEPA)?

The actions were also assigned a prioritization category of low, medium, or high, based on the following definitions:

- **Low:** Based on one to two STAPLEE criteria, the action is feasible and important, with multiple potential challenges. The action should be implemented as funding becomes available.
- **Medium**: Based on three to four STAPLEE criteria, the action is feasible and important, with some potential challenges. Its implementation is not as urgent as a high priority action item and can be implemented over time.
- **High**: Based on five or more STAPLEE criteria, the action is feasible and important, with minimal to no concerns. It is very important to the jurisdiction to implement and may be prioritized in the short term.

Table 303: Priorities of Mitigation Actions for TRFMA

Action #	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Total STAPLEE Score	Priority
FL-2	3	4	4	4	4	3	4	26	High

Action #	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Total STAPLEE Score	Priority
FL-20, FL-21	2	2	2	2	3	2	2	15	Medium/ Low (for TRFMA)
FL-29	2	2	2	2	3	2	2	15	Low
FL-30	Discuss with RTC*	Discuss with RTC	Discuss with RTC	Discuss with RTC	Discuss with RTC	Discuss with RTC	Discuss with RTC	Discuss with RTC	Discuss with RTC
FL-31	1	2	2	2	3	1	2	13	Low
FL-32	1	2	2	2	3	1	2	13	Medium/ Low
FL-33, FL-34	2	2	2	2	3	2	2	15	Medium/ Low
FL-35	2	4	4	3	3	4	3	23	Medium
FL-36	3	4	4	3	3	3	3	23	Medium
FL-37, FL-38	2	4	4	2	3	2	2	19	Medium
FL-40, FL-41, FL-42, FL-43, FL-48	4	4	4	4	3	4	4	27	High
FL-44	2	4	4	1	3	3	1	18	Low
FL-45	3	4	4	4	3	4	3	25	High
FL-46	4	4	4	4	3	4	4	27	High

Action #	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Total STAPLEE Score	Priority
FL-47, FL-49	3	3	4	3	3	3	4	23	Low
FL-51	3	4	4	4	3	3	3	24	Medium
FL-52	4	4	4	4	3	4	3	26	High

* Note: RTC = Regional Transportation Commission