

CLARK COUNTY
2018 MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

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ACRONYMS AND ABBREVIATIONS

ARAR	Aquifer Recharge and Recovery
ASR	aquifer storage and recovery
BEBB	Banded Elm Bark Beetle
CCSD	Clark County School District
CDC	Centers for Disease Control and Prevention
CFR	Code of Federal Regulations
CO ₂	carbon dioxide
County	Clark County
CPG	Comprehensive Preparedness Guide
CRS	Community Rating System
DEM	Department of Emergency Management
DETR	Department of Employment, Training, and Rehabilitation
DMA	Disaster Mitigation Act
EEBB	European elm bark beetle
°F	degrees Fahrenheit
FEMA	Federal Emergency Management Agency
HMP	Hazard Mitigation Plan
IDF	Inflow Design Flood
IPCC	Intergovernmental Panel on Climate Change
M	Magnitude
NDWR	Nevada Division of Water Resources
NFIP	National Flood Insurance Program
NIPP	National Infrastructure Protection Plan
OEM	Office of Emergency Management
PGA	Peak Ground Acceleration
POC	Point-of-Contact
RL	Repetitive Loss
SFHA	Special Flood Hazard Areas
SRL	Severe Repetitive Loss
THIRA	Threat and Hazard Identification and Risk Assessment
UNLV CBER	University of Nevada, Las Vegas Center for Business and Economic Research
UNR	University of Nevada, Reno
URM	Unreinforced Masonry
U.S.	United States
USC	United States Code

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USFA	United States Fire Administration
U.S. HUD	United States Department of Housing and Urban Development

1 INTRODUCTION

1.1 HAZARD MITIGATION PLANNING

As defined in Title 44 of the Code of Federal Regulations (CFR), Subpart M, Section 206.401, hazard mitigation is “any action taken to reduce or eliminate the long-term risk to human life and property from natural hazards.” As such, hazard mitigation is any work to minimize the impacts of any type of hazard event before it occurs. Hazard mitigation aims to reduce losses from future disasters. It is a process in which hazards are identified and profiled, the people and facilities at risk are analyzed, and mitigation actions to reduce or eliminate hazard risk are developed. The implementation of the mitigation actions, which include short and long-term strategies that may involve planning, policy changes, programs, projects, and other activities, is the end result of this process.

In recent years, local hazard mitigation planning has been driven by a federal law, known as the Disaster Mitigation Act of 2000 (DMA 2000). On October 30, 2000, Congress passed the DMA 2000 (Public Law 106-390), which amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988 (Stafford Act) (Title 42 of the United States Code [USC] Section 5121 et seq.) by repealing the act’s previous mitigation planning section (409) and replacing it with a new mitigation planning section (322). This new section emphasized the need for state, tribal, and local entities to closely coordinate mitigation planning and implementation efforts. This new section also provided the legal basis for the Federal Emergency Management Agency’s (FEMA’s) mitigation plan requirements for the Hazard Mitigation Assistance grant programs.

1.2 2018 HMP SYNOPSIS

To meet the requirements of the DMA 2000, Clark County (the County) has prepared a Multi-jurisdictional Hazard Mitigation Plan (HMP; hereinafter referred to as the 2018 HMP) to assess risks posed by natural and human-caused hazards and to develop mitigation action plans for reducing the risks in Clark County, Nevada. The 2018 HMP replaces the HMP that the County prepared in 2012. The following jurisdictions are included in the 2018 HMP: Unincorporated Clark County, city of Boulder City, city of Henderson, city of Las Vegas, city of Mesquite, city of North Las Vegas, Clark County School District (CCSD), and the Clark County Water Reclamation District (CCWRD). The 2018 HMP also includes tribal annexes for the Las Vegas Paiute Tribe and the Moapa Band of Paiutes.

The 2018 HMP is organized to follow FEMA’s Local Mitigation Plan Review Tool (April 2017) which demonstrates how local HMPs meet the DMA 2000 regulations. As such, specific planning elements of this review tool are in their appropriate plan sections. Jurisdiction-specific information, including a vulnerability analysis and mitigation strategy, is located in Appendices F-M. A full list of chapter and appendix titles can be found in the table of contents. The tribal annexes are included as Annex A and Annex B. These annexes address the forthcoming (2018) Tribal Mitigation Plan Review Tool.

1.3 CLARK COUNTY GEOGRAPHIC PROFILE

Clark County is on the southernmost tip of the state of Nevada and shares borders with Nye County and Lincoln County in Nevada. Interstate neighbors are California and Arizona. The majority of the County’s metropolitan area is located in the valley (Las Vegas Valley), surrounded by several mountain ranges. Clark County is approximately 270 miles northeast of Los Angeles, CA and 280 miles northwest of Phoenix, AZ. The County covers an area of 8,061 square miles, approximately 169 square miles of which are covered by water and the remaining 7,891 square miles are covered by land.

The majority of the population, an estimated 2,205,207 (2016) is located in the Las Vegas Valley, with the area being made up of unincorporated Clark County, city of Las Vegas, city of North Las Vegas, and city

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of Henderson. The city of Boulder City and the city of Mesquite are municipalities outside the valley. There are 33 relatively small unincorporated communities and census-designated places in Clark County. The unincorporated communities include: Arden; Cactus Springs; Cottonwood Cove; Coyote Springs; Glendale; Jean, Logandale; Mountain Springs; Nelson; Overton; Primm; Sloan; and Sutor. Census-designated places include: Blue Diamond; Bunkerville; Cal-Nev-Ari; Crystal; Enterprise; Fort Mojave Indian Reservation (part); Goodsprings; Indian Springs; Laughlin; Moapa Town; Moapa Valley; Mount Charleston; Paradise; Sandy Valley; Searchlight; Spring Valley; Summerlin South; Sunrise Manor; Whitney; and Winchester. The Las Vegas Paiute Tribe and the Moapa Band of Paiutes make up the two tribes in Clark County.

2 PLANNING PROCESS

Section 2 – Planning Process addresses Elements A and D of the Local Mitigation Plan Regulation Checklist.

Regulation Checklist – 44 CFR 201.6 Local Mitigation Plans
Element A: Planning Process
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1)) A2. Does the Plan document an opportunity for neighboring communities, local 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? (Requirement §201.6(b)(2)) A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1)) A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3)) A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii)) A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))

Regulation Checklist – 44 CFR 201.6 Local Mitigation Plans
Element D: Plan Review, Evaluation and Implementation
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3)) D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3)) D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))

2.1 OVERVIEW OF 2018 HMP PLANNING PROCESS

The Clark County Point-of-Contact (POC) led the plan update process. The process started in 2016 and consisted of the following:

- **Tabletop Exercise:** On February 24, 2016, the fourth year of the 2012 HMP, the Clark County POC invited the Multi-Agency Work Group (**Table 2-1**) and other County agencies to kick-off the 2018 HMP update process by participating in a tabletop exercise. During this exercise, participants completed the Annual Review Worksheet to determine which sections of the 2012 HMP warranted updates and which did not. In addition, the Multi-Agency Work Group completed Mitigation Progress Project Reports to determine mitigation actions implemented to date. An After Action Report for this exercise is confidential and kept on file with the Clark County POC.
- **Multi-Agency Work Group Meetings:** The Clark County POC held Multi-Agency Work Group meetings for the 2018 HMP on the following dates: September 14, 2017; October 23, 2017; and February 5, 2018. Agendas for these meetings can be found in Appendix C. For those that could not attend the meetings, the Clark County POC followed up via email or phone call.

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- Clark County POC – Consultant Meetings: The Clark County POC met directly with the consultant three times during the update process: September 29, 2017 to discuss GIS data; October 13, 2017 to formalize the new plan format, discuss the tribal annexes, create a work plan, and craft public and stakeholder notifications; and January 22, 2018 to document the planning process.
- Drafts: The Clark County POC and consultant presented the initial draft 2018 HMP to the Multi-Agency Work Group on February 5, 2018. Shortly after, the draft was be available for public and stakeholder input over a two week period from February 12 – 26, 2018. Based on comments and input received to date, the draft was updated and presented to the Clark County Commission for adoption on February 20, 2018 and then sent to the Nevada DEM and FEMA Region IX for approval. The initial tribal annexes followed a similar drafting process in March 2018.

Table 2-1. Multi-Agency Work Group

Jurisdiction	Representative's Name and Department / Agency
Unincorporated Clark County	Irene Navis / Office of Emergency Management
City of Boulder City	Kevin Nicholson/Boulder City Fire Department
City of Henderson	Jeremy Hynds/City of Henderson Fire Department
City of Las Vegas	Chad Rogers/City of Las Vegas Emergency Management
City of Mesquite	Rick Resnick/City of Mesquite Fire Department
City of North Las Vegas	Solome Barton/City of North Las Vegas Emergency Management
Clark County School District	Roy Anderson/CCSD, Emergency Management
Clark County Water Reclamation District	Dennis Wilson, CCWRD
Southern Nevada Health District	Misty Robinson, Southern Nevada Health District, Preparedness
Las Vegas Paiute Tribe	Harriet Parker, Las Vegas Paiute Tribe
Moapa Band of Paiutes	Troy Hatch, Tribal Police Department

2.2 PLAN REVIEW, EVALUATION AND IMPLEMENTATION

As noted above, the Clark County POC and consultant created the 2018 HMP work plan after reviewing the 2012 HMP and 2016 Tabletop Exercise After Action Report. **Table 2-2** shows a summary of this review and the recommendation process. As shown in this table, the 2018 HMP was streamlined and reorganized to follow the FEMA's updated Local Mitigation Review Tool. Separate tribal annexes were created for the Las Vegas Paiute Tribe and the Moapa Band of Paiutes.

As part of the plan update, particular attention was paid to revising the plan to reflect:

- Changes in development: Section 4.2 (Summary of Impacts) was updated to show the changes in population and residential buildings within the hazard areas over the five-year planning period. Overall land data as well as land within hazard areas was included in Section 4.2 of the 2018 HMP to track changes in land use over the next five-year planning period.
- Progress in local mitigation efforts: The "Recent Hazard Mitigation Projects and Programs" tables within the jurisdiction-specific appendices and tribal annexes were updated to show progress made in local mitigation efforts over the five-year planning period.

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- Revised mitigation action priorities: Section 5.5 (Mitigation Action Plans) was updated to better align with existing regional planning priorities as well as project priorities addressed in the current FEMA grant program guidance.

Table 2-2. 2018 HMP Work Plan

2012 HMP	Actions to Take for 2018 HMP
General – Formatting	Reorganize to follow FEMA’s Local Mitigation Plan Review Tool (2017) Create/Update the Tribal Appendices to follow the current (2010) Tribal Multi-Hazard Mitigation Plan Review Crosswalk as well as the forthcoming (2018) Tribal Mitigation Plan Review Tool
Section 1: Introduction	Delete grant programs descriptions, jurisdiction-specific community profiles
Section 2: Prerequisites	Delete Prerequisites Section, create Section 6: Plan Adoption
Section 3: Planning Process	Update as Section 2 Update: timeline; Multi-Agency Work Group members; Summary of Initial Update Findings table (and rename 2018 HMP Work Plan); stakeholder involvement; public outreach; incorporation of plans and other relevant information
Section 4: Hazard Analysis	Update as Section 3 Include climate change, delete utility failure, update all hazards
Section 5: Vulnerability Analysis	Update as Section 4 Use 2016 Clark County Comprehensive Planning residential and building information. Discuss changes in development within Summary of Impacts. Include land (square miles) in vulnerability analysis Update flood loss information
Section 6: Capability Assessment	Delete as a separate section and address within Section 5: Mitigation Strategy Update capability assessment tables, include mitigation actions completed between 2012 – 2017 to document progress made in local mitigation efforts
Section 7: Mitigation Strategy	Update as Section 5 Update goals to reflect resiliency focus Update master list of potential mitigation actions to include: actions similar to FEMA success stories, best management practices and job aids; local and regional studies recommendations; and input from pertinent local government departments and agencies Revise prioritization process to be more closely aligned with local/regional capital improvement prioritization criteria and 2017 FEMA grant requirements Develop new jurisdiction-specific and tribal mitigation action plans Streamline implementation of mitigation strategies
Appendices	Update appendices to reflect changes to main document
Annexes	Update/create annexes for the Las Vegas Paiute Tribe and the Moapa Band of Paiutes

2.3 REVIEW AND INCORPORATION OF EXISTING PLANS AND REPORTS

The Clark County POC and consultant also reviewed existing relevant information to include in the 2018 HMP. **Table 2-3** shows a summary of this review process, including information to be incorporated into the 2018 HMP.

Table 2-3. Review and Incorporation of Existing Plans and Reports

Plans and Reports	Information to be Incorporated into the 2018 HMP
Clark County Capital Improvement Program (2017 – 2021)	The CIP project priority rating system into the HMP’s mitigation action plan prioritization process.
Clark County Comprehensive Master Plan (2017)	Hazard summary information into the HMP hazard analysis section.
Clark County Emergency Management Plan – Basic Plan (2011)	All hazards summary information, specifically extent/magnitude, into the HMP hazard analysis section.
Clark County Local Emergency Planning Committee – Hazardous Materials Emergency Response Plan (2013)	Hazardous material information into the HMP hazardous materials profile section.
Clark County Regional Flood Control District Master Plan (2016)	Flood hazard information into the HMP flood profile
Las Vegas Master Plan 20/20 – Safety and Seismic Safety Element (2010)	Seismic hazard information into the HMP earthquake profile section.
State of Nevada Enhanced Hazard Mitigation Plan (2013)	All hazards information into the HMP hazard analysis section.
State of Nevada and Las Vegas Urban Area THIRA and SPR Report (2016)	Threat and hazard assessment information into the HMP hazard analysis section. Incorporate the report’s outcome statements into the HMP’s list of potential mitigation actions.
Southern Nevada Water Authority Water Resource Plan (2017)	Drought information into the HMP drought hazard profile.

2.4 PUBLIC INVOLVEMENT AND CONTINUED PUBLIC INVOLVEMENT

Public involvement and stakeholder opportunities were delayed due to the October 1, 2017 mass shooting in Las Vegas. On January 23, 2018, the Clark County Office of Public Communications issued a press release notifying the public of the 2018 plan update. The County invited the public to review the existing plan on the Clark County Office of Emergency Management (OEM) website and provided contact information to send comments, questions or concerns. The Clark County Office of Public Communication issued a second press release in early February 2018 for the public to review and provide input on the initial draft plan. The Las Vegas Sun interviewed the Clark County POC about the 2018 HMP. The Las Vegas Sun published an article about the 2018 HMP and the inclusion of climate change as a hazard on January 31, 2018. On February 15, 2018, Emergency Management Magazine also included a similar article about the 2018 HMP on its website and Facebook page. All public outreach documentation is included in Appendix D.

Similar to the 2012 HMP continued public involvement process, a copy of the final draft 2018 HMP is located on the Clark County OEM website (<http://www.clarkcountynv.gov/fire/oem/Pages/2018-Hazard-Mitigation-Draft-Plan-Coming-Soon.aspx>). The website includes contact information for comments and questions.

2.5 OPPORTUNITIES FOR STAKEHOLDERS

In January 30, 2018, the Clark County POC notified stakeholders of the ongoing plan update process and invited them to participate in the planning process. The following stakeholders were notified of the 2018 HMP via email: the American Red Cross of Southern Nevada; Southern Nevada Emergency Response Team; Southern Nevada Regional Planning Coalition; Southern Nevada Strong; Lincoln County, NV Emergency Management Office; Nye County, NV Department of Emergency Management; Mojave County, AZ Division of Emergency Management; Clark County Comprehensive Planning; Inter-Tribal Council of Nevada (a nonprofit organization that serves the member reservations and colonies of Nevada); Southwest Gas; NV Energy; and the Las Vegas Valley Water District. A copy of the email notification is located in Appendix D. On February 13, 2018, the Clark County POC notified the stakeholders to review and provide input on the initial draft plan. All stakeholder documentation is included in Appendix D.

2.6 PLAN UPDATE METHOD AND SCHEDULE

Between 2013 and 2016 the Clark County HMP POC held an annual Tabletop Exercise to review the 2012 HMP. During each exercise, the Multi-Agency Work Group members were asked to complete the Annual Review Worksheet and Mitigation Progress Project Reports, if applicable. For the 2018 HMP, the plan update method and schedule has been streamlined to include an upgraded Annual Review Worksheet and Mitigation Progress Project Report and only one Tabletop Exercise during the 5-year planning period:

- **Annual Review Worksheets:** Every 12 months from plan adoption, the Clark County POC will email each member of the Multi-Agency Work Group an Annual Review Worksheet to complete. As shown in Appendix E, the Annual Review Worksheet has been revised to reflect the 2017 Local Mitigation Plan Review Tool and 2018 Tribal Mitigation Plan Review Tool and includes the following: planning process, hazard analysis, vulnerability analysis, and mitigation strategy. Each member of the Multi-Agency Work Group will email completed worksheets back to the Clark County POC to review. The Clark County POC will summarize these findings and email them out to the Multi-Agency Work Group. If the Clark County POC believes that the 2018 HMP needs to be updated based on the findings, then a request will be made to the Multi-Agency Work Group to attend a formal HMP update meeting.
- **Mitigation Progress Project Reports:** Mitigation actions will be monitored and updated through the use of the Mitigation Project Progress Report. During each annual review, each department or agency currently administering a mitigation project will submit a progress report to the Clark County POC. For projects that are being funded by a FEMA mitigation grant, FEMA quarterly reports may be used as the preferred reporting tool. As shown in Appendix E, the progress report will discuss the current status of the mitigation project, including any changes made to the project, identify implementation problems, and describe appropriate strategies to overcome them.
- **Tabletop Exercise:** On the fourth year of the update, the Clark County POC will lead a tabletop exercise with the Multi-Agency Work Group to: research funding available to assist in HMP update (and apply for funds that may take up to one year to obtain); collect the Annual Review Worksheet and any Mitigation Project Progress Reports and FEMA quarterly reports; develop a new work plan; and begin the plan update process.

3 HAZARD ANALYSIS

Section 3 – Hazard Analysis addresses Element B of the Local Mitigation Plan Regulation Checklist.

Regulation Checklist – 44 CFR 201.6 Local Mitigation Plans
Element B: Hazard Identification and Risk Assessment
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement § 201.6(c)(2)(ii))
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement § 201.6(c)(2)(i))

3.1 HAZARD IDENTIFICATION

For the 2018 HMP, the Clark County POC, Multi-Agency Work Group and consultant revisited the hazards addressed in the 2012 HMP and also reviewed the hazards addressed in the 2016 Clark County Threat and Hazard Identification and Risk Assessment (THIRA). They determined that these hazards are still threats to the County and should continue to be addressed in the 2018 HMP. However, the decided that utility failure was more of a secondary hazard and would be better addressed as a vulnerable asset within the vulnerability analysis and mitigation strategy of the 2018 HMP. In addition, the group decided that climate change should be included in the plan based on recent disaster declarations and increasing hazard impacts.

The following hazards, including all natural hazards that may affect Clark County, are profiled in the 2018 HMP. General descriptions of these hazards are listed in Section 3.2.

- Climate Change
- Dam Failure
- Drought
- Earthquake
- Flood
- Hazardous Materials
- Infectious Disease
- Infestation
- Subsidence and Fissures
- Terrorism
- Wildfire

3.2 HAZARD PROFILES

Hazard profiling consists of describing the nature of the hazard, disaster history, location of hazard, extent/severity, and probability of future events. Hazard profiles have been developed for each of the 11 hazards addressed in **Tables 3-1 through 3-11**.

According to the *Comprehensive Preparedness Guide (CPG) 201: Threat and Hazard Identification and Risk Assessment Guide—Second Edition (CPG 201)* drought, earthquake, flood, and wildfire are classified natural hazards while dam failure and hazardous materials releases are classified as a technological hazards and violence/attacks are classified as a human-caused hazard. CPG 201 does not classify climate change, subsidence/fissures or infestation. As such, the hazards profiled for this HMP are discussed in alphabetical order and not by CPG 201 classification. The order does not signify level of risk.

Table 3-1. Climate Change

Profile	Description
Nature	Climate is defined as the average statistics of weather, which includes temperature, precipitation, and seasonal patterns in a particular region. Climate change refers to the long term and irrevocable shift in these weather related patterns, either regionally or more globally. The Earth and its natural ecosystem are very closely tied to the climate and any permanent climate change will lead to an imbalance in the existing ecosystem, impacting the way people live, the food they grow, their health, the wildlife, the availability of water and many more. Research indicates that much of this warming is due to human activities, primarily burning fossil fuels and clearing forests, that release carbon dioxide (CO₂) and other gases into the atmosphere, trapping in heat that would otherwise escape into space. Once in the atmosphere, these heat-trapping emissions remain there for many years—CO₂, for example, lasts about 100 years. If left unchecked, by the end of the century, CO₂ concentrations could reach levels three times higher than pre-industrial times. According to most climatologists, the planet is starting to experience shifts in climate patterns and increased frequency of extreme weather events at both the global and local levels. Over the next century, increasing atmospheric greenhouse gas concentrations are expected to cause a variety of changes to local climate conditions, including sea level rise and storm surge in coastal areas, reduced mountain snow pack, increased riverine flooding throughout the County, and more frequent, higher temperatures (leading to extreme heat events and wildfires), particularly inland, decreasing air quality, and extended periods of drought. These effects of climate change are expected to negatively impact water and electricity demand and supplies in Clark County; decreasing air quality and extreme heat days will degrade public health; increasing wildfire risks; and contributing to the decline of the County’s agricultural industry.
Location	According to the National Climate Assessment the entire Southwest region, including Clark County, has been affected by climate change.

Table 3-1. Climate Change

Profile	Description
History	The history of the scientific discovery of climate change began in the early 19th century when ice ages and other natural changes in paleoclimate were first suspected and the natural greenhouse effect first identified. In the late 19th century, scientists first argued that human emissions of greenhouse gases could change the climate. Many other theories of climate change were advanced, involving forces from volcanism to solar variation. In the 1960s, the warming effect of carbon dioxide gas became increasingly convincing, although some scientists also pointed out that human activities, in the form of atmospheric aerosols (e.g., "pollution"), could have cooling effects as well. During the 1970s, scientific opinion increasingly favored the warming viewpoint. By the 1990s, as a result of improving fidelity of computer models and observational work confirming the Milankovitch theory of the ice ages, a consensus position formed: greenhouse gases were deeply involved in most climate changes, and human emissions were bringing serious global warming. Since the 1990s, scientific research on climate change has included multiple disciplines and has expanded, significantly increasing our understanding of causal relations, links with historic data and ability to numerically model climate change. The most recent work has been summarized in the Assessment Reports by the Intergovernmental Panel on Climate Change (IPPC). Climate change is a significant and lasting change in the statistical distribution of weather patterns over periods ranging from decades to millions of years. It may be a change in average weather conditions, or in the distribution of weather around the average conditions (i.e., more or fewer extreme weather events). Climate change is caused by factors that include oceanic processes (such as oceanic circulation), biotic processes, variations in solar radiation received by Earth, plate tectonics and volcanic eruptions, and human-induced alterations of the natural world; these latter effects are currently causing global warming, and "climate change" is often used to describe human-specific impacts.
Extent / Severity	Over the next century, weather patterns that are considered extreme today are expected to become the norm. One hundred-plus degree days will occur more frequently, droughts will last longer and monsoon rainstorms will become more intense. Scientists predict that the average temperature in region is expected to rise between 2.5 and 8°F. These higher temperatures will mean less water in Lake Mead. As a result, minerals in the lake will become more concentrated, making the water undrinkable and threatening native fish. Drier conditions will also make wildfires more frequent and intense.
Recurrence Probability	The specific probability of the extent and frequency climate change induced impacts is uncertain and depends on various climate modeling assumptions. While there is some uncertainty about the rate of climate of change and the severity and frequency of extreme weather events, the IPCC, in its Fifth Assessment of climate change (2014), concluded that: ...warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased...It is extremely likely that human influence has been the dominant cause of the observed warming since the mid-20th century.

Table 3-2. Dam Failure

Profile	Description
Nature	Dam failure is the structural collapse of a dam that releases the water stored in the reservoir behind the dam. A dam failure is usually the result of the age of the structure, inadequate spillway capacity used in construction, or structural damage caused by an earthquake or flood. When a dam fails, a large quantity of water is suddenly released with a great potential to cause human casualties, economic loss, and environmental damage. This type of disaster is especially dangerous because it can occur suddenly, providing little warning and evacuation time for the people living downstream. The flows resulting from dam failure generally are much larger than the capacity of the downstream channels and therefore lead to extensive flooding. Flood damage occurs as a result of the momentum of the flood caused by the sediment-laden water flooding over the channel banks and impact debris carried by the flow.
Location	State records identify 133 dams in Clark County. The majority of these structures are flood detention basins that are built to protect residential neighborhoods. The County has two high-profile dams within its purview, Hoover Dam and Davis Dam. Hoover Dam is located about 36 miles southeast of Las Vegas, in the Black Canyon of the Colorado River. Davis Dam is located near the town of Laughlin, Nevada. Further downstream along the Colorado River in the state of Arizona, are the Parker Dam and its reservoir, Lake Havasu. In addition to these high-profile dams, several detention basins are scattered throughout Clark County to divert and contain seasonal flood waters. Mill ponds that serve to store large quantities of water from mining operations are also of significant concern. Breach of these structures could also present a threat to lives and property throughout the County.
History	In Nevada, there have been no dam failure declarations, however, the following incidents are on record: • In 2005, rainfall runoff overtopped the Schroeder Dam in Beaver Dam State Park located in eastern Nevada by one foot. The top surface of the dam was not damaged, but the downstream face of the dam was severely eroded. Erosion in several of the gullies may have reached as far as the core material. The dam was an earth-fill dam with a 35 foot concrete spillway on the east side. Prior to this event the dam was considered a low-hazard dam; mitigation at this site is ongoing. • In 2006, failure of the Rogers Dam occurred as a result of very high flows in the Humboldt River concrete control sections of the dam were undermined making it useless. The concrete portion of the dam was completely undercut by four to five feet allowing the river to flow underneath the dam, unimpeded. No one was injured and no property damage was reported. However, the main effect of the Rogers Dam failure was that the reservoir behind the dam is diverted into a canal which provides water to 60 percent of the ranches in the valley, representing about 20,000 acres of land. • On September 9, 2014 three dams on the Moapa Indian Reservation and three dams off the reservation breached. The dam failures contributed to major damages to the Moapa Band of Paiutes reservation lands and infrastructure. Furthermore, many dams in Nevada suffer from poor design or encroachment of development into the potential floodplain below the dam. As a result, many dams fail to pass an Inflow Design Flood (IDF) inspection commensurate with their hazard potential and size. There however, is no record of dam failure for any dam located in or affecting Clark County.

Table 3-2. Dam Failure

Profile	Description
Extent / Severity	According to the Nevada Division of Water Resources (NDWR), there are 67 high-hazard structures in Clark County. A high-hazard designation does not reflect a dam's condition, but rather its potential for destruction in the event of an actual failure. As for February 2017, NDWR stated that approximately 90 percent of the high-hazard dams in Nevada are in satisfactory condition, the highest rating state inspectors give. According to the United States (U.S.) Bureau of Reclamation, the risk of failure for the Hoover Dam is "very, very low."
Recurrence Probability	Dam failure can result from numerous natural or human activities. Earthquakes, internal erosion, improper siting, structural and design flaws, or rising floodwaters can all result in the collapse or failure of a dam. A dam failure may also be a result of the age of the structure or inadequate spillway capacity. While it has been mentioned that a number of dams have failed to pass an IDF inspection, the State has taken an active role in remediating the deficient dams. As such, the probability of a future dam failure affecting Clark County is unknown.

Table 3-3. Drought

Profile	Description
Nature	Drought is a normal, recurrent feature of virtually all climatic zones, including areas of both high and low rainfall, although characteristics will vary significantly from one region to another. Drought differs from normal aridity, which is a permanent feature of the climate in areas of low rainfall. Drought is the result of a natural decline in the expected precipitation over an extended period of time, typically one or more seasons in length. Other climatic characteristics, such as high temperature, high wind, and low relative humidity, impact the severity of drought conditions. Four common definitions for drought are provided as follows: • Meteorological drought is defined solely on the degree of dryness, expressed as a departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales. • Hydrological drought is related to the effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels. • Agricultural drought is defined principally in terms of soil moisture deficiencies relative to water demands of plant life, usually crops. • Socioeconomic drought associates the supply and demand of economic goods or services with elements of meteorological, hydrologic, and agricultural drought. Socioeconomic drought occurs when the demand for water exceeds the supply as a result of weather-related supply shortfall. It may also be referred to as a water management drought. A drought's severity depends on numerous factors, including duration, intensity, and geographic extent as well as regional water supply demands by humans and vegetation. Due to its multi-dimensional nature, drought is difficult to define in exact terms and also poses difficulties in terms of comprehensive risk assessments. Drought differs from other natural hazards in three ways. First, the onset and end of a drought are difficult to determine due to the slow accumulation and lingering of effects of an event after its apparent end. Second, the lack of an exact and universally accepted definition adds to the confusion of its existence and severity. Third, in contrast with other natural hazards, the impact of drought is less obvious and may be spread over a larger geographic area. These characteristics have hindered the preparation of drought contingency or mitigation plans by many governments.
Location	The state of Nevada, in particular the Lower Colorado River System which includes Clark County, experienced a significant drought from 2000 – 2016.
History	Based on the Palmer Drought Severity Index which measures relative dryness or wetness, the 17-year drought noted above is the largest and most persistent drought for the West on historical record. During this time, the Colorado River Basin experienced its lowest 16-year period of inflow in over 100 years of record keeping. Reservoir storage in the Colorado River system declined from nearly full to about half of capacity during this timeframe. In January 2014, the U.S. Department of Agriculture designated nine Nevada counties, including Clark County, as primary natural disaster areas due to the drought.
Extent / Severity	The U.S. Drought Monitor sets the standard for the location and intensity of droughts. The map denotes four levels of droughts, ranging from D1 (abnormally dry) to D4 (exceptional drought). From 2000-2016, Clark County experienced D3-D4 "extreme" drought conditions over five periods in 2003, 2004, 2007, 2014, and 2015.
Recurrence Probability	According to climate scientists, there is an 80 to 90 percent chance of another 10-plus year drought occurring this century, with a realistic threat of an epic 30- to 40-year dry spell or "mega-drought."

Table 3-4. Earthquake

Profile	Description
Nature	An earthquake is a sudden motion or trembling caused by a release of strain accumulated within or along the edge of Earth's tectonic plates. The effects of an earthquake can be felt far beyond the site of its occurrence. Earthquakes usually occur without warning and can cause massive damage and extensive casualties in a few seconds. Common effects of earthquakes are ground motion and shaking, surface fault ruptures, and ground failure. Ground motion is the vibration or shaking of the ground during an earthquake. When a fault ruptures, seismic waves radiate, causing the ground to vibrate. The severity of the vibration increases with the amount of energy released and decreases with distance from the causative fault or epicenter. Soft soils can amplify ground motions. In addition to ground motion, several secondary natural hazards can occur from earthquakes, such as the following: • Surface Faulting: Surface Faulting is the differential movement of two sides of a fault at the Earth's surface. Displacement along faults, both in terms of length and width, varies but can be significant (e.g., up to 20 feet), as can the length of the surface rupture (e.g., up to 200 miles). Surface faulting can cause severe damage to linear structures, including railways, highways, pipelines, tunnels and dams. • Liquefaction: Liquefaction occurs when seismic waves pass through saturated granular soil, distorting its granular structure, and causing some of the empty spaces between granules to collapse. Pore water pressure may also increase sufficiently to cause the soil to behave like a fluid for a brief period and cause deformations. Liquefaction causes lateral spreads (horizontal movements of commonly 10 to 15 feet, but up to 100 feet), flow failures (massive flows of soil, typically hundreds of feet, but up to 12 miles), and loss of bearing strength (soil deformations causing structures to settle or tip). Liquefaction can cause severe damage to property. • Landslides/Debris Flows: Landslides/debris flows occur as a result of horizontal seismic inertia forces induced in the slopes by the ground shaking. The most common earthquake-induced landslides include shallow, disrupted landslides such as rock falls, rockslides, and soil slides. Debris flows are created when surface soil on steep slopes becomes totally saturated with water. Once the soil liquefies, it loses the ability to hold together and can flow downhill at very high speeds, taking vegetation and/or structures with it. Slide risks increase after an earthquake during a wet winter. The two most common measures of earthquake intensity used in the United States are the Modified Mercalli Intensity Scale, which measures felt intensity, and peak ground acceleration (PGA), which measures instrumental intensity by quantifying how hard the earth shakes in a given location. Magnitude (M) is measured by the amplitude of the earthquake waves recorded on a seismograph using a logarithmic scale.
Location	According to the Nevada Bureau of Mines and Geology, the Las Vegas Valley has at least seven fissures, or fault zones (Figure B-3). Despite the large amount of seismic activity within Nevada, experts continue to identify Furnace Creek Fault in Death Valley California as the highest most likely seismic threat to Clark County. Much of the Las Vegas area, approximately 158 square miles, is also considered a high liquefaction area (Figure B-3).

Table 3-4. Earthquake

Profile	Description
History	Nevada is the third most seismically active state in the United States (after Alaska and California). Historical earthquakes over the past 117 years are shown in Figure B-4. Since 2012, there has only been one earthquake larger than M 5.0 in nearby Caliente, Nevada. This earthquake registered as an M 5.3 event (later revised as an M 4.8 event) on May 22, 2015. The Las Vegas basin also experiences shaking due to distant earthquakes in western and northern Nevada, southern California, or western Utah. Earthquakes in western and northern Nevada and western Utah ranging from M5.0 to 6.0 were widely felt throughout the basin in 1902, 1916, and 1966. More recently, the 1992 Landers earthquake (M7.3) and the 1999 Hector mine earthquake (M7.1), which occurred more than 100 miles away, were felt strongly throughout the valley.
Extent / Severity	The strength of an earthquake's ground movement can be measured by PGA. PGA measures the rate in change of motion relative to the established rate of acceleration due to gravity ($g = 980$ centimeters per second, per second). PGA is used to project the risk of damage from future earthquakes by showing earthquake ground motions that have a specified probability (e.g., 10 percent, 5 percent, or 2 percent) of being exceeded in 50 years. The ground motion values are used for reference in construction design for earthquake resistance and can also be used to assess the relative hazard between sites when making economic and safety decisions. In 2008, the U.S. Geological Survey (USGS) updated the 2002 National Seismic Hazard Maps displaying earthquake ground motions for various probability levels across the United States. The updated maps incorporate new findings on earthquake ground shaking, faults, and seismicity and are currently applied in seismic provisions of building codes, insurance rate structures, risk assessments, and other public policy. PGA data from these maps have been used to determine the areas within Clark County that are at risk for earthquake hazards. Figure B-5 shows the PGA values in Clark County for the two percent probability of exceedance in 50 years. Clark County falls within the strong to severe ranges of the scale. Regions that reach the top end of the scale, violent, are often near major active faults. These regions will, on average, experience stronger earthquake shaking more frequently, with intense shaking that can damage even strong, modern buildings. Thus, based on historic activity and the PGA values shown in Figure B-5, all areas in Clark County will feel shaking from an earthquake, with 98 percent of the area likely to experience strong to very strong shaking from earthquakes.
Recurrence Probability	In the Las Vegas Valley, Seismologists say there is a roughly 1 in 10 chance that an M 6.0 earthquake — one large enough to cause significant damage — will strike the valley in the next 50 years.

Table 3-5. Flood

Profile	Description
Nature	A flood occurs when the existing channel of a stream, river, canyon, or other watercourse cannot contain excess runoff from rainfall or snowmelt, resulting in overflow on to adjacent lands. There are many types of flooding and Clark County is susceptible to the following: • Channel flooding is characterized by lateral channel migration during major flows, which results in abrupt changes in the horizontal alignment or location of the channel. Other characteristics include localized channel bed and bank-scour in addition to the potential for over-bank flow inundation. • Sheet flooding is characterized by channel having minimal capacity, water flowing across broad areas at relatively shallow depths, and gently sloping terrain. Damage from these events includes localized scour and deposition of extensive amounts of sediments and debris typically associated with sheet flow. If the depth of the water is high enough, water may encroach into low-lying structures within the floodplain. • Alluvial fan flooding refers to flooding occurring on the surface of an alluvial fan or similar landform characterized by high-velocity flows, active erosion processes, sediment transportation and deposition, and unpredictable flow paths. Flow depths with alluvial fan flooding are generally shallow with damage resulting from inundation, variable flow paths, localized scour and the deposition of debris. Alluvial flooding is potentially more dangerous than riverine flooding due to its unpredictable nature resulting in difficulties associated with threat identification. • Flash flooding is characterized by the time scale in which it develops: a flash flood generally develops in less than six hours. Flash flood waters also move at very fast speeds and have the power to move boulders, tear out trees, and destroy both buildings and transportation infrastructure. During a flash flood, walls of water can reach heights of 10 to 20 feet. This combination of power and suddenness makes flash floods particularly dangerous. They are likely to occur in areas with steep slopes and sparse vegetation. These floods arise when storms produce a high volume of rainfall in a short period, over a watershed where runoff collects quickly as well as in the mountain areas resulting in the massive melting of the snow pack leading to heavy run off. They are likely to occur in areas with steep slopes and sparse vegetation. They often strike with little warning and are accompanied by high velocity flow.
Location	Figure B-6 illustrates the locations of mapped flood-prone areas in Clark County. In the north-central and north-eastern portions of Clark County, many of the flood-prone areas are associated with the tributaries leading into Lake Mead, such as the Muddy River that flows through the communities of Overton and Logandale, and the Virgin River that runs along the southern boundary of the city of Mesquite. In the desert basins of central and southern Clark County, natural runoff channels, or washes, focus the sheet flow across desert pavement. Because of these topographic phenomena the probability of floods occurring in Clark County communities is relatively high. Contributing to this dispersion type is an urbanization and sprawl pattern that has spread development onto the washes and sediment piedmonts. In addition, runoff from monsoon thunderstorms can quickly overtop a wash, thereby flooding adjacent areas.

Table 3-5. Flood

Profile	Description
History	While floods can, and have occurred in almost every month of the year, the most damaging storms typically occur between July and September. Recent major events include: • Aug. 25, 2013 flash flooding on the Las Vegas Paiute Golf Resort caused millions of dollars in damage to three golf courses, only 18 of the 54 holes were spared from damage. • Sept. 9, 2014: Nearly five inches of rain over a two hour period resulted in two washes and a river overflowing. The floods resulted in nearly 20 people being rescued in the area. In addition, 139 homes were damaged and a large portion of I-15 was washed away and impaired accessibility to the Moapa River Indian Reservation. A major disaster declaration was proclaimed for the state of Nevada due to severe storms and flooding. • July 6, 2015: A thunderstorm brought heavy rain, hail and strong winds across the valley. One area of the valley received nearly an inch of rainfall within just 15 minutes, and 1 to 1.5 feet of rain was reported in the west valley. Firefighters performed 10 swift-water rescues and tended to stranded motorists near the Linq Hotel and Casino. Approximately 800 Southern Nevada customers lost power. • April 9, 2016: Flash flood warnings were issued when 0.81 inch of rain was recorded at McCarran International Airport. The Nevada Highway Patrol responded to 127 crashes, mostly caused by hydroplaning. A total of 43 injuries and 77 cases of property damage were reported. In addition, the Clark County Fire Department also rescued seven people caught in the flooding. • August 4, 2017: Heavy flooding was triggered by afternoon thunderstorms that dropped a total of 0.47 inches of rain on the central valley over a six-hour period. Mount Charleston was hit the hardest, receiving 2.80 inches of rain in total that caused heavy flooding and debris to clutter roads. Along the Las Vegas Strip area, eight people were swept away by floodwaters in two areas; the Seigel Suites Hotel and the Linq Hotel and Casino. Seven of the eight people were rescued and one body was later recovered.
Extent / Severity	Various factors such as rainfall intensity and duration, watershed conditions (slope, soil type, presence of vegetation) and the existence of flood control features, both natural and human-built, determine the severity of floods. In the United States, the severity or magnitude of flooding is determined by the National Flood Insurance Program (NFIP). The NFIP maps known flood-prone areas, called Special Flood Hazard Areas (SFHA), which include the 500-year and 100-year zones. In Clark County, there are 417.1 square miles in the SFHA.
Recurrence Probability	The desert southwest often experiences intense rainfall and subsequent flash floods. Floods can and have occurred in almost every month of the year, however, the most damaging storms typically occur between July and September, which has been designated as flash flood season. According to the Clark County Emergency Management Plan – Basic Plan, a severe flash flood will occur in the Las Vegas Metropolitan Statistical Area every 2 – 12 months.

Table 3-6. Hazardous Material Events

Profile	Description
Nature	Hazardous materials are substances that may have negative effects on health or the environment. Exposure to hazardous materials may cause injury, illness, or death. Effects may be felt over seconds, minutes or hours (short-term), or not emerge until days, weeks, or even years after exposure (long-term). Also, some substances are harmful after single exposures of short duration, while others require long episodes of exposure or repeated exposure over time to create harm. Hazardous materials that pose the greatest risk for causing catastrophic emergencies, as identified by the EPA, are classified as Extremely Hazardous Substances (EHSs). Releases of EHSs and other hazardous substances can occur at facilities or during transport. Transportation-related releases are generally more troublesome because they may occur anywhere, including close to human populations, critical facilities, or environmentally sensitive areas. Transportation-related EHS releases can also be more difficult to mitigate due to the great area over which any given incident might occur, and the potential distance from response resources. In addition to accidental, human-caused hazardous material events, natural phenomena may cause the release of hazardous materials and complicate response activities. Earthquakes pose a particular risk, because they can damage or destroy facilities containing hazardous substances. The threat of any hazardous material event may be amplified by restricted access, reduced fire suppression and spill containment capability, and even complete cutoff of response personnel and equipment. Hazardous materials events or releases can also cause a host of secondary effects, depending on the nature and size of the incident. Fuel spills can create fires, incidents on highways or railroads can halt or impede transportation, and releases of EHSs can trigger evacuation and short or long-term displacement and social disruption.
Location	The most frequent mode for transportation of hazardous materials is on one of the County's four major highway systems: I-15, U.S. 95, U.S. 93, and I-215. Other modes of transportation of hazardous materials include: rail (two Union Pacific Railroad main lines); airports (McCarran International Airport, five general aviation airports and Nellis Air Force Base); and four major petroleum product pipelines. Other hazardous material areas include: Black Mountain Industrial, (2,717) EHS fixed facilities, wellheads, and the Nevada National Security Site.
History	The Pipeline and Hazardous Materials Safety Administration's Office of Hazardous Materials Safety Hazmat Incident Report Search Tool collects information from the Hazardous Materials Incident Report Form 5800.1 on the size, frequency and impacts of hazardous materials releases during transportation. The tool shows that from January 1, 2010 – August 1, 2017 there were seven known "serious" hazardous material incidents occurred in Clark County. All seven of these incidents occurred on the highway system within the County. The largest hazardous materials event at a fixed facility in Clark County occurred in 1988. A fire started inside the Pacific Engineering and Production Corporation of Nevada's plant building in Henderson and created the largest domestic, non-nuclear explosion in recorded history. Two employees were killed and another 372 were injured. The explosion caused an estimated \$100M in damages.
Extent / Severity	As noted above, Clark County has experienced "serious" hazardous material transportation incidents. These incidents are defined as including a fatality or injury requiring in-patient hospitalization. On the fixed facility side, as of December 2017, there are 437 EHS facilities within the County that have chemicals above the Threshold Planning Qualities.
Recurrence Probability	Based on previous known occurrences, there is approximately one significant occurrence of a hazardous material event on a highway within Clark County each year.

Table 3-7. Infectious Disease

Profile	Description
Nature	A disease is a pathological condition of a part, organ, or system of a living organism resulting from various causes, such as infection or exposure to toxins, and characterized by an identifiable group of signs or symptoms. The major concern here is an epidemic, when a disease affects a disproportionately large number of individuals within a population, community, or region at the same time. Of great concern are infectious diseases caused by the entry and growth of microorganisms in humans. Infectious diseases are diseases caused by a pathogen which enters the body, triggering development of an infection. Such pathogens may include bacteria, viruses, fungi, prions, or protozoans. Infectious diseases can have a range of causes and are often contagious or communicable, meaning they can be passed from person-to-person. They can be transmitted through numerous modes, including direct contact (person-to-person, animal-to-person, or mother-to-unborn child), insect bites, food and water contamination, or airborne inhalation. Many infectious diseases can make the body vulnerable to secondary infections, which are caused by other organisms taking advantage of an already weakened immune system. According to the Global Health Council, over 9.5 million people die each year from infectious diseases. Although progress has been made to control or eradicate many infectious diseases, humans remain vulnerable to many new emerging organisms, such as severe acute respiratory syndrome (SARS) and the West Nile virus. In addition, previously recognized pathogens can evolve to become resistant to available antibiotics and other treatments. For example, malaria, tuberculosis, and bacterial pneumonias are appearing in new forms that are resistant to drug treatments. The spread of infectious diseases also increases with population growth and the ease of travel. The State of Nevada has established a list of over 60 communicable (infectious) diseases, which, by law, must be reported by health providers to report to state or local public health officials. These diseases are those of public interest by reason of their communicability, severity, or frequency.
Location	The entire County is susceptible to infectious diseases. Segments of the population at highest risk for contracting an illness from a pathogen are the very young, the elderly, or individuals who currently experience respiratory or immune deficiencies. These segments of the population are present throughout the region. Additionally, because of the communicable nature of these diseases, tourism centers or areas of high population density are considered more at risk. As a result the population in and around the Las Vegas Strip may have an increased potential for exposure and spread of infectious diseases.
History	In Clark County recent occurrences of registered infectious diseases include: • 2008: In 2008, SNHD investigated the largest outbreak of healthcare-acquired hepatitis C in U.S. history, with 115 cases identified and 63,000 people notified of their possible exposure (those notified were patients who received a particular treatment between March 2004 and January 11, 2008). • 2009 - 2010: The novel H1N1 influenza virus became a global pandemic and in Nevada thousands of people were infected leading to 40 deaths. • June 2011 - July 2011: Six guests of the ARIA Resort and Casino were diagnosed with, treated for, and recovered from Legionnaires' disease (a form of pneumonia caused by Legionella bacteria). As a result, about 18,000 people who stayed at the ARIA Resort and Casino from June 21 to July 4 were mailed letters, warning them about possible exposure to Legionella bacteria. Also in 2011, a person who stayed at the Luxor hotel in Las Vegas died after contracting Legionnaires' disease.

Table 3-7. Infectious Disease

Profile	Description
	• April 2013: An estimated 294 people were affected by an outbreak of salmonellosis at a Las Vegas restaurant. • June – December 2013: 60 people tested positive to a tuberculosis outbreak. Five people were contagious; three people of those, a mother and her twin premature twin daughters, died. • February 2016: Clark County health officials declared an outbreak in Las Vegas after noting a 128 percent increase in reported syphilis cases since 2012, with 615 of the 694 cases involving men diagnosed in 2015. This makes Nevada's rate of syphilis the highest in the West. • 2016 – 2017: There were 24 confirmed cases of the Zika virus in Clark County in 2016 – 2017. Of these cases, the first non-travel Zika virus case was reported in February 2017. • 2017: Two people died in 2017 from contracting the West Nile virus. • April – May 2017: Seven cases and an additional 27 suspected cases of Legionnaire's disease were reported in guests who stayed at the Rio All-Suite Hotel and Casino. In addition, the same bacteria caused 56 suspected cases of influenza-like Pontiac fever in hotel guests.
Extent / Severity	Each infectious disease has a different pathogenicity, which can affect the probability of occurrence. In addition, the spread of infectious diseases and the probability of their occurrence are affected by factors, such as environmental changes, human behavior and demographics, and technological advancement. People who have weak immune systems are particularly vulnerable to infectious diseases. Infectious diseases can seriously affect those individuals who are infected with HIV or are receiving immunosuppressive therapy for cancer or organ transplants. Others who may be disproportionately affected by infectious diseases include the elderly; persons being cared for in institutional settings (such as hospitals and nursing homes); and persons with inadequate access to healthcare, such as the homeless, and others of low socioeconomic status. In addition, pregnant women and people who care for small children are generally at higher risk for acquiring infectious diseases.
Recurrence Probability	The probability and magnitude of an infectious disease occurrence is difficult to evaluate due to the wide variation in disease characteristics, such as rate of spread, morbidity and mortality, detection and response time, and the availability of vaccines and other forms of prevention. A review of the historical record indicates that disease related disasters do occur in humans with some regularity and varying degrees of severity. There is growing concern, however, about emerging infectious diseases. Infectious diseases constitute a significant risk to the population of Clark County. Minor outbreaks occur an estimated 30 times per year. The probability of a major infectious disease outbreak, with the potential of reaching the scale of an epidemic, however, is not nearly as common. Based upon past history, a major infectious disease outbreak occurs about once every 10 years.

Table 3-8. Infestation

Profile	Description
Nature	As defined by Federal Executive Order 13112 and invasive species is a non-native (or alien) to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health. Invasive species can be plants, animals, and other organisms (e.g., microbes). Human actions are the primary means of invasive species introductions. Infestations impact Nevada's economy through the destruction of crops and natural resources which also impacts tourism. Some of the plant infestations are highly flammable and assist in the spread of wildfires. The infestations of greatest concern in Clark County include noxious weeds as defined by the U.S. Department of Agriculture, noxious weeds are “species of plants that cause disease or are injurious to crops, livestock or land, and thus are detrimental to agriculture, commerce or public health.” Noxious weeds are considered invasive due to their ability to rapidly reproduce and spread, ultimately out-competing all other vegetation in an area. In reference to agriculture, invasive weeds affect crop production. In reference to natural or wildland areas, invasive weeds cause a drastic change in the composition, structure, and function of ecosystems. The Nevada Department of Agriculture has developed a list of 47 Noxious Weeds, divided into three categories (A, B and C): Category A: Weeds not found or limited in distribution throughout the state; actively excluded from the state and actively eradicated wherever found; actively eradicated from nursery stock dealer premises; control required by the state in all infestations . Category B: Weeds established in scattered populations in some counties of the state; actively excluded where possible, actively eradicated from nursery stock dealer premises; control required by the state in areas where populations are not well established or previously unknown to occur. Category C: Weeds currently established and generally widespread in many counties of the state; actively eradicated from nursery stock dealer premises; abatement at the discretion of the state quarantine officer. Other invasive plants that are too widely distributed in Nevada to be included in the noxious weed list but present problems in Nevada include Cheatgrass and Red brome. Cheatgrass (<i>bromus tectorum</i> L.) is an annual grass that forms tufts up to two feet tall with leaves and sheathes that are covered in short soft hairs. The flowers occur as drooping, open, terminal clusters that can have a greenish, red, or purple hue. These annual plants will germinate in the fall or spring and senescence usually occurs in summer. Cheatgrass’s invasive nature is due to its potential to completely alter the ecosystem in which it invades, completely replacing native vegetation and changing fire regimes. Red brome (<i>bromus rubens</i> L.) is a tufted, cool-season annual bunchgrass commonly found growing on shallow dry soil or poor textured, clayey soil. It becomes extremely competitive with other grasses and displaces native species. The accumulation of litter and necromass has the potential to increase fire frequency in the desert.
Location	Infestations have occurred throughout Clark County in the following locations: • Noxious Weeds: The majority of noxious weed infestations are north of Clark County. Sarah Mustard (<i>brassica tournefortii</i>) is the exception, which extends throughout the eastern half and southern portion of the County. • Cheatgrass and Red Brome: Cheatgrass and Red brome prosper in similar habitats and are found particularly in areas of dry rangeland and shrub steppe habitats of the County. • Africanized Honey Bees: Africanized honey bees were first found in the U.S. in southern Texas in 1990. In 1998 their presence had been detected in Clark County and has since continued to spread north, into Lincoln and Nye Counties Nevada. • Banded Elm Bark Beetle (BEBB): The BEBB is found in populations of elm trees throughout the County. • Mosquitos: Mosquitos are quite active in throughout Southern Nevada. As of May 2017, the <i>Aedes aegypti</i> mosquito has been identified in North Las Vegas.

Table 3-8. Infestation

Profile	Description
History	The following infestations have been documented to have occurred within Clark County: • Noxious Weeds: Many non-native plants are introduced to new areas every year. Many are considered benign, but some species are classified as noxious because of their invasive nature; more than 500 weeds in North America are classified as noxious. The first widespread weed in Nevada considered to be invasive was a Russian thistle or tumbleweed that was introduced in the late 1800s. The Halogeton glomeratus was the second invasive species to reach Nevada and was discovered in 1934. • Cheatgrass: Cheatgrass is native to Europe and parts of Africa and Asia. It was first introduced into the United States accidentally in the mid-1800s and by the early 1900s was found throughout the Great Basin (includes Nevada, and parts of California, Idaho and Utah). • Red Brome: The red brome is native to Europe and parts of Africa and Asia. It was brought to North American before 1800. In contrast to accidental introductions, red brome was seeded near the University of Arizona at Tucson from 1906 to 1908 for evaluation as a forage plant; this grass soon escaped and became established along the Santa Cruz River. It continued to spread and by the 1960s was found throughout Nevada. • Africanized Honey Bees: Africanized honey bees were first found in the U.S. in southern Texas in 1990. In 1998 their presence had been detected in Clark County and has since continued to spread into northern Nevada. • Banded Elm Bark Beetle: The BEBB is native to northern China, Central Asia and Russia. The beetle was first detected in the United States in 2003 in Colorado and Utah. Since then the beetle has been collected in 21 states, including Nevada. However, the simultaneous detection across the country suggested that it was not a recent introduction and a survey of museum specimens established their presence in Denver Colorado in 1994. • Quagga Mussels: Quagga mussels are native to Ukraine and were first sighted in the United States in 1989 in the Great Lakes. By 1995 quagga mussels were discovered outside of the Great Lakes basin and in January 2007 populations were discovered in Lake Mead near Boulder City. • Asian Clam: The Asian clam is native to Asian and parts of Africa and was introduced into the United States in 1938. In 1959 the clam was discovered in Nevada in Lake Mead. • New Zealand Mudsnaill: The New Zealand Mudsnaill is native to New Zealand and was first detected in the United States in 1987 in Idaho. No other populations were discovered until 1993 when they were found in Oregon. Since then their invasion has expanded and the New Zealand Mudsnaill is currently found in all western states, except New Mexico. • Mosquitos: Two people died from the West Nile virus in 2017. Fourteen zip codes in the County returned positive tests for the virus in that year. • The <i>Aedes aegypti</i> mosquito was identified in Clark County in 2017.

Table 3-8. Infestation

Profile	Description
Extent / Severity	The extent of infestations in Clark County is based on many factors. Pests enter Clark County on commercial shipments of plants, food, and other materials. They may also be transported on vehicles, fruits, plants, seeds, or animals when travelers enter the County. • Noxious Weeds: Of the 47 noxious weeds listed by the State of Nevada, only 13 are found in Clark County. Most of them do not have an overwhelming presence. • Cheatgrass and Red Brome: Cheatgrass and Red brome have thrived in Nevada and cover about 9 million acres of land in Nevada, about 13 percent of the state’s total acreage. Without human intervention, their populations will continue to grow. • Africanized Honey Bees: The Clark County Public Works Department notes that “the Africanized honey bee is well established in Las Vegas” and has recommended that residents “Stay Away From Honey Bee Colonies.” In a report from February 2000 a state agriculturist said that the actual number of hives or swarms found in Las Vegas in 1999 was about 1,000, before 1998 there had been no reports of hives or swarms. Additionally the Agriculture Department estimated that 75 percent of all bees in the valley are Africanized. • Banded Elm Bark Beetle: The BEBB has invaded much of Nevada and the Western United States and the extent of its infestation continues to grow. Prior to the introduction of the BEBB a similar beetle, the European elm bark beetle (EEBB) was found in populations of elm trees. In a study to determine the relative abundance of the BEBB and the EEBB, presented at the annual USDA Interagency Research Forum on Invasive Species, beetle traps were set up in five states. In 2007, 43 percent of the beetles caught in the Nevada traps were BEBB. The following year a similar study was set up and BEBB increased in abundance in Nevada to 68 percent. It seems that the BEBB attacks standing trees more aggressively, may have displaced the EEBB and/or is better able to colonize regions beyond EEBB’s range. • Quagga Mussels: As an aquatic species their presence in Clark County has remained limited to the bodies of water along the Colorado River. However, since their introduction to Clark County, their presence has expanded to northern Nevada; in 2011 Quagga mussels were found in Lahontan Reservoir and Rye Patch Reservoir. • Asian Clam: The presence of Asian Clams in the County has not extended beyond Lake Mead. • New Zealand Mudsnail: The extent of the New Zealand Mudsnail appears to be confined to Lake Mead. • The <i>Aedes aegypti</i> mosquito is the main type of mosquito that spreads Zika, dengue, chikungunya, and other viruses.
Recurrence Probability	The invasive species that are present in Clark County will likely exist for years to come. Clark County has taken steps to reduce the extent of infestations through laws, regulations and planning (such as the 2000 Nevada State Weed Plan and the Establishment of an Interior quarantine due to Africanized honey bees [May 2001]), but it is not likely that these infestations will ever be eradicated. Furthermore, due to the transient nature of the County’s invasive species, controls are even more difficult to regulate. Historically new invasive species appeared on average, every 10 years. However, when looking at more recent statistics, new infestations are occurring more frequently. In the last 20 years, four new invasive species have been introduced to Clark County. This is likely attributed to the more transient nature of the population, but also an increased ability to track/study invasive species.

Table 3-9. Subsidence and Fissures

Profile	Description
Nature	In the southwestern United States, agricultural and urban areas that depend on ground water pumping are prone to land subsidence. Non-recoverable land subsidence occurs when declining water levels lead to inelastic water compaction. A lesser amount of subsidence occurs with the recoverable compression of coarse-grained sands and gravel deposits. A common feature that accompanies subsidence is earth fissures, which are tension cracks in the sediment above the water table. Land subsidence can be caused by actions other than overdrafting of water. Mining, hydrocompaction, and underground fluid withdrawal (water, oil, or other fluid) can cause this hazard and result in land surface displacements and fissures.
Location	While a broad regional primary subsidence bowl occupies the central portion of the Las Vegas Valley, three localized secondary subsidence bowls are superimposed on this area, and are located in the central (downtown), southern (Las Vegas Strip) and the northwestern part of the valley. In the Las Vegas Valley, eight zones of fissuring exist and are “closely coincident” with known or inferred geologic faults.
History	Subsidence in the Las Vegas Valley has been geodetically monitored since 1935. Monitoring showed that the center of the valley (near downtown Las Vegas) had subsided as much as 3.4 feet by 1963. The following monitoring period revealed that from 1963 - 1987 the downtown area sunk another 2.8 feet and other nearby areas subsided more than 5.0 feet. Fissures have been observed in Las Vegas Valley since 1925.
Extent / Severity	According to the Nevada Bureau of Mines and Geology, the greatest subsidence hazard is: ...occurrence and continued growth of earth fissures. Valleywide and localized subsidence bowls are triggering vertical and horizontal differential movements on the numerous Quaternary faults occurring throughout the valley, resulting in the formation of fissures. Once initiated as small tension cracks, fissures will continue to grow as erosional features even if subsidence is arrested, and the impact on structures will increase with time if the fissures are not detected and remedial action taken. In Las Vegas Valley, enlarged fissures range up to 10 feet in width and 13 feet in visible depth.
Recurrence Probability	Land subsidence and the creation of fissures will continue to occur in Las Vegas Valley as long as the net annual groundwater withdrawal continues to exceed the net annual recharge. Even if the region can reduce the net annual groundwater withdrawal to the level of net annual recharge, subsidence may continue for years after equilibrium is achieved because of a lag in sediment response.

Table 3-10. Terrorism

Profile	Description
Nature	The Clark County THIRA profiles terrorism as an overarching activity that includes armed assault, whereas civil disturbance is characterized as “refusing to obey various demands or commands especially as a nonviolent and usually collective means of forcing concessions from the another entity.” However, many believe there is a political differentiation between these classifications or titles making terrorism a political action. Whereas, terrorism is seen as violence against civilians to achieve a political or ideological objective through fear. It can occur in various forms: assassinations; kidnappings; hijackings; bomb scares and bombings; cyber-attacks (computer-based); and the use of chemical, biological, nuclear and radiological weapons. The following federal and state government legal decisions demonstrate that terrorism is a violent, criminal act, not necessarily a political statement. The Homeland Security Act of 2002, Public Law 107-296, 107th Congress, Nov 25, 2002, 6 USC 101, §2(15) defines terrorism as: <i>“...any activity that involves an act that is dangerous to human life or potential destructive of critical infrastructure or key resources; and is a violation of the criminal laws of the United States or of any State or other subdivisions of the United States; and appears to be intended to intimidate or coerce a civilian population; to influence the policy of government by intimidation or coercion; or to affect the conduct of a government by mass destruction, assassination or kidnapping.”</i> The 28 CFR defines terrorism as: <i>“... the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment hereof, in furtherance of political or social objectives” (28 C.F.R. Section 0.85).</i> The Interagency Security Committee defines an active shooter as: <i>“...an individual or individuals actively engaged in killing or attempting to kill people in a populated area. In most cases, firearms are the weapon of choice during active shooter incidents, but any weapon (such as a knife, etc.) can be used to harm innocent individuals. Typically, there is no pattern or method to the selection of victims. Active shooter situations are dynamic and quickly evolve. Often, the immediate deployment of law enforcement is required to stop the aggressive action of a shooter to mitigate harm to potential victims.” (ISC 2015).</i> Nevada Law defines terrorism in NRS 202.4415 as: <i>“An “Act of Terrorism” means any act that involves the use or attempted use of sabotage, coercion or violence which is intended to:</i> (a) <i>Cause great bodily harm or death to the general population; or</i> (b) <i>Cause substantial destruction, contamination or impairment of:</i> (1) <i>Any building or infrastructure, communications, transportation, utilities or services; or</i> (2) <i>Any natural resource or the environment.”</i> Terrorism categories include: • Active shooter: deliberate actions taken to kill or attempt to kill innocent people in a populated area typically using firearms or other weapons. • Biological attacks: releases of large quantities of living, disease-causing microorganisms that have extraordinary lethal potential. • Chemical attacks: deliberate release of a toxic agent (gaseous, liquid, or solid) that can poison people or the environment. • Radiological attacks: deliberate dispersal of radioactive materials, via dirty bombs (conventional explosives laced with radioactive materials) or other methods. • Nuclear attacks: explosion of nuclear devices and the radioactive fallout from such explosions.

Table 3-10. Terrorism

Profile	Description
	• Cyber-terrorism: deliberate disruption/damage of computer systems and data. Weapons used for terrorist activities are not always weapons produced by the terrorist, but can sometimes come in the form of one's own resources being used against them. An example of this is targeting a jurisdiction's hazardous materials facilities or transporters. Clark County has several facilities that handle or process hazardous materials as well as those that are transported through the County.
Location	The Department of Homeland Security's National Planning Scenario identifies possible terrorist strike locations it views as most plausible. The at risk sites include cities that have economic and symbolic value, places with hazardous facilities, and areas where large groups of people congregate such as an office building or sports arenas. As such, the Las Vegas Strip is potentially a high profile target. As one of 64 designated urban metropolitan areas, Las Vegas has been identified by the federal government as "high-threat, high-density," with regard to acts of terrorism. In addition to the Las Vegas Strip, the following locations are viewed as potential targets in Clark County: Fremont Street (Las Vegas, Nevada) individual casinos, Las Vegas Convention Center, McCarran International Airport (Las Vegas, Nevada), military bases, and dams.
History	Recent terrorism events in Clark County include: • April 5, 2017: Nicolai Howard Mork, An MIT business school graduate faces terrorism charges in Las Vegas and unlawful acts related to weapons of mass destruction. • July 18, 2017: A 51-year-old man, who police said evaded officers before barricading himself inside of a car and shutting down Interstate 15 traffic, faces a charge of committing an act of terrorism. • October 1, 2017: Clark County experienced the largest mass shooting incident in United States' history. The ongoing investigation reports that an active shooter killed 58 people, and injured 515 more during an outdoor music festival on the Las Vegas Strip; and Clark County is experiencing significant economic impact and resource shortage in responding to these matters and anticipated continued economic obligation resulting in financial hardship for short term response and long-term recovery for the affected individuals and areas.
Extent / Severity	Standard models are available for estimating the effects of a nuclear, chemical, or biological release, including the area affected and consequences to population, resources, and infrastructure. However, due to the large number of factors involved, including the various types of terrorist events, and the factors of human decision and drive, the extent of a future terrorist attack is unknown.
Recurrence Probability	Based on the Homeland Security Threatened Level System, it is anticipated that terrorism will remain a high threat in Clark County for the foreseeable future.

Table 3-11. Wildfire

Profile	Description
Nature	Wildfires spread by consuming vegetation flammable. This fire type often begins unnoticed, spreads quickly, and is usually signaled by dense smoke that may be visible from miles around. Wildfires can be caused by human activities (such as unattended burns, campfires, or off-road vehicles without spark arresting muffles) or by natural events such as lightning. Wildfires often occur in forests or other highly vegetated areas. In addition, wildfires can be classified as forest, urban, or interface or intermix fires, and prescribed burns. The following three factors contribute significantly to wildfire behavior and can be used to identify wildfire hazard areas: • Topography describes slope increases, which influences wildfire spread rate increases. South-facing slopes are also subject to more solar radiation, making them drier and thereby intensifying wildfire behavior. However, ridge tops may mark the end of wildfire spread since fire spreads more slowly or may even be unable to spread downhill. • Fuel is the type and condition of vegetation that plays a significant role in wildfire spread occurrence. Certain plant types are more susceptible to burning or will burn with greater intensity. Dense or overgrown vegetation increases the amount of combustible material available as fire fuel (referred to as the “fuel load”). The living-to-dead plant matter ratio is also important. Certain climate changes may increase wildfire risk significantly during prolonged drought periods as both living and dead plant matter moisture content decreases. Both the horizontal and vertical fuel load continuity is also an important factor. • Weather is the most variable factor affecting wildfire behavior. Temperature, humidity, wind, and lightning can affect ignition opportunities and fire spread rate. Extreme weather, such as high temperatures and low humidity, can lead to extreme wildfire activity. Climate change increases fire to vegetation ignition susceptibility due to longer dry seasons. By contrast, cooling and higher humidity often signal reduced wildfire occurrence and easier containment. Wildfire frequency and severity sometimes result from other hazard impacts, such as lightning, drought, and infestations (such as the damage caused by spruce-bark beetle infestations). If not promptly controlled, wildfires may grow into an emergency or disaster. Even small fires can threaten lives and resources and destroy improved properties. In addition to affecting people, wildfires may severely affect livestock and pets. Such events may require emergency water/food, evacuation, and shelter. Indirect wildfire effects can be catastrophic. In addition to stripping the land of vegetation and destroying forest resources, large, intense fires can harm the soil, waterways, and the land itself. Soil exposed to intense heat may lose its capability to absorb moisture and support life. Exposed soils erode quickly and exacerbate river and stream siltation; thereby increasing flood potential, harming aquatic life, and degrading water quality. Vegetation stripped lands are more susceptible to increased debris flow hazards.
Location	The Nevada Community Wildfire Risk/Hazard Assessment Project has identified the following communities, all within or adjacent to Spring Mountains as being extreme wildfire hazard communities: Kyle Canyon, Lee Canyon, Mt. Springs, and Trout Canyon. High wildfire hazard communities include: Cold Creek, Nelson, and Torino Ranch.
History	Recent large wildfires in Clark County include: • July 2013: The Carpenter 1 Fire was a large wildfire on Mount Charleston, 25 miles northwest of Las Vegas. The fire began on July 1, 2013 near Pahrump (Nye County) before spreading eastward. The Carpenter 1 Fire was fully contained on August 18,

Table 3-11. Wildfire

Profile	Description
	2013. It consumed nearly 28,000 acres and destroyed six buildings. According to the National Interagency Fire Center, the Carpenter 1 Fire was considered "the highest ranked priority fire in the nation" at the time of its occurrence. July 2017: The Mount Potosi Fire was a large wildfire in the Humboldt-Toiyabe National Forest's Spring Mountains National Recreation Area, about six miles southwest of Mountain Springs and 28 miles southwest of Las Vegas. It began on July 6 due to lightening. It burned roughly 420 acres before it was contained one week later.
Extent / Severity	The Nevada Community Wildfire Risk/Hazard Assessment Project (2004-2005) developed a hazard rating point system of low through extreme fire hazards based on the scoring system. Five primary factors that affect potential fire hazard were assessed: community design, construction materials, defensible space, availability and capability of fire suppression resources, and physical conditions such as fuel loading and topography. In Clark County, there are four extreme wildfire hazard communities and 3 high wildfire hazard communities.
Recurrence Probability	Based on historical events, multiple wildfires are expected to burn within Clark County each year. However, large wildfires (i.e., fires greater than 200 acres) tend to occur every few years.

4 VULNERABILITY ASSESSMENT

Section 4 – Vulnerability Assessment addresses Element B of the Local Mitigation Plan Regulation Checklist.

Regulation Checklist – 44 CFR 201.6 Local Mitigation Plans
Element B: Hazard Identification and Risk Assessment
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 §201.6(c)(2)(ii))
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))

4.1 EXPOSURE ANALYSIS

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

For this 2018 HMP, a conservative exposure-level analysis was conducted to assess the risks associated with the identified hazards. Due to a combination of a lack of adequate information and the lack of a standard methodology for a quantitative vulnerability analysis, a vulnerability analysis has only been prepared for the following hazards: earthquake; flood and wildfire.

Land data provided by Clark County GIS was included in the 2018 HMP vulnerability analysis. With this information, a spatial overlay was used to determine the square miles and percentage of square miles in a hazard area.

2016 population and residential building information came from Clark County Comprehensive Planning, which collaborates with other local agencies to prepare annual resident population estimates for Clark County unincorporated and the cities. Tribal population and residential building information came directly from the tribes. With this information, a spatial overlay and proportional analysis was used to determine the number and percentage of people and residential buildings located where hazards are likely to occur. The analysis represents the number of people at risk; no estimate of the number of potential injuries or deaths was prepared.

Critical facilities and infrastructure information came from the Clark County GIS and City GIS departments. No updates have been made to this information since 2011 due to lack of availability during the plan update period. Critical facilities for the 2018 HMP include: government facilities; community facilities including libraries, community centers, and parks; county jails and detentions centers; emergency response facilities, including police and fire stations; public hospitals and medical clinics; public utilities, including wastewater facilities, sanitation facilities and river gages; educational facilities, including school buildings and district offices; transportation infrastructure, including airports, transit stations, and county-maintained bridges; and tourism facilities including hotels and convention centers (considered high profile facilities). Geocoded critical facility locations were compared to locations where hazards are likely to occur.

A County-wide exposure analysis for earthquake, flood and wildfire is shown below in Tables 4 – 2 through 4 – 5. Jurisdiction – specific exposure analyses are provided in Appendices L – M and Tribal Annexes A and B.

Table 4-1. Total: County-wide Land Area, Population, Residential Buildings and Critical Facilities and Infrastructure

Category	Number
Land (square miles)	8,060.8
Population	2,205,207
Residential Buildings	797,452
Critical Facilities and Infrastructure	1,830

**Table 4-2. Total: County-wide Summary of Impacts for Earthquakes
(Strong – Very Strong Shaking)**

Category	Number	% of Total
Land (square miles)	7,961.5	98.7
Population	2,205,100	99.9
Residential Buildings	797,410	99.9
Critical Facilities and Infrastructure	1,830	100

**Table 4-3. Total: County-wide Summary of Impacts for Earthquakes
(Liquefaction)**

Category	Number	% of Total
Land (square miles)	158	1.2
Population	820,042	37.2
Residential Buildings	288,911	36.2
Critical Facilities and Infrastructure	815	44.5

**Table 4-4. Total: County-wide Summary of Impacts for Floods
(500 –Year and 100-Year Floodplains)**

Category	Number	% of Total
Land (square miles)	417.1	5.2
Population	229,926	10.4
Residential Buildings	85,053	10.7
Critical Facilities and Infrastructure	389	21.3

**Table 4-5. Total: County-wide Summary of Impacts for Wildfires
(High – Very High Wildfire Hazard Potential)**

Category	Number	% of Total
Land (square miles)	1,396.1	17.3
Population	1,396	0.1
Residential Buildings	921	0.1
Critical Facilities and Infrastructure	18	1

4.2 SUMMARY OF IMPACTS

A summary of impacts, or the overall vulnerability, for each hazard is shown below. The summary of impacts for earthquake, flood, and wildfire is based on the quantitative analysis in Section 4.1. Changes in development within these three hazard areas was conducted using the 2016 Clark County Comprehensive Planning data versus the 2010 Census data. A summary of impacts for climate change, dam failure, drought, hazardous material events, infectious disease, infestation, subsidence and fissures, and terrorism is based on the qualitative analysis from in Section 3.2.

- **Climate Change:** All of Clark County is vulnerable to climate change. Over the next century, weather patterns that are considered extreme today are expected to become the norm. One hundred-plus degree days will occur more frequently, droughts will last longer, and monsoon rainstorms will become more intense. Climate change impacts include: increased demand in electricity, decreased water supply, increased public health-related issues such as heatstroke and asthma, and increased risk of wildfires for in the County’s wildland urban-interface areas.
- **Dam Failure:** There are 133 dams located throughout Clark County. The majority of these structures are flood detention basins to divert and contain seasonal flood waters. Additionally, there are several mill ponds that serve to store large quantities of water from mining operations in the unincorporated areas of Roach, Jean, Goodsprings, Sandy Valley, and Blue Diamond. Dam failure inundation impacts include major damage to infrastructure and inaccessibility for residents.
- **Drought:** All of Clark County is vulnerable to drought. According to climate scientists, there is an 80 to 90 percent chance that the County will experience another 10-plus year drought occurring this century, with a realistic threat of an epic 30- to 40-year dry spell or “mega-drought.” Drought impacts include: a shortfall of water supply, often referred to as a water management drought, and an increase in wildfire risk in the County’s wildland urban-interface areas.
- **Earthquake:** Similar to the 2012 HMP’s vulnerability analysis, all of Clark County is vulnerable to shaking from an earthquake; 98.7 percent of the County (7,961.5 square miles) is located within the strong to very strong shaking range for an earthquake. According to the USGS, very strong shaking has the potential for moderate damage. The remaining 1.3 percent of the County, an area north east of North Las Vegas, is located in the severe shaking range which could cause moderate to severe damage. However, there are no residents or buildings in the area of severe shaking.
- **Earthquake (Liquefaction):** There are 58 square miles, approximately 1.2 percent of the total land area of Clark County, located in a liquefaction hazard area. Although only a small portion of the County’s land mass is located in this hazard zone, approximately 37 percent of the population, 36 percent of the residential buildings and 45 percent of the County’s critical facilities and

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infrastructure are at risk. The 2012 HMP did not include a County-wide summary of impacts for liquefaction, therefore the changes in development within this hazard area is unknown.

- Flood: Approximately 5.2 percent of Clark County's land mass (417.1 square miles) is located in the SFHA, which is concentrated along the Virgin, Muddy, and Colorado rivers, in the eastern and southern portions of the County. Every incorporated jurisdiction within Clark County is mapped for the SFHA. In the 2012 HMP's vulnerability analysis, 15.2 percent of the population and 12.4 percent of the residential buildings within the County were located in the SFHA. The percentage of people and buildings slightly decreased for the 2018 HMP vulnerability analysis which shows only 10.4 percent of people and 10.7 percent of residential buildings are located in this hazard area.
- Hazardous Materials Event: Clark County is vulnerable to both fixed and transportation-related hazardous material events. Hazardous material releases or events are most likely to occur on one of the County's four major highway systems (I-15, U.S. 95, U.S. 93, and I-215); two Union Pacific Railroad main lines; six airports, including McCarran International Airport and Nellis Air Force Base; four major petroleum product pipelines; Black Mountain Industrial Park in the city of Henderson (2,717); EHS fixed facilities, wellheads, and the Nevada National Security Site in southeastern Nye County, which is 65 miles northwest of the city of Las Vegas. Hazardous material event impacts include: fires; impediment of transportation; evacuation and short- or long-term displacement; and social disruption.
- Infectious Disease: All of Clark County is susceptible to infectious diseases. Segments of the population at highest risk for contracting an illness from a pathogen are the very young, the elderly, or individuals who currently experience respiratory or immune deficiencies. These segments of the population are present throughout the region. Additionally, because of the communicable nature of these diseases, tourism centers or areas of high population density, such as the Las Vegas Strip, are considered more at risk. Infectious disease impacts are difficult to evaluate due to the wide variation in disease characteristics. However, infectious diseases can cause human suffering, illness, and death.
- Infestation: Clark County has taken steps to reduce the extent of infestations through laws and regulations. However, due to the transient nature of the invasive species in the County it is likely for the region to experience new infestations. Infestation impacts include: soil erosion; native animal population / biodiversity decline; displacement of native plant species; alteration of wildfire intensity/frequency; and hosts for other plants, insects, and diseases.
- Subsidence and Fissures: The Las Vegas Valley is vulnerable to subsidence and fissures. A broad regional primary subsidence bowl occupies the central portion of the Las Vegas Valley, and three localized secondary subsidence bowls are located in the central (downtown), southern (Las Vegas Strip), and northwestern part of the valley. Additionally, eight zones of fissuring exist within the Las Vegas Valley. While artificial groundwater recharge programs have contributed to stabilizing water levels, increasing groundwater demands from a growing population in region could result in lower water levels and, ultimately, an increase in subsidence rates throughout the Las Vegas Valley. Subsidence and fissure impacts include: residential structure and critical infrastructure failure and serviceability problems; increased flood risk in low-lying areas; and long-term damage to groundwater aquifers and aquatic ecosystems.
- Terrorism: Las Vegas has been identified by the federal government as "high-threat, high-density," with regard to acts of terrorism. In addition to the Las Vegas Strip, the following locations are viewed as potential targets in Clark County: Fremont Street (Las Vegas, Nevada), individual casinos, Las Vegas Convention Center, McCarran International Airport (Las Vegas, Nevada), military bases, and dams. Due to the large number of factors involved, including the various types of terrorist events and the human decision/drive, the impact of a future terrorist event is unknown.

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- Wildfire: Approximately 17.3 percent of land (1,396.1 square miles) in Clark County is located in high to very high wildfire hazard areas. The largest areas susceptible to wildfire are the areas west and north of the Las Vegas Valley. In the 2012 HMP's vulnerability analysis, 1,960 people and 838 residential buildings were located in the high to very high wildfire hazard area. The number of people and buildings at risk to this hazard has slightly decreased; the 2018 HMP vulnerability analysis shows that only 1,396 people and 921 residential buildings are at risk.

4.3 NFIP INSURED REPETITIVE LOSS PROPERTIES

According to FEMA Region IX, as of June 2018, there are a total of 25 Repetitive Loss (RL) properties located in Unincorporated Clark County; with 52 losses equaling \$1,705,220. In the city of Henderson, there are two RL properties, with four losses equaling \$20,837. In the city of Las Vegas there are eight RL properties, with 24 losses totaling \$805,563.

5 MITIGATION STRATEGY

Section 5 – Mitigation Strategy addresses Element C of the Local Mitigation Plan Regulation Checklist.

Regulation Checklist – 44 CFR 201.6 Local Mitigation Plans
Element C: Mitigation Strategy
C1. Does the Plan document each jurisdiction’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))
C2. Does the Plan address each jurisdiction’s participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement § 201.6(c)(3)(i))
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))
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 each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))

5.1 CAPABILITY ASSESSMENT

A capability assessment identifies and evaluates the human and technical, financial, legal, and regulatory resources available for hazard mitigation; and describes the current, ongoing, and recently completed mitigation projects. Capability assessment tables for each participating jurisdiction are provided in jurisdiction-specific appendices (Appendices F – M) and tribal annexes. These tables have been updated since the 2012 HMP to reflect any changes in human and technical resources as well as any changes to the expansion and improvement of existing hazard mitigation policies or programs. In addition, a list of current and recently completed mitigation projects and programs, including those identified in the 2012 HMP’s mitigation action plans, is included in each jurisdiction-specific appendix (Appendices F – M) and tribal annex.

5.2 NFIP PARTICIPATION

The National Flood Insurance Program (NFIP) aims to reduce the impact of flooding to residential and nonresidential buildings. It does so by providing insurance to property owners and by encouraging communities to adopt and enforce floodplain management regulations. As participants of the NFIP, Unincorporated Clark County and each of its cities enforce a floodplain management ordinance and participate in FEMA’s Community Assisted Visits, which occur on a three- to five-year cycle. Specifics regarding the floodplain manager and floodplain management ordinance for Unincorporated Clark County and each city are contained in the capability assessment tables provided the jurisdiction-specific appendices (Appendices F – K) and tribal annexes. **Table 5-1** lists the date of the initially mapped FIRM, the emergency/regular program entrance date into the NFIP and the number of policies in force. Additionally, **Table 5 –1** shows the jurisdictions that participate in the Community Rating System (CRS) program and their level of participation. CRS is a voluntary program for communities that engage in community floodplain management activities, which exceed the minimum NFIP standards. CRS communities benefit from reduced insurance rates and improved floodplain management programs.

Table 5-1. Date of Initially Mapped FIRM and NIP Emergency/Regular Program Entrance Date

Jurisdiction Name	Date of Initially Mapped FIRM	Emergency/Regular Program Entrance Date into NFIP	Number of Policies in Force (10/31/2017)	CRS Program (10/31/2016)
Unincorporated Clark County	9/29/1989	9/29/1989	1,517	6
City of Boulder City	9/16/1981	6/28/1974	18	---
City of Henderson	6/28/1974	8/24/1981	375	5
City of Las Vegas	12/15/1983	12/3/1976	623	5
City of Mesquite	9/28/1984	11/1/1985	64	7
City of North Las Vegas	9/30/1982	1/16/1981	189	6

Sources: FEMA 2017 and 2017. FIRM: Flood Insurance Rate Maps; NFIP: National Flood Insurance Program; CRS: Community Rating System

5.3 MITIGATION GOALS

Mitigation goals are defined as general guidelines that explain what a community wants to achieve in terms of hazard and loss prevention. Goal statements are typically long-range, policy-oriented statements representing community-wide vision. **Table 5-2** shows the goals developed for the 2018 HMP. The updated goals reflect the planning area's focus on disaster resilience.

Table 5-2. Mitigation Goals

Goal Number	Description
1	Reduce loss of life and injury.
2	Minimize damage to structures and property, as well as interruption of essential services and activities.
3	Promote hazard mitigation as an integrated public policy and as a standard business practice.
4	Protect the environment and promote community resiliency.

5.4 POTENTIAL MITIGATION ACTIONS

Mitigation actions are activities, measures, and/or projects that help achieve the goals of a HMP. For the 2018 HMP, a master list of potential mitigation actions to be considered by each jurisdiction is listed in **Table 5-3**. This list addresses every hazard profiled in this plan. It was developed using: FEMA success stories and best management practices; FEMA job aids; local and regional studies; and input from pertinent local government departments and agencies.

Table 5-3. Master List of Potential Mitigation Actions

Project Name	Hazard	Description
Critical Infrastructure Flood Risk Reduction	Flood	Reinforce roads/bridges that are prone to repetitive flooding and/or flash flooding through protection activities, including elevating the roads/bridges and installing/widening culverts beneath the roads/bridges or upgrading storm drains.
Flood Control	Flood, Dam Failure	Alleviate the damage associated with flooding through new and reinforced flood control projects, including storm drains, culverts, drop inlets, channels, and detention basins.
Floodplain and Stream Restoration	Flood	Implement floodplain and stream restoration projects to reduce flood risk and erosion by providing stable reaches and also mitigate drought impacts by providing baseflow recharge, water supply augmentation, floodwater storage, terrestrial and aquatic wildlife habitat, and recreation opportunities by restoring the site's soil, hydrology and vegetation conditions that mimic pre-development channel flow and floodplain connectivity.
Critical Facilities & Infrastructure Seismic Retrofit or Replacement	Earthquake, Dam Failure	Seismically retrofit or replace critical facilities and infrastructure that are categorized as structurally deficient and are located in strong to very strong ground shaking areas, and/or are necessary to use during and/or immediately after a disaster or emergency.
Unreinforced Masonry Database	Earthquake	Continue to update and validate the Clark County Unreinforced Masonry (URM) Inventory Database by undertaking the following activities: complete screening for structures that were not able to be screened during this phase of the project; expand the scope of project to include screening of URMs within the incorporated cities in Clark County; prepare a GIS enabled map layer showing the validated database of URM structures; work collectively with state and local officials to determine the next appropriate step in mitigating the potential hazards associated with URM structures.
NIPP's Security and Resilience Challenge	Hazardous Materials, Terrorism	Strengthen the security and resilience of critical infrastructure through state-of-the-art, cost-effective technology, tools, processes and methods as part of the 2017 National Infrastructure Protection Plan's (NIPP) Security and Resilience Challenge.
Fuel Management	Wildfire	Reduce the understory fuel around lines, areas or zones where structures and other human development meet or intermingle with underdeveloped wildland or vegetative fuels. Focus should be placed on larger areas (including those surrounding neighborhoods that have varying degrees of fire resistance and defensible space) that have a history of large destructive fires and a high-density concentration of understory fuel.
Defensible Space	Wildfire	Create defensible space around new and existing isolated critical facilities and infrastructure by reducing the wildland fuel load and altering vegetative patterns. Efforts to create defensible space may include one or more of the following: mechanical/manual treatment, mowing/mastication, hand thinning/brushing, chaining, livestock grazing, seeding, control burn, greenstripping/brownstripping, and seeding.

Table 5-3. Master List of Potential Mitigation Actions

Project Name	Hazard	Description
Emergency Power	Earthquake, Flood, Climate Change, Wildfire	Provide additional emergency power, such as generator equipment, for new and existing critical facilities to operate continuously but is not possible for long durations of power outage.
Mosquito Abatement Program	Infectious Disease, Infestation	Continue the County-wide Vector Surveillance Program for early warning disease introduction and the County-wide long term abatement program to target treatment areas, particularly those prone to flooding.
Aquifer Storage and Recovery or Aquifer Recharge and Recovery	Drought, Subsidence & Fissures	Maximize the use of recycled water in areas where return flow to the Colorado River system is not practical, by creating aquifer storage and recovery (ASR). Source waters for injection into ASR wells range from potable water, reclaimed water, partially treated surface water, and raw groundwater. A subset of ASR is Aquifer Recharge and Recovery (ARAR), where water is recharged to an aquifer either under gravity (spreading basins) or injected (wells) for the purpose of recharging the aquifer.

5.5 MITIGATION ACTION PLANS

A mitigation action plan is a proposed list of actions that a jurisdiction hopes to implement to reduce its' risks and vulnerabilities. Each jurisdiction and tribe developed its' own mitigation action plan by selecting mitigation actions listed in **Table 5-3** that met the prioritization criteria listed below. The 2018 HMP prioritization criteria is based on similar criteria used in the 2014 – 2018 Clark County Capital Improvement Program and the 2017 FEMA Pre-Disaster Mitigation Grant Program and considers the following:

- Mitigation actions that are critical or essential to remedy or prevent a major health/safety hazard.
- Mitigation actions that align with the jurisdiction's general/comprehensive plan, master plan, capital improvement plan and/or other regional planning and policy efforts.
- Mitigation actions that are economically justifiable and outside agency grants may be available.
- Mitigation actions that address the top priority hazards for each jurisdiction based on the 2018 HMP's hazard analysis and vulnerability analysis.
 - o Unincorporated Clark County: climate change, earthquake, flood, mosquito abatement, wildfire
 - o City of Boulder City: climate change, earthquake, flood
 - o City of Henderson: climate change, earthquake, flood
 - o City of Las Vegas: climate change, drought, earthquake, flood, hazardous materials/terrorism
 - o City of Mesquite: climate change, earthquake, flood
 - o North Las Vegas: climate change, earthquake, flood
 - o Clark County School District: climate change, earthquake, flood
 - o Clark County Water Reclamation District: climate change, earthquake, flood, mosquito abatement

o Las Vegas Paiute Tribe: climate change, earthquake, flood

o Moapa Band of Paiutes: climate change, earthquake, flood

Each jurisdiction's mitigation action plan is included in that jurisdiction's appendix or tribal annex. Each mitigation action plan includes a description of the selected priority mitigation action; additional information if available (the potential facility(ies), location(s) to be mitigated), the department or agency responsible for implementing the mitigation action; and the implementation time frame for the mitigation action.

5.6 PLAN INTEGRATION

The 2018 HMP integration process will follow a similar one developed for the 2012 HMP. This process ensured that elements of that plan were incorporated into other relevant planning documents including: 2016 Clark County Flood Control District Master Plan (2012 HMP mitigation action plan); 2016 State of Nevada and Las Vegas Urban Area THIRA and SPR Report (2012 HMP hazard profiles); and the 2017 – 2021 Clark County Capital Improvement Program (2012 HMP mitigation action plan).

As such, members on the Multi-Agency Work Group (**Table 2.1**) will work with their respective jurisdictions to incorporate elements of the 2018 HMP into other relevant local planning documents as they are created or updated, including:

- Activity 1: 2018 HMP's hazard analysis and mitigation strategy sections into the safety elements of general plans.
- Activity 2: 2018 HMP's hazard analysis and vulnerability analysis sections into emergency operation or emergency response plans (or hazard-specific annexes).
- Activity 3: 2018 HMP's vulnerability analysis section in the 2018 HMP into emergency preparedness public information and related outreach efforts.
- Activity 4: 2018 HMP's Mitigation Action Plans into capital improvement plans/programs.

Additionally, the 2018 HMP POC will be the lead to incorporate elements of the 2018 HMP into the following regional efforts:

- Activity 1: 2018 HMP's hazard analysis section into the 2018 State of Nevada and Las Vegas Urban Area THIRA and SPR Report.
- Activity 2: 2018 HMP's hazard analysis section into the Southern Nevada Strong Regional Plan (to include improving safety and protecting residents from all hazards).

6 PLAN ADOPTION

Section 6 – Plan Adoption addresses Element E of the Local Mitigation Plan Regulation Checklist.

Regulation Checklist – 44 CFR 201.6 Local Mitigation Plans	
Element E: Plan Adoption	
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))	
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	

6.1 FORMAL ADOPTION

The 2018 HMP was formally adopted by the Clark County Commission via resolution on February 20, 2018. A scanned copy of the resolution will be sent to FEMA and inserted in Appendix A.

6.2 MULTI-JURISDICTIONAL PLANS

Following the adoption of the 2018 HMP by the Clark County Commission, each jurisdiction and tribe's governing body will adopt this 2018 HMP by resolution. Each jurisdiction and tribe will send a scanned copy of its resolution to Nevada DEM and FEMA. The Clark County POC will also keep a copy of each resolution on file.

APPENDICES

Appendix A – Local Mitigation Plan Review Tool and Adoption Resolutions

Jurisdiction: Unincorporated Clark County City of Boulder City City of Henderson City of Las Vegas City of Mesquite City of North Las Vegas Clark County School District Clark County Water Reclamation District	Title of Plan: Clark County 2017 Multi-Jurisdictional Hazard Mitigation Plan	Date of Plan:
Local Point of Contact: Irene Navis	Address: Clark County Fire Department 575 E. Flamingo Road Las Vegas, NV 89119	
Title: Planning Coordinator		
Agency: Clark County Office of Emergency Management		
Phone Number: (702)455-5715	E-Mail: iln@clarkcountynv.gov	

State Reviewer:

Title:

Date:

FEMA Reviewer:	Title:	Date:
Date Received in FEMA Region <i>(insert #)</i>		
Plan Not Approved		
Plan Approvable Pending Adoption		
Plan Approved		

SECTION 1: REGULATION CHECKLIST

INSTRUCTIONS: The Regulation Checklist must be completed by FEMA. The purpose of the Checklist is to identify the location of relevant or applicable content in the Plan by Element/sub-element and to determine if each requirement has been ‘Met’ or ‘Not Met.’ The ‘Required Revisions’ summary at the bottom of each Element must be completed by FEMA to provide a clear explanation of the revisions that are required for plan approval. Required revisions must be explained for each plan sub-element that is ‘Not Met.’ Sub-elements should be referenced in each summary by using the appropriate numbers (A1, B3, etc.), where applicable. Requirements for each Element and sub-element are described in detail in this *Plan Review Guide* in Section 4, Regulation Checklist.

1. REGULATION CHECKLIST		Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)				
ELEMENT A. PLANNING PROCESS				
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))	Section 2.1 Overview of the 2018 Planning Process			
A2. Does the Plan document an opportunity for neighboring communities, local 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? (Requirement §201.6(b)(2))	Section 2.5 Opportunities for Stakeholders			
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	Section 2.4 Public Involvement and Continued Public Involvement			
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	Section 2.2 Planning Process			
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	Section 2.4 Public Involvement and Continued Public			
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))	Section 2.6 Plan Update Method and Schedule			
<u>ELEMENT A: REQUIRED REVISIONS</u>				

1. REGULATION CHECKLIST		Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)				
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT				
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))	Section 3.2 Hazard Profiles. "Type" (referred to as "Nature"), "location" and "extent/severity" for each hazard.			
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))	Section 3.2 Hazard Profiles. "History" and "Recurrence Probability" for each hazard.			
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 §201.6(c)(2)(ii))	Section 4.2 Summary of Impacts. Jurisdiction-specific vulnerability tables (Appendices F-M).			
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))	Section 4.3 NFIP-Insured Repetitive Loss Properties.			
<u>ELEMENT B: REQUIRED REVISIONS</u>				
ELEMENT C. MITIGATION STRATEGY				
C1. Does the plan document each jurisdiction'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))	Section 5.1 Capability Assessment. Jurisdiction-specific tables (Appendices F-M), specifically Legal and Regulatory Resources for Hazard Mitigation and Recent Hazard Mitigation Policies and Programs tables.			

C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))	Section 5.2 NFIP Participation. Jurisdiction-specific tables (Appendices F-K) specifically Human and Technical Resources for Hazard Mitigation table.		
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	Section 5.3 Mitigation Goals		
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))	Section 5.4 Potential Mitigation Actions		
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 each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))	Section 5.5 Mitigation Action Plans		
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))	Section 5.6 Plan Integration		
<u>ELEMENT C: REQUIRED REVISIONS</u>			

1. REGULATION CHECKLIST		Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)				
ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates only)				
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))	Section 4.2 Summary of Impacts			
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	Jurisdiction-specific tables (Appendices F- M), specifically Recent Hazard Mitigation Policies and Programs tables.			
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	Section 5.5 Mitigation Action Plans			
<u>ELEMENT D: REQUIRED REVISIONS</u>				
ELEMENT E. PLAN ADOPTION				
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))	Section 6.1 Formal Adoption			
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	Section 6.2 Multi- Jurisdictional Plans			
<u>ELEMENT E: REQUIRED REVISIONS</u>				
ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)				
F1.				
F2.				
<u>ELEMENT F: REQUIRED REVISIONS</u>				

INSTRUCTIONS: For multi-jurisdictional plans, a Multi-jurisdiction Summary Spreadsheet may be completed by listing each participating jurisdiction, which required Elements for each jurisdiction were ‘Met’ or ‘Not Met,’ and when the adoption resolutions were received. This Summary Sheet does not imply that a mini-plan be developed for each jurisdiction; it should be used as an optional worksheet to ensure that each jurisdiction participating in the Plan has been documented and has met the requirements for those Elements (A through E).

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Appendix B – Figures

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Appendix C – Multi-Agency Working Group

CLARK COUNTY OFFICE OF EMERGENCY MANAGEMENT

2018 HAZARD MITIGATION PLAN UPDATE WORKSHOP

AGENDA

September 14, 2017

Welcome and Overview of Agenda

Review of Work Plan (confirm tasks, milestones, and deadlines)

- ✓ Tasks accomplished or in process
- ✓ Tasks to be accomplished
- ✓ Brainstorm additional resources/inputs needed to complete plan

Discuss/refine strategy and resources needed to accomplish Work Plan

Discuss coordination and strategy for plan outreach and approval steps

- ✓ Brainstorm outreach mechanisms
- ✓ Discuss timing of outreach
- ✓ Discuss timing of approval of adoption resolutions

Next Steps (future meetings, assignments, deliverables)

CLARK COUNTY OFFICE OF EMERGENCY MANAGEMENT

2018 HAZARD MITIGATION PLAN UPDATE WORKSHOP

AGENDA

October 23, 2017, 9-11am

Welcome and Overview of Agenda

Progress Made-to-Date

- ✓ Public Outreach
- ✓ Stakeholder Outreach
- ✓ Streamlined Format
- ✓ Hazard Profiles
- ✓ GIS: Updated Hazard and Asset Information
- ✓ CRS Activity 510 Floodplain Management Planning
- ✓ Mitigation Goals
- ✓ Common Draft Mitigation Actions

Documents Needed / Next Steps

- ✓ Capability Assessment Tables (Friday, Oct 27)
 - o Human and Technical Resources for Hazard Mitigation
 - o Financial Resources for Hazard Mitigation
 - o Legal and Regulatory Resources for Hazard Mitigation
 - o Current, Ongoing, and Completed Hazard Mitigation Projects & Programs
- ✓ 2017 Potential Mitigation Actions (TBD)
- ✓ 2017 Prioritized Mitigation Action Plan (TBD)

Final Steps

- ✓ 2018 Initial Draft HMP (TBD)
- ✓ 2018 Final Draft HMP (TBD)
- ✓ 2018 State/FEMA Review (TBD)
- ✓ Adoption by Resolution (TBD)
- ✓ Tribal Annexes (TBD)

CLARK COUNTY OFFICE OF EMERGENCY MANAGEMENT

2018 HAZARD MITIGATION PLAN UPDATE WORKSHOP

AGENDA

February 5, 2018, 2-3:30 pm

Welcome and Overview of Agenda

Progress Made-to-Date

- ✓ Streamlined Format
- ✓ Initial Draft HMP
- ✓ Public and Stakeholder Outreach

Next Steps

- ✓ Final Draft HMP
- ✓ County Adoption by Resolution (Tuesday, Feb 20)
- ✓ Nevada DEM / FEMA Review
- ✓ Jurisdiction Adoption by Resolution
- ✓ Tribal Annexes (March)

FEMA Grant Funding

- ✓ FEMA Hazard Mitigation Assistance Program Guidance:
<https://www.fema.gov/hazard-mitigation-assistance-program-guidance>
- ✓ FEMA Pre-Disaster Mitigation (PDM) Grant Program
- ✓ FEMA Hazard Mitigation Grant Program (HMGP)

Appendix D – Public and Stakeholder Outreach



News Release

County Commission:
Steve Sisolak, Chairman
Chris Giunchigliani, Vice Chair
Susan Brager
Larry Brown
James B. Gibson
Marilyn Kirkpatrick
Lawrence Weekly

Yolanda King, County Manager

Office of Public Communications • (702) 455-3546 • FAX (702) 455-3558 • www.ClarkCountyNV.gov

Contact: Stacey Welling
Sr. Public Information Officer

Phone: (702) 455-3201
Cell: (702) 249-3823
E-mail: stac@ClarkCountyNV.gov

For Immediate Release

Tuesday, Jan 23, 2018

Hazard Mitigation Plan to be Updated in 2018

Clark County, in cooperation with the cities of Boulder City, Henderson, Las Vegas, North Las Vegas, Mesquite, the Las Vegas Band of Paiutes and the Moapa Band of Paiutes, and the Clark County School District (CCSD) and the Clark County Water Reclamation District (CCWRD), has conducted a countywide effort to re-assess risks posed by natural, technological and human-caused disasters and identify ways to mitigate those risks.

Hazard Mitigation planning is important to a community because it lowers risks associated with disasters," said Clark County Deputy Fire Chief John Steinbeck, who oversees the County's Office of Emergency Management. "Lower risks can result in reduced costs for homeowner's insurance and flood insurance, for example. Maintaining this plan also helps us to be eligible for project funds for mitigation projects."

The planning process will result in the update of the Hazard Mitigation Plan (HMP). The County developed its first HMP in 2007, updated the plan in 2012, and is in the process of completing the current update. An up-to-date plan is required under the Federal Disaster Mitigation Act of 2000 in order to be eligible to continue to receive certain forms of non-emergency disaster assistance.

The County's 2012 HMP draft can be found at:

http://www.clarkcountynv.gov/fire/oem/Documents/2012-10_FINAL_Clark_HMP_Oct_.pdf#search=Hazard%20Mitigation. A draft of the 2018 plan is expected to be posted in February for review.

To learn more about the 2018 HMP update process, please contact the Office of Emergency Management via email at OEM@ClarkCountyNV.gov or phone at (702) 455-5710.

###

Clark County is a dynamic and innovative organization dedicated to providing top-quality service with integrity, respect and accountability. With jurisdiction over the world-famous Las Vegas Strip and covering an area the size of New Jersey, Clark is the nation's 14th-largest county and provides extensive regional services to more than 2.2 million citizens and 46.2 million visitors a year. Included are the nation's 8th-busiest airport, air quality compliance, social services and the state's largest public hospital, University Medical Center. The County also provides municipal services that are traditionally provided by cities to about 951,000 residents in the unincorporated area. Those include fire protection, roads and other public works, parks and recreation, and planning and development.

Clark County news releases may be found at www.ClarkCountyNV.gov.
You may also follow the County on more than 40 social media sites, including
Facebook, Twitter, Instagram, LinkedIn, Pinterest and YouTube.



Las Vegas Sun

Clark County's hazard plan to cover climate change

By *Yvonne Gonzalez*

Wed, Jan 31, 2018 (2 a.m.)

The dangers of climate change will be addressed for the first time in Clark County's hazard mitigation plan.

Southern Nevada officials from the county to the Moapa Band of Paiutes are updating the plan to remain eligible for federal disaster mitigation and response funding. Clark County Assistant Emergency Manager Irene Navis said the Federal Emergency Management Agency administers the program and in 2015 added climate change to its requirements for communities to address.

The plan references climate change and its related threats, such as drought, wildfires and flooding. Las Vegas recently broke a streak of 116 rainless days, not enough to end the region's ongoing drought.

"All of those hazards can be tied back to climate change overall," Navis said. "Since we're in, for example, 10 years of a drought, dry vegetation can contribute to the potential for wildfires, can also contribute to flash flooding and that sort of thing."

Climate change has largely been wiped from federal agencies' radar under President Donald Trump, though a recent federal report did conclude that "it is extremely likely that human influence has been the dominant cause of the observed warming since the mid-20th century."

The plan keeps agencies eligible for hazard mitigation dollars and, in the event of an emergency, can be used to tap additional federal dollars. Navis said the government provides 75 percent of the funds, while the county accounts for the remainder in a soft match using dollars, resources and manpower.

The government kicked in \$150,000 for this most recent plan update and the research associated with it, and the county accounted for \$50,000, Navis said.

"The feds expect us to spend the funding on either preparation for hazard mitigation or as a justification for future mitigation projects," she said.

The plan was originally developed in 2007 and updated in 2012. Residents can provide feedback on the new version when it is released in February. Navis said major updates come every five years, but officials also hold a tabletop exercise to review and adjust the plan annually.

After flooding in 2014, Navis said, the Moapa Band of Paiutes issued a disaster declaration but couldn't access federal reimbursement dollars until they were annexed into the county's plan. The move made the tribe eligible to apply for up to \$1 million in reimbursement, she said.

"They would have gotten partial reimbursement on some of the costs, but they wouldn't have been able to get reimbursement on the mitigation measures," Navis said. "So it's really important to have that in place for eligibility reasons, for insurance reasons, and for making sure that we have a plan that all agencies can turn to."

Navis said pre-disaster mitigation grant funding is helping to fund a study on unreinforced masonry, buildings that may be more at risk if an earthquake hits the Las Vegas Valley.

Structures built before the 1970s are potentially unreinforced masonry construction, she said, though Navis would not name any specific structures that had been identified in town.

Hazard mitigation studies also help boost the community's rating for flood and homeowners insurance.

"Hazard mitigation planning is important to a community because it lowers risks associated with disasters," said Clark County Deputy Fire Chief John Steinbeck, who oversees the county's Office of Emergency Management, in a Jan. 23 news release.

"Lower risks can result in reduced costs for homeowners insurance and flood insurance, for example. Maintaining this plan also helps us to be eligible for project funds for mitigation projects."

The multi-agency plan includes the county, Boulder City, Henderson, Las Vegas, North Las Vegas, Mesquite, the Las Vegas Band of Paiutes and the Moapa Band of Paiutes, the Clark County School District and the Clark County Water Reclamation District.

The plan is expected to be published on the county website the first week of February for the public to review. Copies will also be sent to the state emergency management office as well as FEMA for approval.

Climate Change Officially Addressed in Clark County Hazard Mitigation Plan

It's a grant funding requirement but fits neatly in the county's 2018 plan.

BY JIM MCKAY / FEBRUARY 15, 2018



In Clark County, Nev.'s 2018 Multijurisdictional Hazard Mitigation Plan you'll find a section on climate change, and the issue is addressed throughout.

It's an important piece of the document because addressing the issue is a requirement for jurisdictions to receive hazard funding and undertake certain future projects.

To receive \$150,000, the county was required to address, in future mitigation plans, climate change and related threats that the county faces. Jurisdictions applying for the Pre-Disaster Mitigation Grant are required to address the nature of the issue, history, location, extent, severity and recurrence of the hazard as it relates to climate change.

You can find in Clark County's plan a section devoted to climate change, the history of its scientific discovery, how it is defined as well as related hazards facing the county. Persistent drought, wildfires, even damn safety and pandemics are addressed in the plan.

"The reason that we addressed it in this plan and hadn't in previous plans is that this particular plan is funded under the grant for fiscal 2015 that required that mitigation plans using those funds are required to address climate change," said Assistant Emergency Manager Irene Navis.

She said the plan itself didn't have to be changed drastically from what it would normally have been, but the language used needed to be specific to addressing climate change.

"We tie in which hazards fall under climate change mitigation strategies, like drought, wildfire and the potential risks associated with climate change have always been part of the hazard mitigation planning process, but this is the first time we've specifically called it out to meet a requirement."

This is common when applying for federal grants, such as homeland security grants. Navis said seven years ago the buzzword was interoperability but that's gone, replaced with cybersecurity. "Now you can't open up a grant application process guideline without seeing the word cybersecurity in it," she said.

Clark County Deputy Fire Chief John Steinbeck, who is also in charge of the Office of Emergency Management, said, "Hazard mitigation planning is important to a community because it lowers risks associated with disasters. Lower risks can result in reduced costs for homeowners insurance and flood insurance. Maintaining the plan also helps us to be eligible for project funds for mitigation projects."

Clark County is desert and receives little rainfall but is right now in the middle of an even dryer spell, so the county has to be mindful of wildfires and flash floods. Part of the mitigation effort includes investing in fuel reduction and that fits neatly in the realm of climate change mitigation.

"Climate change is a term used to describe a long-term condition," Navis said. "I think the best change is the scope of our mitigation measures over time. For example, investing in flood control measures may make us take a longer look over time as opposed to immediate needs."

Navis said the reason the Carpenter 1 fire in Nevada in 2013 was so difficult to fight was because of an excess of vegetation that acted as fuel and made

response difficult. “That is one example of how change over time and conditions can cause additional dangers. We have to look at it in hazard mitigation planning and see what needs to be addressed.”

<http://www.govtech.com/em/disaster/Climate-Change-Officially-Addressed-in-Clark-County-Hazard-Mitigation-Plan.html>

Contact: Stacey Welling

Phone: (702) 455-3201

Email: Stac@ClarkCountyNV.gov

2/16/2018

2018 Hazard Mitigation Plan Now Posted Online

Clark County, in cooperation with the cities of Boulder City, Henderson, Las Vegas, North Las Vegas, Mesquite, the Las Vegas Band of Paiutes and the Moapa Band of Paiutes, the Clark County School District (CCSD) and the Clark County Water Reclamation District (CCWRD), has completed a countywide effort to re-assess risks posed by natural, technological and human-caused disasters and identify ways to mitigate those risks.

The planning process has resulted in an update of the Hazard Mitigation Plan (HMP). The County developed its first HMP in 2007, updated the plan in 2012. An up-to-date plan is required under the Federal Disaster Mitigation Act of 2000 in order to be eligible to continue to receive certain forms of non-emergency disaster assistance.

A resolution to adopt the plan is scheduled for the **Feb. 20, 2018**, Board of County Commissioners meeting at **9 a.m.** The County's 2018 Hazard Mitigation Plan update can be found on our Fire Department's Office of Emergency Management website pages under Community Emergency Plans at: [2018 Hazard Mitigation Plan](#).

To learn more about the 2018 HMP update process or to provide comments, please contact the Office of Emergency Management via email at OEM@ClarkCountyNV.gov or phone at (702) 455-5710.

###

Clark County is a dynamic and innovative organization dedicated to providing top-quality service with integrity, respect and accountability. With jurisdiction over the world-famous Las Vegas Strip and covering an area the size of New Jersey, Clark is the nation's 14th-largest county and provides extensive regional services to more than 2.2 million citizens and 46.2 million visitors a year. Included are the nation's 8th-busiest airport, air quality compliance, social services and the state's largest public hospital, University Medical Center. The County also provides municipal services that are traditionally provided by cities to about 954,000 residents in the unincorporated area. Those include fire protection, roads and other public works, parks and recreation, and planning and development.

• [© Copyright 2015 Clark County, NV](#)

<http://www.clarkcountynv.gov/public-communications/news/Pages/2018-Hazard-Mitigation-Plan-Now-Posted-Online.aspx>

Stakeholder Notification for the 2018 Clark County Hazard Mitigation Plan Update

January 30, 2018

Clark County, in cooperation with the cities of Boulder City, Henderson, Las Vegas, North Las Vegas, Mesquite, the Las Vegas Band of Paiutes and the Moapa Band of Paiutes, and the Clark County School District (CCSD) and the Clark County Water Reclamation District (CCWRD) has launched a countywide effort to re-assess risks posed by natural, technological and human-caused disasters and identify ways to mitigate those risks.

The planning process will result in the update of the Hazard Mitigation Plan (HMP). The County developed its first HMP in 2007 and updated the plan in 2012. The 2018 HMP planning process began in 2017, and is in its final stages of completion. A current plan is required under the Federal Disaster Mitigation Act of 2000 in order to be eligible to continue to receive certain forms of non-emergency disaster assistance.

The County's 2012 HMP can be found at:

http://www.clarkcountynv.gov/fire/oem/Documents/2012-6-14_REVIEW_DRAFT_Clark_County_HMP_2012.pdf#search=clark%20county%20hazard%20mitigation. Once an updated draft is completed, it will be posted to Clark County's website for review.

To learn more about Clark County's Hazard Mitigation Plan update for 2018, please contact Clark County's Office of Emergency Management & Homeland Security at [\(702\)455-5710](tel:7024555710).

Stakeholder Notification for the 2018 Clark County Hazard Mitigation Plan Update

February 13, 2018

Clark County, in cooperation with the cities of Boulder City, Henderson, Las Vegas, North Las Vegas, Mesquite, the Las Vegas Band of Paiutes and the Moapa Band of Paiutes, and the Clark County School District (CCSD) and the Clark County Water Reclamation District (CCWRD) has launched a countywide effort to re-assess risks posed by natural, technological and human-caused disasters and identify ways to mitigate those risks.

The County's 2018 HMP has been completed and can be found at: http://www.clarkcountynv.gov/fire/oem/Documents/General%20Documents/Clark%20County%20HMP_021218.pdf

A resolution adopting the HMP update is scheduled for the 2/20/18 Board of County Commissioners meeting at 9:00 a.m.

To learn more about Clark County's Hazard Mitigation Plan update for 2018, please contact Clark County's Office of Emergency Management & Homeland Security at [\(702\) 455-5710](tel:7024555710).

Appendix E – Plan Maintenance Documents

2018 Clark County HMP - Annual Review Worksheet

HMP Section	Questions	Yes	No	Comments
PLANNING PROCESS	Has your jurisdiction done any public outreach activities regarding the HMP or a mitigation project? If yes, please describe.			
	Has your jurisdiction integrated any of the HMP's elements into other plans or policies? If yes, please describe.			
HAZARD ANALYSIS	Has the natural and/or human-caused disaster occurred in this reporting period for your jurisdiction?			
	Are there natural and/or human-caused hazards that have not been addressed in this HMP and should be?			
	Are additional maps or new hazard studies available in your jurisdiction (or regionally or nationally)? If so, what are they?			
VULNERABILITY ANALYSIS				
	Have there been changes in development trends that could create additional risks?			
MITIGATION STRATEGY	Are there different or additional resources (financial, technical, and human) that are now available for mitigation planning?			
	Should new mitigation actions be added? Should any existing mitigation actions be deleted?			

2018 Clark County HMP - Mitigation Project Progress Report

Progress Report Period From (date):		To (date):	
Project Title:			
Project ID:			
Description of Project:			
Implementing Agency:			
Supporting Agencies:			
Contact Name:			
Contact E-mail:			
Contact Number:			
Grant/Finance Administrator:			
Total Project Cost:			
Anticipated Cost Overrun/Underrun:			
Date of Project Approval:			
Project Start Date:			
Anticipated Completion Date:			

Summary of Progress of Project for this Reporting Period**1. What was accomplished during this reporting period?****2. What obstacles, problems, or delays did the project encounter, if any?****3. How were the problems resolved?**

Appendix F – Unincorporated Clark County

Table F-1. Unincorporated Clark County: Land Area, Population, Residential Buildings and Critical Facilities and Infrastructure

Category	Number
Land (square miles)	7,432.4
Population	978,122
Residential Buildings	363,783
Critical Facilities & Infrastructure	798

Table F-2. Unincorporated Clark County Vulnerability, Land Area

Hazard	Number (square miles)	% of Total
Earthquake – Very Strong Ground Shaking	3,949.3	53.1
Earthquake – Strong Ground Shaking	3,426.4	46.1
Earthquake – Liquefaction	96.3	1.3
Flood – 100 Year Floodplain	338	4.5
Flood – 500 Year Floodplain	33.1	0.4
Wildfire – Very High	111.7	1.5
Wildfire – High	1,284.2	17.3

Table F-3. Unincorporated Clark County Vulnerability, Population

Hazard	Population	% of Total
Earthquake – Very Strong Ground Shaking	564,898	57.8
Earthquake – Strong Ground Shaking	418,607	42.8
Earthquake – Liquefaction	483,224	49.4
Flood – 100 Year Floodplain	54,790	5.6
Flood – 500 Year Floodplain	125,500	12.8
Wildfire – Very High	222	0.02
Wildfire – High	1,173	0.1

Table F-4. Unincorporated Clark County Vulnerability, Residential Buildings

Hazard	Residential Buildings	% of Total
Earthquake – Very Strong Ground Shaking	186,768	51.3
Earthquake – Strong Ground Shaking	176,988	48.7
Earthquake – Liquefaction	189,421	52.1
Flood – 100 Year Floodplain	25,075	6.9
Flood – 500 Year Floodplain	46,165	12.7
Wildfire – Very High	108	0.03
Wildfire – High	813	0.2

Table F-5. Unincorporated Clark County Vulnerability, Critical Facilities and Infrastructure

Hazard	Critical Facilities	% of Total
Earthquake – Very Strong Ground Shaking	478	59.9
Earthquake – Strong Ground Shaking	320	40.1
Earthquake – Liquefaction	445	55.8
Flood – 100 Year Floodplain	224	28
Flood – 500 Year Floodplain	165	20.7
Wildfire – Very High	1	0.1
Wildfire – High	17	2.1

Table F-6. Unincorporated Clark County Human and Technical Resources for Hazard Mitigation

Staff/Personnel Resources	Department or Agency	Principal Activities Related to Hazard Mitigation
Planner(s), engineer(s) and technical staff with knowledge of land development, land management practices, and human-caused and natural hazards.	Comprehensive Planning	Develops and maintains the General Plan, including the Safety Element. Develops area plans based on the General Plan, to provide more specific guidance for the development of more specific areas. Reviews private development projects and proposed capital improvements projects and other physical projects involving property for consistency and conformity with the General Plan. Anticipates and acts on the need for new plans, policies, and code changes. Applies the approved plans, policies, code provisions, and other regulations to proposed land uses.
Engineer(s), Building Inspectors/Code Enforcement Officers or other professional(s) and technical staff trained in construction requirements and practices related to existing and new buildings.	Clark County Building Department	Oversees the effective, efficient, fair, and safe enforcement of the Nevada Building Code.
Engineers, construction project managers, and supporting technical staff.	Clark County Public Works	Provides direct or contract civil, structural, and mechanical engineering services, including contract, project, and construction management.
Engineer(s), project manager(s), technical staff, equipment operators, and maintenance and construction staff.	Clark County Public Works	Maintains and operates of a wide range of local equipment and facilities as well as providing assistance to members of the public. These include providing sufficient clean fresh water, reliable sewer services, street maintenance, storm drainage systems, street cleaning, street lights and traffic signals.

Table F-6. Unincorporated Clark County Human and Technical Resources for Hazard Mitigation

Staff/Personnel Resources	Department or Agency	Principal Activities Related to Hazard Mitigation
Floodplain Administrator	Clark County Public Works Development Services & Clark County Regional Flood Control District	Enforces the jurisdiction's floodplain management ordinance, which that new development proposals do not increase flood risk, and that new developments are not located below the 100 year flood level. In addition, the Floodplain Administrator is responsible for planning and managing flood risk reduction projects throughout the jurisdiction.
Emergency Manager	Clark County Emergency Management	Maintains and updates the Emergency Operations Plan for the local jurisdiction. In addition, coordinates local response and relief activities within the Emergency Operation Center, and works closely with county, state, and federal partners to support planning and training and to provide information and coordinate assistance.
Procurement Services Manager	Purchasing and Contracts	Provides a full range of municipal financial services, administers several licensing measures, and functions as the local jurisdiction's procurement services manager.
Comptroller	Comptroller's Office	Provides financial services including grant financial services.
District Attorney	District Attorney's Office	Provides legal services.
Fire Chief	Fire Department	Provides fire protection services including response, fire prevention, and mitigation activities.
Sheriff	Sheriff's Civil Division	Provides law enforcement services.

Table F-7. Unincorporated Clark County Financial Resources for Hazard Mitigation

Type	Administrator	Purpose	Amount
General Fund	Finance Department	Program operations and specific projects.	Variable.
General Obligation Bonds	Finance Department	General obligation bonds are appropriately used for the construction and/or acquisition of improvements to real property broadly available to residents and visitors. Such facilities include, but are not limited to, libraries, hospitals, parks, public safety facilities, and cultural and educational facilities.	Variable.
Special Tax and Revenue Bonds	Comptroller	Revenue bonds are used to finance capital projects that 1) have an identified budgetary stream for repayment (e.g., specified fees, tax receipts); 2) generate project revenue but rely on a broader pledge of general fund revenues to reduce borrowing costs; or 3) finance the acquisition and installation of equipment for the local jurisdiction's general governmental purposes.	Variable.
Wildfire Emergency and Mitigation Funds	Nevada Division of Forestry	Administers funding from FEMA, BLM, and U.S. Forest Service for certain types of wildfire emergency and mitigation funding	Project-specific.
Earthquake Mitigation Funds	Nevada Earthquake Safety Council	Allocates FEMA money for earthquake mitigation efforts	Project-specific.
Water Preservation Funds	SNWA	Provides incentives to preserve water	Project-specific.
Hazard Mitigation Grant Program	FEMA	Supports pre- and post-disaster mitigation plans and projects. Available to Nevada communities after a presidentially declared disaster has occurred in Nevada.	Grant award based on specific projects as they are identified.
Pre-Disaster Mitigation grant program	FEMA	Supports pre-disaster mitigation plans and projects. Available on an annual basis as a nationally competitive grant.	Grant award based on specific projects as they are identified.
Flood Mitigation Assistance grant program	FEMA	Mitigates repetitively flooded structures and infrastructure. Available on an annual basis, distributed to Nevada communities by the Nevada DEM.	Grant award based on specific projects as they are identified.

Table F-7. Unincorporated Clark County Financial Resources for Hazard Mitigation

Type	Administrator	Purpose	Amount
Assistance to Firefighters Grant Program	FEMA/USFA	Provides equipment, protective gear, emergency vehicles, training, and other resources needed to protect the public and emergency personnel from fire and related hazards. Available to fire departments and nonaffiliated emergency medical services providers.	Grant awards based on specific projects as they are identified.
Community Block Grant Program Entitlement Communities Grants	U.S. HUD	Acquisition of real property, relocation and demolition, rehabilitation of residential and non-residential structures, construction of public facilities and improvements, such as water and sewer facilities, streets, neighborhood centers, and the conversion of school buildings for eligible purposes.	Grant award based on specific projects as they are identified.
Community Action for a Renewed Environment	U.S. EPA	Through financial and technical assistance offers an innovative way for a community to organize and take action to reduce toxic pollution (i.e., stormwater) in its local environment. Through this program, a community creates a partnership that implements solutions to reduce releases of toxic pollutants and minimize people's exposure to them.	Grant award based on specific projects as they are identified.
Clean Water State Revolving Fund	U.S. EPA	A loan program that provides low-cost financing to eligible entities within state and tribal lands for water quality projects, including all types of non-point source, watershed protection or restoration, estuary management projects, and more traditional municipal wastewater treatment projects.	Variable.
Public Health Emergency Preparedness Cooperative Agreement.	CDC	Funds are intended to upgrade state and local public health jurisdictions' preparedness and response to bioterrorism, outbreaks of infectious diseases, and other public health threats and emergencies.	Grant award based on specific projects as they are identified.
Homeland Security Preparedness Technical Assistance Program	FEMA/DHS	Build and sustain preparedness technical assistance activities in support of the four homeland security mission areas (prevention, protection, response, recovery) and homeland security program management.	Grant award based on specific projects as they are identified.

Table F-8. Unincorporated Clark County Legal and Regulatory Resources for Hazard Mitigation

Name	Description (Effect on Hazard Mitigation)	Hazards Addressed	Emergency Management	Affects Development
Comprehensive Master Plan: Safety Element (2011)	Describes hazard areas and regulates current and future development based on known hazard areas.	Provides policies on both natural and manmade hazards	Mitigation & Preparedness	Yes
Emergency Operations Plan (2011)	Describes what the local jurisdiction's actions will be during a response to an emergency. Includes annexes that describe in more detail the actions required of the local jurisdiction's departments/agencies. Further, this plan describes the role of the Emergency Operation Center (EOC) and the coordination that occurs between the EOC and the local jurisdiction's departments and other response agencies. Finally, this plan describes how the EOC serves as the focal point among local, state, and federal governments in times of disaster.	Lists 12 natural hazards which are listed in the Hazard Mitigation Plan & manmade hazards	Response	No
Clark County Capital Improvement Program (CIP) (2017)	The CIP is a 5-year plan for financing infrastructure improvements, government facility construction improvements and equipment acquisition.	Earthquake, Flood and Wildfire	Mitigation	Yes
LEPC Hazardous Materials Response Plan (2008)	Describes response actions in the event of a hazardous materials release.	Hazardous Materials	Response	Yes
Land Use Plans (2011)	Provides land use restrictions and planning for areas within Clark County	Provides policies on both natural and manmade hazards	Mitigation & Response	Yes
CDBG 5 Year Plan (2011)	Five Year Capital Improvement Plan for Community Development Block Grant.	N/A	Mitigation	Yes
State of Nevada and Las Vegas Urban Area THIRA and SPR Report (2016)	Describes risks to a community's core capabilities, enabling them to determine desired outcomes, capability targets, and the resources required to achieve their capability targets.	Active Shooter, Chemical HazMat Release, Cyber Attack, Drought, Earthquake, Flood, Pandemic, Wildfire	Mitigation & Preparedness	Yes
SNWA Water Conservation Plan (2014 – 2018)	Provides a plan for water resource management, planning and conservation	Drought	Mitigation	Yes

Table F-8. Unincorporated Clark County Legal and Regulatory Resources for Hazard Mitigation

Name	Description (Effect on Hazard Mitigation)	Hazards Addressed	Emergency Management	Affects Development
Water Quality Protection Plan (2011)	Water Quality Program is responsible for the protection, preservation, and enhancement of County's water resources for the benefit of present and future generations through proactive long-term planning, real-time monitoring, community education, regulations, compliance assurance, and working together with the public, federal, state and local agencies.	Hazardous Materials	Mitigation	Yes
Building Administrative Code (2010) includes Building, Fire, Zoning	The purpose of this code is to establish the minimum requirements to safeguard public health, safety, and general welfare through structural strength, means of egress facilities, and stability; access for persons with disabilities, sanitation, adequate lighting, ventilation and energy conservation; and safety for life and property from fire and other hazards attributed to the built environment.	All	Mitigation, Preparedness, and Response	Yes
Special purpose ordinances	Includes floodplain management, storm water management, wildfire ordinances, and hazard set back requirements.	All	Mitigation, Preparedness & Response	Yes

Table F-9. Unincorporated Clark County Recent Hazard Mitigation Projects and Programs

Status (Current, Ongoing, or Completed)	Project / Program Name	Description	Year(s)
Ongoing	Research into earthquake hazard	UNR and the Nevada Earthquake Safety Council (NESC) continue to study earthquake hazard and risk in the Las Vegas Valley.	Ongoing
Ongoing	Wildfire Awareness	Public Awareness of threat of wildfire and actions to reduce the threat.	Ongoing
Ongoing	Flood Projects through the CCRFCD	Reduce the threat of flood and flash flooding through development of flooding facilities and public awareness.	Ongoing
Ongoing	Drought Response Measures	Implement drought plan through changes to building codes, zoning, and comprehensive plan requirements SNWA Water Conservation Plan 2014 – 2018.	Ongoing
Ongoing	Unreinforced Masonry (URM) Identification	Obtain site-specific studies to ascertain how the building stock, old and new, might fair if a credible earthquake were to occur with specific attention to lifelines, transportation corridors, buildings, and pipelines.	Started in 2010
Ongoing	HMP Integration	Continue to integrate the Clark County HMP, in particular the hazard analysis and mitigation strategy sections, into local planning documents, including general plans, emergency operations plans, and capital improvement plans. 2017 Clark County Comprehensive Master Plan – Safety Element and the 2017 State of Nevada and Las Vegas Urban Area THIRA and SPR Report acknowledge the 2012 HMP.	Started in 2012
Ongoing	Turf Limits Program	Turf limits restrict or prohibit the amount of grass to be planted at new properties. The restrictions prohibiting types of grass that can be planted apply to all property owners.	Ongoing

Table F-10. Unincorporated Clark County Mitigation Action Plan

Project Name: Emergency Power	
Description	Provide additional emergency power, such as a generator equipment, for new and existing critical facilities to operate continuously but cannot do so for long durations of power outage.
Additional Information	Provide additional emergency power (generator) to Clark County Multi-Agency Coordination Center/EOC.
Administrator	CCFD (Office of Emergency Management & Homeland Security)
Timeframe	2018-2019
Potential Funding	PDM, other applicable federal programs
Project Name: Fuel Management	
Description	Reduce the understory fuel around lines, areas or zones where structures and other human development meet or intermingle with wildland or vegetative fuels (including invasive species). Focus should be placed on larger areas (such as those surrounding neighborhoods that have varying degrees of fire resistance and defensible space) that have a history of large destructive fires and a high-density concentration of understory fuel.
Additional Information	Conduct annual fuel reduction activities in highest risk areas for wildland/urban interface, including the Spring Mountains (Trout Canyon, Mountain Springs), and Northeast Clark County (Moapa/Moapa Valley)
Administrator	CCFD – Rural Fire Division
Timeframe	2018-2022
Potential Funding	PDM, other applicable federal programs
Project Name: Unreinforced Masonry Database	
Description	Continue to update and validate the Clark County Unreinforced Masonry (URM) Inventory Database by undertaking the following activities: complete screening for structures that were not able to be screened during this phase of the project; expand the scope of project to include screening of URM's within the incorporated cities in Clark County; prepare a GIS enabled map layer showing the validated database of URM structures; work collectively with state and local officials to determine the next appropriate step in mitigating the potential hazards associated with URM structures.
Additional Information	Conduct Phase III inspection and data collection activities for URM buildings in Clark County
Administrator	Clark County Building & Fire Safety
Timeframe	2019-2021
Potential Funding	PDM
Project Name: Mosquito Abatement Program	
Description	Continue the countywide Vector Surveillance Program for early warning disease introduction and the countywide long term abatement program to target treatment areas, particularly those prone to flooding.
Additional Information	Continue Annual Clark County Mosquito Abatement Program to prevent and respond to mosquito infestations, including outreach to the general public and affected area residents
Administrator	Clark County Public Works (Vector Control) / Southern Nevada Health District

	2018-2022
Potential Funding	PDM and Post-Event Mitigation funds, if applicable
Project Name: Emergency Power	
Description	Provide additional emergency power, such as generator equipment, for new and existing critical facilities to operate continuously but is not possible for long durations of power outage.
Additional Information	Working through Southern Nevada Healthcare Preparedness Coalition and healthcare system partners to include hospitals, EMS, emergency management, Healthcare support agencies partners serving/caring for functional and access needs populations, assess existing resources and needed refueling plans for emergency generators to ensure that power is sustained for duration of power loss (two weeks).
Administrator	Southern Nevada Health District /Clark County/Henderson/North Las Vegas/Las Vegas, Southern Nevada Healthcare Preparedness Coalition
Timeframe	1-3 years
Potential Funding	FEMA grant funding

Appendix G – City of Boulder City

Table G-1. City of Boulder City Total: Land Area, Population, Residential Buildings and Critical Facilities and Infrastructure

Category	Number
Land (square miles)	208
Population	16,570
Residential Buildings	6,646
Critical Facilities & Infrastructure	41

Table G-2. City of Boulder City Vulnerability, Land Area

Hazard	Number (square miles)	% of Total
Earthquake – Very Strong Ground Shaking	153	73.5
Earthquake – Strong Ground Shaking	55.2	26.5
Earthquake – Liquefaction	0	0
Flood – 100 Year Floodplain	9.8	4.7
Flood – 500 Year Floodplain	0	0
Wildfire – Very High	0	0
Wildfire – High	0	0

Table G-3. City of Boulder City Vulnerability, Population

Hazard	Population	% of Total
Earthquake – Very Strong Ground Shaking	16,570	100
Earthquake – Strong Ground Shaking	0	0
Earthquake – Liquefaction	0	0
Flood – 100 Year Floodplain	757	4.6
Flood – 500 Year Floodplain	0	0
Wildfire – Very High	0	0
Wildfire – High	0	0

Table G-4. City of Boulder City Vulnerability, Residential Buildings

Hazard	Residential Buildings	% of Total
Earthquake – Very Strong Ground Shaking	6,646	100
Earthquake – Strong Ground Shaking	0	0
Earthquake – Liquefaction	0	0
Flood – 100 Year Floodplain	17	0.3
Flood – 500 Year Floodplain	0	0
Wildfire – Very High	0	0
Wildfire – High	0	0

Table G-5. City of Boulder City Vulnerability, Critical Facilities and Infrastructure

Hazard	Critical Facilities	% of Total
Earthquake – Very Strong Ground Shaking	41	100
Earthquake – Strong Ground Shaking	0	0
Earthquake – Liquefaction	0	0
Flood – 100 Year Floodplain	3	7.3
Flood – 500 Year Floodplain	0	0
Wildfire – Very High	0	0
Wildfire – High	0	0

Table G-6. City of Boulder City Human and Technical Resources for Hazard Mitigation

Staff/Personnel Resources	Department or Agency	Principal Activities Related to Hazard Mitigation
Planner(s), engineer(s) and technical staff with knowledge of land development, land management practices, and human-caused and natural hazards.	Community Development Department	Develops and maintains the General Plan, including the safety element. Develops area plans based on the General Plan, to provide more specific guidance for the development of more specific areas. Reviews private development projects and proposed capital improvements projects and other physical projects involving property for consistency and conformity with the General Plan. Anticipates and acts on the need for new plans, policies, and code changes. Applies the approved plans, policies, code provisions, and other regulations to proposed land uses.
Engineer(s), Building Inspectors/Code Enforcement Officers or other professional(s) and technical staff trained in construction requirements and practices related to existing and new buildings.	Community Development Department	Oversees the effective, efficient, fair, and safe enforcement of the Nevada Building Code
Engineers, construction project managers, and supporting technical staff.	Public Works Department	Provides direct or contract civil, structural, and mechanical engineering services, including contract, project, and construction management.
Engineer(s), project manager(s), technical staff, equipment operators, and maintenance and construction staff.	Public Works Department	Maintains and operates of a wide range of local equipment and facilities as well as providing assistance to members of the public. These include providing sufficient clean fresh water and reliable sewer services.
Engineer(s), project manager(s), technical staff, equipment operators, and maintenance and construction staff.	Public Works Department	Maintains and operates of a wide range of local equipment and facilities as well as providing assistance to members of the public. These include providing street maintenance, storm drainage systems, street cleaning, street lights and traffic signals.

Table G-6. City of Boulder City Human and Technical Resources for Hazard Mitigation

Staff/Personnel Resources	Department or Agency	Principal Activities Related to Hazard Mitigation
Engineer(s), project manager(s), technical staff, equipment operators, and maintenance and construction staff.	Public Works Department	Maintains and operates of a wide range of local equipment and facilities as well as providing assistance to members of the public. These include providing street lights and traffic signals.
Floodplain Administrator	Public Works Department	Enforces the jurisdiction's floodplain management ordinance, which that new development proposals do not increase flood risk, and that new developments are not located below the 100 year flood level. In addition, the Floodplain Administrator is responsible for planning and managing flood risk reduction projects throughout the jurisdiction.
Emergency Manager	Fire Department – Emergency Management	Maintains and updates the Emergency Operations Plan for the local jurisdiction. In addition, coordinates local response and relief activities within the Emergency Operation Center, and works closely with county, state, and federal partners to support planning and training and to provide information and coordinate assistance.
Procurement Services Manager	Finance Department	Provides a full range of municipal financial services, administers several licensing measures, and functions as the local jurisdiction's procurement services manager.

Table G-7. City of Boulder City Financial Resources for Hazard Mitigation

Type	Administrator	Purpose	Amount
General Fund	Finance Department	Program operations and specific projects.	Variable.
General Obligation Bonds	Finance Department	General obligation bonds are appropriately used for the construction and/or acquisition of improvements to real property broadly available to residents and visitors. Such facilities include, but are not limited to, libraries, hospitals, parks, public safety facilities, and cultural and educational facilities.	Variable.
Lease Revenue Bonds	Finance Department	Lease revenue bonds are used to finance capital projects that 1) have an identified budgetary stream for repayment (e.g., specified fees, tax receipts); 2) generate project revenue but rely on a broader pledge of general fund revenues to reduce borrowing costs; or 3) finance the acquisition and installation of equipment for the local jurisdiction's general governmental purposes.	Variable.
Wildfire Emergency and Mitigation Funds	Nevada Division of Forestry	Administers funding from FEMA, BLM, and U.S. Forest Service for certain types of wildfire emergency and mitigation funding	Project-specific.
Earthquake Mitigation Funds	Nevada Earthquake Safety Council	Allocates FEMA money for earthquake mitigation efforts	Project-specific.
Water Preservation Funds	SNWA	Provides incentives to preserve water	Project-specific.
Hazard Mitigation Grant Program	FEMA	Supports pre- and post-disaster mitigation plans and projects. Available to Nevada communities after a Presidentially declared disaster has occurred in Nevada.	Grant award based on specific projects as they are identified.
Pre-Disaster Mitigation grant program	FEMA	Supports pre-disaster mitigation plans and projects. Available on an annual basis as a nationally competitive grant.	Grant award based on specific projects as they are identified.
Flood Mitigation Assistance grant program	FEMA	Mitigates repetitively flooded structures and infrastructure. Available on an annual basis, distributed to Nevada communities by the Nevada DEM.	Grant award based on specific projects as they are identified.

Table G-7. City of Boulder City Financial Resources for Hazard Mitigation

Type	Administrator	Purpose	Amount
Assistance to Firefighters Grant Program	FEMA/USFA	Provides equipment, protective gear, emergency vehicles, training, and other resources needed to protect the public and emergency personnel from fire and related hazards. Available to fire departments and nonaffiliated emergency medical services providers.	Grant awards based on specific projects as they are identified.
Community Block Grant Program Entitlement Communities Grants	U.S. HUD	Acquisition of real property, relocation and demolition, rehabilitation of residential and non-residential structures, construction of public facilities and improvements, such as water and sewer facilities, streets, neighborhood centers, and the conversion of school buildings for eligible purposes.	Grant award based on specific projects as they are identified.
Community Action for a Renewed Environment	U.S. EPA	Through financial and technical assistance offers an innovative way for a community to organize and take action to reduce toxic pollution (i.e., stormwater) in its local environment. Through this program, a community creates a partnership that implements solutions to reduce releases of toxic pollutants and minimize people's exposure to them.	Grant award based on specific projects as they are identified.
Clean Water State Revolving Fund	U.S. EPA	A loan program that provides low-cost financing to eligible entities within state and tribal lands for water quality projects, including all types of non-point source, watershed protection or restoration, estuary management projects, and more traditional municipal wastewater treatment projects.	Variable.
Public Health Emergency Preparedness Cooperative Agreement.	CDC	Funds are intended to upgrade state and local public health jurisdictions' preparedness and response to bioterrorism, outbreaks of infectious diseases, and other public health threats and emergencies.	Grant award based on specific projects as they are identified.
Homeland Security Preparedness Technical Assistance Program	FEMA/DHS	Build and sustain preparedness technical assistance activities in support of the four homeland security mission areas (prevention, protection, response, recovery) and homeland security program management.	Grant award based on specific projects as they are identified.

Table G-8. City of Boulder City Legal and Regulatory Resources for Hazard Mitigation

Name	Description (Effect on Hazard Mitigation)	Hazards Addressed	Emergency Management	Affects Development
Boulder City Master Plan (2015)	Outlines the community's vision and goals for the future and provides guidance for elected and appointed officials in making choices regarding the long-range needs of the community on natural resources, growth, public facilities, etc.	Drought, Flood	Mitigation	Yes
Emergency Operations Plan	Describes what the local jurisdiction's actions will be during a response to an emergency. Includes annexes that describe in more detail the actions required of the local jurisdiction's departments/agencies. Further, this plan describes the role of the Emergency Operation Center (EOC) and the coordination that occurs between the EOC and the local jurisdiction's departments and other response agencies. Finally, this plan describes how the EOC serves as the focal point among local, state, and federal governments in times of disaster.	Not Available	Response	No
State of Nevada and Las Vegas Urban Area THIRA and SPR Report (2016)	Describes risks to a community's core capabilities, enabling them to determine desired outcomes, capability targets, and the resources required to achieve their capability targets.	Active Shooter, Chemical HazMat Release, Cyber Attack, Drought, Earthquake, Flood, Pandemic, Wildfire	Preparedness, Mitigation	Yes
Code of Ordinances	The purpose of this code is to establish the minimum requirements to safeguard public health, safety, and general welfare through structural strength, means of egress facilities, and stability; access for persons with disabilities, sanitation, adequate lighting, ventilation and energy conservation; and safety for life and property from fire and other hazards attributed to the built environment.	Fire, Hazardous Materials	Mitigation, Preparedness, and Response	Yes

Table G-9. City of Boulder City Recent Hazard Mitigation Projects and Programs

Status (Current, Ongoing, or Completed)	Project / Program Name	Description	Year(s)
Ongoing	Water Conservation Rebate Program	A Southern Nevada Water Authority program that focuses on reductions in consumptive Colorado River water use, specifically changing the outdoor water use habits of residents, since outdoor use accounts for the greatest consumption of water.	Ongoing

Table G-10. City of Boulder City Mitigation Action Plan

Project Name: Flood Control / Floodplain and Stream Restoration	
Description	Alleviate the damage associated with flooding through new and reinforced flood control projects, including storm drains, culverts, drop inlets, channels, and detention basins. Implement floodplain and stream restoration projects to reduce flood risk and erosion by providing stable reaches and also mitigate drought impacts by providing baseflow recharge, water supply augmentation, floodwater storage, terrestrial and aquatic wildlife habitat, and recreation opportunities by restoring the site's soil, hydrology and vegetation conditions that mimic pre-development channel flow and floodplain connectivity.
Additional Information	Hemenway Watershed Improvements Phase IIA – Improvements in the Hemenway watershed will reduce sediment transport (sediment basins) and reduce erosion around existing facilities.
Administrator	Public Works Department
Timeframe	1 – 5 years
Potential Funding	FEMA Grants; Potential CIP Funding
Project Name: Flood Control	
Description	Alleviate the damage associated with flooding through new and reinforced flood control projects, including storm drains, culverts, drop inlets, channels, and detention basins.
Additional Information	Hemenway Watershed Improvements Phase IIB – Hemenway channel improvements to meet flood control freeboard requirements, improve access for maintenance, and reduce erosion around existing facilities.
Administrator	Public Works Department
Timeframe	1 – 5 years
Potential Funding	FEMA Grants; Potential CIP Funding
Project Name: Flood Control	
Description	Alleviate the damage associated with flooding through new and reinforced flood control projects, including storm drains, culverts, drop inlets, channels, and detention basins.
Additional Information	North Railroad Conveyance Phase 2 – Improvements to install a channel around the Veterans Home to convey flows from the drainage basin to the North Railroad Detention Basin. The project will also increase the capacity of the North Railroad Detention Basin to accommodate additional flows.
Administrator	Public Works Department
Timeframe	1 – 5 years
Potential Funding	FEMA Grants; Potential CIP Funding
Project Name: Emergency Power	
Description	Provide additional emergency power, such as a generator equipment, for new and existing critical facilities to operate continuously but cannot do so for long durations of power outage.
Additional Information	Emergency Generators for Critical Infrastructure and Sheltering Facilities
Administrator	Fire Department
Timeframe	1-2 years

Potential Funding	FEMA Grants; Potential CIP Funding
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Appendix H – City of Henderson

Table H-1. City of Henderson Total: Land Area, Population, Residential Buildings and Critical Facilities and Infrastructure

Category	Number
Land (square miles)	106.5
Population	299,279
Residential Buildings	118,742
Critical Facilities & Infrastructure	226

Table H-2. City of Henderson Vulnerability, Land Area

Hazard	Number (square miles)	% of Total
Earthquake – Very Strong Ground Shaking	90.6	84.7
Earthquake – Strong Ground Shaking	16.4	15.3
Earthquake – Liquefaction	35.2	33.1
Flood – 100 Year Floodplain	8.1	7.6
Flood – 500 Year Floodplain	10.1	9.5
Wildfire – Very High	0	0
Wildfire – High	0	0

Table H-3. City of Henderson Vulnerability, Population

Hazard	Population	% of Total
Earthquake – Very Strong Ground Shaking	295,678	98.8
Earthquake – Strong Ground Shaking	3,601	1.2
Earthquake – Liquefaction	155,591	52
Flood – 100 Year Floodplain	12,658	4.2
Flood – 500 Year Floodplain	24,702	8.3
Wildfire – Very High	0	0
Wildfire – High	0	0

Table H-4. City of Henderson Vulnerability, Residential Buildings

Hazard	Residential Buildings	% of Total
Earthquake – Very Strong Ground Shaking	117,234	98.7
Earthquake – Strong Ground Shaking	1508	1.3
Earthquake – Liquefaction	58,904	49.6
Flood – 100 Year Floodplain	4,096	3.4
Flood – 500 Year Floodplain	9,980	8.4
Wildfire – Very High	0	0
Wildfire – High	0	0

Table H-5. City of Henderson Vulnerability, Critical Facilities and Infrastructure

Hazard	Critical Facilities	% of Total
Earthquake – Very Strong Ground Shaking	222	98.2
Earthquake – Strong Ground Shaking	4	1.8
Earthquake – Liquefaction	139	61.5
Flood – 100 Year Floodplain	32	14.2
Flood – 500 Year Floodplain	20	8.8
Wildfire – Very High	0	0
Wildfire – High	0	0

Table H-6. City of Henderson Human and Technical Resources for Hazard Mitigation

Staff/Personnel Resources	Department or Agency	Principal Activities Related to Hazard Mitigation
Planner(s), engineer(s) and technical staff with knowledge of land development, land management practices, and human-caused and natural hazards.	Community Development Department	Develops and maintains the General Plan, including the safety element. Develops area plans based on the General Plan, to provide more specific guidance for the development of more specific areas. Reviews private development projects and proposed capital improvements projects and other physical projects involving property for consistency and conformity with the General Plan. Anticipates and acts on the need for new plans, policies, and code changes. Applies the approved plans, policies, code provisions, and other regulations to proposed land uses.
Engineer(s), Building Inspectors/Code Enforcement Officers or other professional(s) and technical staff trained in construction requirements and practices related to existing and new buildings.	Public Works Department - Building & Fire Safety	Oversees the effective, efficient, fair, and safe enforcement of the Nevada Building Code
Engineers, construction project managers, and supporting technical staff.	Public Works Department – Engineering Services	Provides direct or contract civil, structural, and mechanical engineering services, including contract, project, and construction management.
Engineer(s), project manager(s), technical staff, equipment operators, and maintenance and construction staff.	Utility Services Department	Maintains and operates of a wide range of local equipment and facilities as well as providing assistance to members of the public. These include providing sufficient clean fresh water and reliable sewer services.
Engineer(s), project manager(s), technical staff, equipment operators, and maintenance and construction staff.	Public Works Department – Support Services	Maintains and operates of a wide range of local equipment and facilities as well as providing assistance to members of the public. These include providing street maintenance, storm drainage systems, street cleaning, street lights and traffic signals.

Table H-6. City of Henderson Human and Technical Resources for Hazard Mitigation

Staff/Personnel Resources	Department or Agency	Principal Activities Related to Hazard Mitigation
Engineer(s), project manager(s), technical staff, equipment operators, and maintenance and construction staff.	Public Works Department – Traffic Services	Maintains and operates of a wide range of local equipment and facilities as well as providing assistance to members of the public. These include providing street lights and traffic signals.
Floodplain Administrator	Public Works Department – Engineering Services	Enforces the jurisdiction’s floodplain management ordinance, which that new development proposals do not increase flood risk, and that new developments are not located below the 100 year flood level. In addition, the Floodplain Administrator is responsible for planning and managing flood risk reduction projects throughout the jurisdiction.
Emergency Manager	Fire Department – Emergency Management	Maintains and updates the Emergency Operations Plan for the local jurisdiction. In addition, coordinates local response and relief activities within the Emergency Operation Center, and works closely with county, state, and federal partners to support planning and training and to provide information and coordinate assistance.
Procurement Services Manager	Finance Department	Provides a full range of municipal financial services, administers several licensing measures, and functions as the local jurisdiction’s Procurement Services Manager.

Table H-7. City of Henderson Financial Resources for Hazard Mitigation

Type	Administrator	Purpose	Amount
General Fund	Finance Department	Program operations and specific projects.	Variable.
General Obligation Bonds	Finance Department	General obligation bonds are appropriately used for the construction and/or acquisition of improvements to real property broadly available to residents and visitors. Such facilities include, but are not limited to, libraries, hospitals, parks, public safety facilities, and cultural and educational facilities.	Variable.
Lease Revenue Bonds	Finance Department	Lease revenue bonds are used to finance capital projects that 1) have an identified budgetary stream for repayment (e.g., specified fees, tax receipts); 2) generate project revenue but rely on a broader pledge of general fund revenues to reduce borrowing costs; or 3) finance the acquisition and installation of equipment for the local jurisdiction's general governmental purposes.	Variable.
Wildfire Emergency and Mitigation Funds	Nevada Division of Forestry	Administers funding from FEMA, BLM, and U.S. Forest Service for certain types of wildfire emergency and mitigation funding	Project-specific.
Earthquake Mitigation Funds	Nevada Earthquake Safety Council	Allocates FEMA money for earthquake mitigation efforts	Project-specific.
Water Preservation Funds	SNWA	Provides incentives to preserve water	Project-specific.
Hazard Mitigation Grant Program	FEMA	Supports pre- and post-disaster mitigation plans and projects. Available to Nevada communities after a Presidentially declared disaster has occurred in Nevada.	Grant award based on specific projects as they are identified.
Pre-Disaster Mitigation grant program	FEMA	Supports pre-disaster mitigation plans and projects. Available on an annual basis as a nationally competitive grant.	Grant award based on specific projects as they are identified.
Flood Mitigation Assistance grant program	FEMA	Mitigates repetitively flooded structures and infrastructure. Available on an annual basis, distributed to Nevada communities by the Nevada DEM.	Grant award based on specific projects as they are identified.
Assistance to Firefighters Grant Program	FEMA/USFA	Provides equipment, protective gear, emergency vehicles, training, and other resources needed to protect the public and emergency personnel from fire and related hazards.	Grant awards based on specific projects as they are identified.

Table H-7. City of Henderson Financial Resources for Hazard Mitigation

Type	Administrator	Purpose	Amount
		Available to fire departments and nonaffiliated emergency medical services providers.	
Community Block Grant Program Entitlement Communities Grants	U.S. HUD	Acquisition of real property, relocation and demolition, rehabilitation of residential and non-residential structures, construction of public facilities and improvements, such as water and sewer facilities, streets, neighborhood centers, and the conversion of school buildings for eligible purposes.	Grant award based on specific projects as they are identified.
Community Action for a Renewed Environment	U.S. EPA	Through financial and technical assistance offers an innovative way for a community to organize and take action to reduce toxic pollution (i.e., stormwater) in its local environment. Through this program, a community creates a partnership that implements solutions to reduce releases of toxic pollutants and minimize people's exposure to them.	Grant award based on specific projects as they are identified.
Clean Water State Revolving Fund	U.S. EPA	A loan program that provides low-cost financing to eligible entities within state and tribal lands for water quality projects, including all types of non-point source, watershed protection or restoration, estuary management projects, and more traditional municipal wastewater treatment projects.	Variable.
Public Health Emergency Preparedness Cooperative Agreement.	CDC	Funds are intended to upgrade state and local public health jurisdictions' preparedness and response to bioterrorism, outbreaks of infectious diseases, and other public health threats and emergencies.	Grant award based on specific projects as they are identified.
Homeland Security Preparedness Technical Assistance Program	FEMA/DHS	Build and sustain preparedness technical assistance activities in support of the four homeland security mission areas (prevention, protection, response, recovery) and homeland security program management.	Grant award based on specific projects as they are identified.

Table H-8. City of Henderson Legal and Regulatory Resources for Hazard Mitigation

Name	Description (Effect on Hazard Mitigation)	Hazards Addressed	Emergency Management	Affects Development
General Plan: Safety Element (2017)	Describes hazard areas and regulates current and future development based on known hazard areas.	Special Flood Hazard Area, Water Demand, Environmentally Sensitive Areas, Increase in Stormwater Runoff with Development	Mitigation & Preparedness	Yes
Emergency Operations Plan (2012)	Describes what the local jurisdiction's actions will be during a response to an emergency. Includes annexes that describe in more detail the actions required of the local jurisdiction's departments/agencies. Further, this plan describes the role of the Emergency Operation Center (EOC) and the coordination that occurs between the EOC and the local jurisdiction's departments and other response agencies. Finally, this plan describes how the EOC serves as the focal point among local, state, and federal governments in times of disaster.	Aircraft Incident, Civil Disturbance, Earthquake, Explosive, Extreme Heat, Flood and Flash Floods, HAZMAT event, Landslide, Large Venue Fires, Radiological/Nuclear Incidents	Response	No
State of Nevada and Las Vegas Urban Area THIRA and SPR Report (2016)	Describes risks to a community's core capabilities, enabling them to determine desired outcomes, capability targets, and the resources required to achieve their capability targets.	Active Shooter, Chemical HazMat Release, Cyber Attack, Drought, Earthquake, Flood, Pandemic, Wildfire	Preparedness, Mitigation	Yes
Code of Ordinances	The purpose of this code is to establish the minimum requirements to safeguard public health, safety, and general welfare through structural strength, means of egress facilities, and stability; access for persons with disabilities, sanitation, adequate lighting, ventilation and energy conservation; and safety for life and property from fire and other hazards attributed to the built environment.	Fire, Hazardous Materials	Mitigation, Preparedness, and Response	Yes

Table H-9. City of Henderson Recent Hazard Mitigation Projects and Programs

Status (Current, Ongoing, or Completed)	Project / Program Name	Description	Year(s)
Complete	Pittman Pecos Sewer Protection Project	Lower an existing sewer line to be below the existing Pecos Legacy Channel at the Pittman Wash West of Green Valley Parkway. Funded by the Clark County Regional Flood Control District.	2011
Ongoing	Regional Flood Control Maintenance Work Program	Annual program to inspect and maintain Regional Flood Control District facilities to ensure the system conveys flows safely and efficiently. Funded by the Clark County Regional Flood Control District.	Ongoing
Ongoing	Drop Inlet Inspection and Maintenance Program	Annual program to inspect and maintain drop inlets to ensure the system conveys flows safely and efficiently.	Ongoing
Ongoing	Turf Limits Program	Turf limits restrict or prohibit the amount of grass to be planted at new properties. The restrictions prohibiting types of grass that can be planted apply to all property owners.	Ongoing

Table H-10. City of Henderson Mitigation Action Plan

Project Name: Emergency Power	
Description	Provide additional emergency power, such as generator equipment, for new and existing critical facilities to operate continuously but cannot do so for long durations of power outage.
Additional Information	Acquire and install permanent emergency generators and appropriate connections for the permanent generators at Downtown and Multi-Generational Recreation Centers. Acquire one (1) portable emergency generator, and acquire and install appropriate connections for the portable emergency generator at Heritage Park, Whitney Ranch and Heritage Aquatics Recreation Centers. These centers will potentially be used as shelter locations.
Administrator	City of Henderson Public Works Parks and Recreation
Timeframe	3-5 Years
Potential Funding	FEMA grant funding
Project Name: Critical Facilities & Infrastructure Seismic Retrofit or Replacement	
Description	Seismically retrofit or replace critical facilities and infrastructure that are categorized as structurally deficient and are located in strong to very strong ground shaking areas and/or are necessary to use during and/or immediately after a disaster or emergency.
Additional Information	Retrofit existing potable water reservoirs with seismic couplings at inlet and outlet connections
Administrator	City of Henderson Public Works Parks and Recreation
Timeframe	5 Years
Potential Funding	FEMA grant funding
Project Name: Critical Infrastructure Flood Risk Reduction	
Description	Reinforce roads/bridges that are prone to repetitive flooding and/or flash flooding through protection activities, including elevating the roads/bridges and installing/widening culverts beneath the roads/bridges or upgrading storm drains.
Additional Information	Implement the City of Henderson Capital Improvement Plan for street projects
Administrator	Public Works, Parks and Recreation
Timeframe	5 years
Potential Funding	FEMA grant funding
Project Name: Flood Control	
Description	Alleviate the damage associated with flooding through new and reinforced flood control projects, including storm drains, culverts, drop inlets, channels, and detention basins.
Additional Information	Implement the Clark County Regional Flood Control District (CCRFCD) Capital Improvement Plan to design and construct master plan flood control facilities.
Administrator	Public Works, Parks and Recreation
Timeframe	1-5 years
Potential Funding	FEMA grant funding, CIP
Project Name: Flood Control	

Description	Implement floodplain and stream restoration projects to reduce flood risk and erosion by providing stable reaches and also mitigate drought impacts by providing baseflow recharge, water supply augmentation, floodwater storage, terrestrial and aquatic wildlife habitat, and recreation opportunities by restoring the site's soil, hydrology and vegetation conditions that mimic pre-development channel flow and floodplain connectivity.
Additional Information	Implement the Clark County Regional Flood Control District (CCRFCD) Maintenance Work Program to inspect, operate, & maintain natural washes identified as master plan flood control facilities.
Administrator	Public Works, Parks and Recreation
Timeframe	5 years
Potential Funding	CIP

Appendix I – City of Las Vegas

Table I-1. City of Las Vegas Total: Land Area, Population, Residential Buildings and Critical Facilities and Infrastructure

Category	Number
Land (square miles)	141.1
Population	640,174
Residential Buildings	220,726
Critical Facilities & Infrastructure	468

Table I-2. City of Las Vegas Vulnerability, Land Area

Hazard	Number (square miles)	% of Total
Earthquake – Very Strong Ground Shaking	94.7	67.1
Earthquake – Strong Ground Shaking	46.4	32.9
Earthquake – Liquefaction	23.4	16.6
Flood – 100 Year Floodplain	2.8	1.9
Flood – 500 Year Floodplain	3.6	2.6
Wildfire – Very High	0	0
Wildfire – High	0.2	0.1

Table I-3. City of Las Vegas Vulnerability, Population

Hazard	Population	% of Total
Earthquake – Very Strong Ground Shaking	484,584	75.7
Earthquake – Strong Ground Shaking	155,590	24.3
Earthquake – Liquefaction	155,482	24.3
Flood – 100 Year Floodplain	600	0.1
Flood – 500 Year Floodplain	27,178	4.2
Wildfire – Very High	0	0
Wildfire – High	0	0

Table I-4. City of Las Vegas Vulnerability, Residential Buildings

Hazard	Residential Buildings	% of Total
Earthquake – Very Strong Ground Shaking	152,114	68.9
Earthquake – Strong Ground Shaking	68,612	31.1
Earthquake – Liquefaction	35,995	16.3
Flood – 100 Year Floodplain	268	0.1
Flood – 500 Year Floodplain	6,319	2.9
Wildfire – Very High	0	0
Wildfire – High	0	0

Table I-5. City of Las Vegas Vulnerability, Critical Facilities and Infrastructure

Hazard	Critical Facilities	% of Total
Earthquake – Very Strong Ground Shaking	369	78.8
Earthquake – Strong Ground Shaking	99	21.2
Earthquake – Liquefaction	204	43.6
Flood – 100 Year Floodplain	13	2.8
Flood – 500 Year Floodplain	17	3.6
Wildfire – Very High	0	0
Wildfire – High	0	0

Table I-6. City of Las Vegas, Human and Technical Resources for Hazard Mitigation

Staff/Personnel Resources	Department or Agency	Principal Activities Related to Hazard Mitigation
Planner(s), engineer(s) and technical staff with knowledge of land development, land management practices, and human-caused and natural hazards.	Department of Planning and Department of Public Works	Develops and maintains the General Plan, including the safety element. Develops area plans based on the General Plan, to provide more specific guidance for the development of more specific areas. Reviews private development projects and proposed capital improvements projects and other physical projects involving property for consistency and conformity with the General Plan. Anticipates and acts on the need for new plans, policies, and code changes. Applies the approved plans, policies, code provisions, and other regulations to proposed land uses.
Engineer(s), Building Inspectors/Code Enforcement Officers or other professional(s) and technical staff trained in construction requirements and practices related to existing and new buildings.	Department of Building and Safety	Oversees the effective, efficient, fair, and safe enforcement of the California Building Code
Engineers, construction project managers, and supporting technical staff.	Department of Building and Safety, Public Works, and all departments with assigned project managers (i.e., Fire and Rescue)	Provides direct or contract civil, structural, and mechanical engineering services, including contract, project, and construction management.
Engineer(s), project manager(s), technical staff, equipment operators, and maintenance and construction staff.	Department of Building and Safety, Public Works, Facilities, Field Operations and all departments with assigned project managers	Maintains and operates of a wide range of local equipment and facilities as well as providing assistance to members of the public. These include providing sufficient clean fresh water, reliable sewer services, street maintenance, storm drainage systems, street cleaning, street lights and traffic signals.

Table I-6. City of Las Vegas, Human and Technical Resources for Hazard Mitigation

Staff/Personnel Resources	Department or Agency	Principal Activities Related to Hazard Mitigation
Floodplain Administrator	Department of Public Works	Reviews and ensures that new development proposals do not increase flood risk, and that new developments are not located below the 100 year flood level. In addition, the Floodplain Administrator is responsible for planning and managing flood risk reduction projects throughout the local jurisdiction or tribal area.
Emergency Manager	Department of Administrative Services, office of Emergency Management	Maintains and updates the Emergency Operations Plan for the local jurisdiction. In addition, coordinates local response and relief activities within the Emergency Operation Center, and works closely with county, state, and federal partners to support planning and training and to provide information and coordinate assistance.
Procurement Services Manager	Department of Finance and Business Services, Purchasing and Contract Division	Provides a full range of municipal financial services, administers several licensing measures, and functions as the local jurisdiction's procurement services manager.

Table I-7. City of Las Vegas Financial Resources for Hazard Mitigation

Type	Administrator	Purpose	Amount
General Fund	Department of Finance	Program operations and specific projects.	Variable.
General Obligation Bonds	Department of Finance	General obligation bonds are appropriately used for the construction and/or acquisition of improvements to real property broadly available to residents and visitors. Such facilities include, but are not limited to, libraries, hospitals, parks, public safety facilities, and cultural and educational facilities.	Variable.
Lease Revenue Bonds	Department of Finance	Lease revenue bonds are used to finance capital projects that 1) have an identified budgetary stream for repayment (e.g., specified fees, tax receipts); 2) generate project revenue but rely on a broader pledge of general fund revenues to reduce borrowing costs; or 3) finance the acquisition and installation of equipment for the local jurisdiction's general governmental purposes.	Variable.
Wildfire Emergency and Mitigation Funds	Nevada Division of Forestry	Administers funding from FEMA, BLM, and U.S. Forest Service for certain types of wildfire emergency and mitigation funding	Project-specific.
Earthquake Mitigation Funds	Nevada Earthquake Safety Council	Allocates FEMA money for earthquake mitigation efforts	Project-specific.
Water Preservation Funds	SNWA	Provides incentives to preserve water	Project-specific.
Hazard Mitigation Grant Program	FEMA	Supports pre- and post-disaster mitigation plans and projects. Available to Nevada communities after a presidentially declared disaster has occurred in Nevada.	Grant award based on specific projects as they are identified.
Pre-Disaster Mitigation grant program	FEMA	Supports pre-disaster mitigation plans and projects. Available on an annual basis as a nationally competitive grant.	Grant award based on specific projects as they are identified.
Flood Mitigation Assistance grant program	FEMA	Mitigates repetitively flooded structures and infrastructure. Available on an annual basis, distributed to Nevada communities by the Nevada DEM.	Grant award based on specific projects as they are identified.
Assistance to Firefighters Grant Program	FEMA/USFA	Provides equipment, protective gear, emergency vehicles, training, and other resources needed to protect the public and emergency personnel from fire and related hazards.	Grant awards based on specific projects as they are identified.

Table I-7. City of Las Vegas Financial Resources for Hazard Mitigation

Type	Administrator	Purpose	Amount
		Available to fire departments and non-affiliated emergency medical services providers.	
Community Block Grant Program Entitlement Communities Grants	U.S. HUD	Acquisition of real property, relocation and demolition, rehabilitation of residential and non-residential structures, construction of public facilities and improvements, such as water and sewer facilities, streets, neighborhood centers, and the conversion of school buildings for eligible purposes.	Grant award based on specific projects as they are identified.
Community Action for a Renewed Environment	U.S. EPA	Through financial and technical assistance offers an innovative way for a community to organize and take action to reduce toxic pollution (i.e., stormwater) in its local environment. Through this program, a community creates a partnership that implements solutions to reduce releases of toxic pollutants and minimize people's exposure to them.	Grant award based on specific projects as they are identified.
Clean Water State Revolving Fund	U.S. EPA	A loan program that provides low-cost financing to eligible entities within state and tribal lands for water quality projects, including all types of non-point source, watershed protection or restoration, estuary management projects, and more traditional municipal wastewater treatment projects.	Variable.
Public Health Emergency Preparedness Cooperative Agreement.	CDC	Funds are intended to upgrade state and local public health jurisdictions' preparedness and response to bioterrorism, outbreaks of infectious diseases, and other public health threats and emergencies.	Grant award based on specific projects as they are identified.
Homeland Security Preparedness Technical Assistance Program	FEMA/DHS	Build and sustain preparedness technical assistance activities in support of the four homeland security mission areas (prevention, protection, response, recovery) and homeland security program management.	Grant award based on specific projects as they are identified.

Table I-8. City of Las Vegas Legal and Regulatory Resources for Hazard Mitigation

Name	Description (Effect on Hazard Mitigation)	Hazards Addressed	Emergency Management	Affects Development
Las Vegas Master Plan 20/20 – Safety and Seismic Safety Element (2010)	Describes hazard areas and regulates current and future development based on known hazard areas.	Fire – Flood – Seismic- Noise – Hazardous Materials and Landslide	Mitigation & Preparedness	Yes
Emergency Operations Plan	Describes what the local jurisdiction’s actions will be during a response to an emergency. Includes annexes that describe in more detail the actions required of the local jurisdiction’s departments/agencies. Further, this plan describes the role of the Emergency Operation Center (EOC) and the coordination that occurs between the EOC and the local jurisdiction’s departments and other response agencies. Finally, this plan describes how the EOC serves as the focal point among local, state, and federal governments in times of disaster.	All hazards	Response	No
State of Nevada and Las Vegas Urban Area THIRA and SPR Report (2016)	Describes risks to a community’s core capabilities, enabling them to determine desired outcomes, capability targets, and the resources required to achieve their capability targets.	Active Shooter, Chemical HazMat Release, Cyber Attack, Drought, Earthquake, Flood, Pandemic, Wildfire	Preparedness, Mitigation	Yes
Code of Ordinances	The purpose of this code is to establish the minimum requirements to safeguard public health, safety, and general welfare through structural strength, means of egress facilities, and stability; access for persons with disabilities, sanitation, adequate lighting, ventilation and energy conservation; and safety for life and property from fire and other hazards attributed to the built environment.	Fire, Hazardous Materials	Mitigation, Preparedness, and Response	Yes

Table I-9. City of Las Vegas Recent Hazard Mitigation Projects and Programs

Status (Current, Ongoing, or Completed)	Project / Program Name	Description	Year(s)
Ongoing	Bonneville Stormwater/Groundwater Pumping Station	Bonneville Underpass is constructed below the groundwater table, so constant groundwater dewatering is required to keep the underpass dry. Groundwater is contaminated and requires treatment before discharge into storm drain. The project is ongoing since 1992. The maintenance of pumping station costs approximately \$40,000 per year.	Ongoing
Ongoing	Turf Limits Program	Turf limits restrict or prohibit the amount of grass to be planted at new properties. The restrictions prohibiting types of grass that can be planted apply to all property owners.	Ongoing

Table I-10. City of Las Vegas Mitigation Action Plan

Project Name: Critical Infrastructure Flood Risk Reduction (Bonneville Stormwater)	
Description	Reinforce roads/bridges that are prone to repetitive flooding and/or flash flooding through protection activities, including elevating the roads/bridges and installing/widening culverts beneath the roads/bridges or upgrading storm drains.
Additional Information	Bonneville Underpass is constructed below the groundwater table, so constant groundwater dewatering is required to keep the underpass dry. Groundwater is contaminated and requires treatment before discharge into storm drain. The project is ongoing since 1992. The maintenance of pumping station costs approximately \$40,000 per year.
Administrator	Public Works, Operations and Maintenance / City of Las Vegas
Timeframe	Ongoing
Potential Funding	CIP, Clark County Regional Flood Control District Grant Programs
Project Name: Emergency Power (Shelter Generators)	
Description	Provide additional emergency power, such as a generator equipment, for new and existing critical facilities to operate continuously but cannot do so for long durations of power outage.
Additional Information	Two shelter locations have been identified with a need for back-up power improvements. At least two new trailer mounted diesel generator sets with quick connection cables and temporary fencing will be required.
Administrator	Building and Safety, Community Services, Facilities, Emergency Management / City of Las Vegas
Timeframe	2022
Potential Funding	EMPG, CIP
Project Name: Aquifer Storage and Recovery (Water Use and Conservation)	
Description	Maximize the use of recycled water in areas where return flow to the Colorado River system is not practical, by creating aquifer storage and recovery (ASR). Source waters for injection into ASR wells range from potable water, reclaimed water, partially treated surface water, and raw groundwater. Explore use of Aquifer Recharge and Recovery (ARAR), where water is recharged to an aquifer either under gravity or injected for the purpose of recharging the aquifer.
Additional Information	The primary source of water for the Las Vegas region is the Colorado River. The city plays a crucial role in the conservation and management of the water supply for its residents and businesses by supporting regional management efforts by the Southern Nevada Water Authority. Since 2008, the city has reduced its water consumption from 1.47 billion gallons to 1.18 billion gallons in 2016. These savings were achieved through the replacement of more than 40-acres of grass with synthetic turf at city sports fields and parks. City landscaping utilizes drought tolerant plants and public art. More than 75 million gallons of water per day have been recycled at the city's wastewater treatment plants and used at golf courses around the valley or returned to Lake Mead. In the community, water use has declined from approximately 350 gallons per person per day (GPCD) in 1990 to less than 220 GPCD today. Southern Nevada will soon surpass the region's 2035 goal to reduce consumption through conservation to 199 GPCD. Overall Colorado River water consumption has decreased 40 billion gallons despite an increase of 500,000 residents over the last decade.
Administrator	Parks and Rec, Planning / City of Las Vegas

Timeframe	Ongoing
Potential Funding	CIP
Project Name: NIPP's Security and Resilience Challenge (Smart City)	
Description	Strengthen the security and resilience of critical infrastructure through state-of-the-art, cost-effective technology, tools, processes and methods as part of the 2017 National Infrastructure Protection Plan's (NIPP) Security and Resilience Challenge.
Additional Information	The city of Las Vegas has already invested \$500 million in "smart" infrastructure, having charted a course to become a smart city by 2025. Within the Innovation District, the city is working quickly to create a place where intelligent transportation systems and smart technology operate seamlessly to provide services efficiently to its 650,000 residents and 42 million visitors. The city seeks to improve interoperability among all public service sectors: transportation, energy, public works, facilities, and public safety/law enforcement through open-source data sharing, real-time data analytics and decision support. The city's aim is to keep the public safe and connected and provide them information they seek when they need it. The Innovation District will serve as a test bed for new Internet of Things innovations that will be deployed across the city's vast metropolitan area.
Administrator	Planning, Information Technologies, Public Works, Operations and Maintenance, Economic and Urban Development / City of Las Vegas
Timeframe	2025
Potential Funding	CIP
Project Name: NIPP's Security and Resilience Challenge (Connected Corridors)	
Description	Strengthen the security and resilience of critical infrastructure through state-of-the-art, cost-effective technology, tools, processes and methods as part of the 2017 National Infrastructure Protection Plan's (NIPP) Security and Resilience Challenge.
Additional Information	The city is underway with a robust connected vehicle corridor deployment. To date, 14 traffic signals within the region have been instrumented with Dedicated Short Range Communications (DSRC) radios. Our experience includes the installation, inspection and integration of the data into our regional traffic system. The city is developing a network of connected corridors within our Innovation District for deployment of Connected Autonomous Vehicles (CAVS). The roadways include Main and Fourth streets, Stewart, Bonneville and Clark avenues and Casino Center Boulevard. The connected corridor project is underway and will install 24 additional DSRC radios in the downtown Innovation District again using our significant fiber optic investment. This project will provide a solid backbone for the safe assessment of CAVs, that use this area as a proving ground, and offers the capability of monitoring the performance of various technology deployments.
Administrator	Public Works, Operations and Maintenance, Information Technologies, Planning / City of Las Vegas
Timeframe	Ongoing
Potential Funding	CIP

Appendix J – City of Mesquite

Table J-1. City of Mesquite Total: Land Area, Population, Residential Buildings and Critical Facilities and Infrastructure

Category	Number
Land (square miles)	32.1
Population	20,325
Residential Buildings	11,663
Critical Facilities & Infrastructure	42

Table J-2. City of Mesquite Vulnerability, Land Area

Hazard	Number (square miles)	% of Total
Earthquake – Very Strong Ground Shaking	0	0
Earthquake – Strong Ground Shaking	32.1	100
Earthquake – Liquefaction	0	0
Flood – 100 Year Floodplain	2.2	6.9
Flood – 500 Year Floodplain	0.1	0.3
Wildfire – Very High	0	0
Wildfire – High	0	0

Table J-3. City of Mesquite Vulnerability, Population

Hazard	Population	% of Total
Earthquake – Very Strong Ground Shaking	0	0
Earthquake – Strong Ground Shaking	20,325	100
Earthquake – Liquefaction	0	0
Flood – 100 Year Floodplain	2206	10.9
Flood – 500 Year Floodplain	0	0
Wildfire – Very High	0	0
Wildfire – High	0	0

Table J-4. City of Mesquite Vulnerability, Residential Buildings

Hazard	Residential Buildings	% of Total
Earthquake – Very Strong Ground Shaking	0	0
Earthquake – Strong Ground Shaking	11,663	100
Earthquake – Liquefaction	0	0
Flood – 100 Year Floodplain	1,183	10.1
Flood – 500 Year Floodplain	0	0
Wildfire – Very High	0	0
Wildfire – High	0	0

Table J-5. City of Mesquite Vulnerability, Critical Facilities and Infrastructure

Hazard	Critical Facilities	% of Total
Earthquake – Very Strong Ground Shaking	0	0
Earthquake – Strong Ground Shaking	42	100
Earthquake – Liquefaction	0	0
Flood – 100 Year Floodplain	9	21.4
Flood – 500 Year Floodplain	0	0
Wildfire – Very High	0	0
Wildfire – High	0	0

Table J-6. City of Mesquite Human and Technical Resources for Hazard Mitigation

Staff/Personnel Resources	Department or Agency	Principal Activities Related to Hazard Mitigation
Planner(s), engineer(s) and technical staff with knowledge of land development, land management practices, and human-caused and natural hazards.	Development Services	Develops and maintains the General Plan, including the Safety element. Develops area plans based on the General Plan, to provide more specific guidance for the development of more specific areas. Reviews private development projects and proposed capital improvements projects and other physical projects involving property for consistency and conformity with the General Plan. Anticipates and acts on the need for new plans, policies, and code changes. Applies the approved plans, policies, code provisions, and other regulations to proposed land uses.
Engineer(s), Building Inspectors/Code Enforcement Officers or other professional(s) and technical staff trained in construction requirements and practices related to existing and new buildings.	Development Services	Oversees the effective, efficient, fair, and safe enforcement of the Nevada Building Code
Engineers, construction project managers, and supporting technical staff.	Development Services, Public Works	Provides direct or contract civil, structural, and mechanical engineering services, including contract, project, and construction management.
Engineer(s), project manager(s), technical staff, equipment operators, and maintenance and construction staff.	Public Works	Maintains and operates of a wide range of local equipment and facilities as well as providing assistance to members of the public. These include providing sufficient clean fresh water, reliable sewer services, street maintenance, storm drainage systems, street cleaning, street lights and traffic signals.

Table J-6. City of Mesquite Human and Technical Resources for Hazard Mitigation

Staff/Personnel Resources	Department or Agency	Principal Activities Related to Hazard Mitigation
Floodplain Administrator	Public Works	Enforces the jurisdiction's floodplain management ordinance, which that new development proposals do not increase flood risk, and that new developments are not located below the 100 year flood level. In addition, the Floodplain Administrator is responsible for planning and managing flood risk reduction projects throughout the jurisdiction.
Emergency Manager	Fire and Rescue	Maintains and updates the Emergency Operations Plan for the local jurisdiction. In addition, coordinates local response and relief activities within the Emergency Operation Center, and works closely with county, state, and federal partners to support planning and training and to provide information and coordinate assistance.
Procurement Services Manager	City Manager, Finance Division	Provides a full range of municipal financial services, administers several licensing measures, and functions as the local jurisdiction's procurement services manager.

Table J-7. City of Mesquite Financial Resources for Hazard Mitigation

Type	Administrator	Purpose	Amount
General Fund	Finance Division	Program operations and specific projects.	Variable.
General Obligation Bonds	Finance Division	General obligation bonds are appropriately used for the construction and/or acquisition of improvements to real property broadly available to residents and visitors. Such facilities include, but are not limited to, libraries, hospitals, parks, public safety facilities, and cultural and educational facilities.	Variable.
Lease Revenue Bonds	Finance Division	Lease revenue bonds are used to finance capital projects that 1) have an identified budgetary stream for repayment (e.g., specified fees, tax receipts); 2) generate project revenue but rely on a broader pledge of general fund revenues to reduce borrowing costs; or 3) finance the acquisition and installation of equipment for the local jurisdiction's general governmental purposes.	Variable.
Wildfire Emergency and Mitigation Funds	Nevada Division of Forestry	Administers funding from FEMA, BLM, and U.S. Forest Service for certain types of wildfire emergency and mitigation funding	Project-specific.
Earthquake Mitigation Funds	Nevada Earthquake Safety Council	Allocates FEMA money for earthquake mitigation efforts	Project-specific.
Water Preservation Funds	SNWA	Provides incentives to preserve water	Project-specific.
Hazard Mitigation Grant Program	FEMA	Supports pre- and post-disaster mitigation plans and projects. Available to Nevada communities after a presidentially declared disaster has occurred in Nevada.	Grant award based on specific projects as they are identified.
Pre-Disaster Mitigation grant program	FEMA	Supports pre-disaster mitigation plans and projects. Available on an annual basis as a nationally competitive grant.	Grant award based on specific projects as they are identified.
Flood Mitigation Assistance grant program	FEMA	Mitigates repetitively flooded structures and infrastructure. Available on an annual basis, distributed to Nevada communities by the Nevada DEM.	Grant award based on specific projects as they are identified.
Assistance to Firefighters Grant Program	FEMA/USFA	Provides equipment, protective gear, emergency vehicles, training, and other resources needed to protect the public and emergency personnel from fire and related hazards.	Grant awards based on specific projects as they are identified.

Table J-7. City of Mesquite Financial Resources for Hazard Mitigation

Type	Administrator	Purpose	Amount
		Available to fire departments and non-affiliated emergency medical services providers.	
Community Block Grant Program Entitlement Communities Grants	U.S. HUD	Acquisition of real property, relocation and demolition, rehabilitation of residential and non-residential structures, construction of public facilities and improvements, such as water and sewer facilities, streets, neighborhood centers, and the conversion of school buildings for eligible purposes.	Grant award based on specific projects as they are identified.
Community Action for a Renewed Environment	U.S. EPA	Through financial and technical assistance offers an innovative way for a community to organize and take action to reduce toxic pollution (i.e., stormwater) in its local environment. Through this program, a community creates a partnership that implements solutions to reduce releases of toxic pollutants and minimize people's exposure to them.	Grant award based on specific projects as they are identified.
Clean Water State Revolving Fund	U.S. EPA	A loan program that provides low-cost financing to eligible entities within state and tribal lands for water quality projects, including all types of non-point source, watershed protection or restoration, estuary management projects, and more traditional municipal wastewater treatment projects.	Variable.
Public Health Emergency Preparedness Cooperative Agreement.	CDC	Funds are intended to upgrade state and local public health jurisdictions' preparedness and response to bioterrorism, outbreaks of infectious diseases, and other public health threats and emergencies.	Grant award based on specific projects as they are identified.
Homeland Security Preparedness Technical Assistance Program	FEMA/DHS	Build and sustain preparedness technical assistance activities in support of the four homeland security mission areas (prevention, protection, response, recovery) and homeland security program management.	Grant award based on specific projects as they are identified.

Table J-8. City of Mesquite Legal and Regulatory Resources for Hazard Mitigation

Name	Description (Effect on Hazard Mitigation)	Hazards Addressed	Emergency Management	Affects Development
Master Plan	Community goals and values into realistic policies and action programs that will guide decisions about new growth and development.	State of Nevada requires jurisdictions to address seismic safety.	Mitigation	Yes
Emergency Operations Plan (2008)	Describes what the local jurisdiction's actions will be during a response to an emergency. Includes annexes that describe in more detail the actions required of the local jurisdiction's departments/agencies. Further, this plan describes the role of the Emergency Operation Center (EOC) and the coordination that occurs between the EOC and the local jurisdiction's departments and other response agencies. Finally, this plan describes how the EOC serves as the focal point among local, state, and federal governments in times of disaster.	Earthquake; Fires and Explosions; Hazardous Materials Spills and Releases; Extended Utility Interruptions (power, natural gas, water, HTW); Floods; Mass Casualty Events; Terrorism; Tornadoes; Violence	Response	No
State of Nevada and Las Vegas Urban Area THIRA and SPR Report (2016)	Describes risks to a community's core capabilities, enabling them to determine desired outcomes, capability targets, and the resources required to achieve their capability targets.	Active Shooter, Chemical HazMat Release, Cyber Attack, Drought, Earthquake, Flood, Pandemic, Wildfire	Preparedness, Mitigation	Yes
Flood Control Master Plan Update (2007)	The Clark County Regional Flood Control District (CCRFCD) is responsible for developing and implementing a comprehensive flood control master plan to alleviate flooding in Clark County.	Flood	Mitigation	Yes
Code of Ordinances	The purpose of this code is to establish the minimum requirements to safeguard public health, safety, and general welfare through structural strength, means of egress facilities, and stability; access for persons with disabilities, sanitation, adequate lighting, ventilation and energy conservation; and safety for life and property from fire and other hazards attributed to the built environment.	Fire, Hazardous Materials	Mitigation, Preparedness, and Response	Yes

Table J-9. City of Mesquite Recent Hazard Mitigation Projects and Programs

Status (Current, Ongoing, or Completed)	Project / Program Name	Description	Year(s)
Ongoing	Mesquite Town Wash, Abbott Wash Channel, Pulsipher Wash Channel	Assessment of wash, inspection, cleaning and reshaping, vegetation control, species survey and removal, erosion control	Ongoing
Ongoing	Town Wash Detention Basin, Abbott Wash Detention Basin, Pulsipher Wash Detention Basin	Assessment of basin, inspection, cleaning and reshaping, vegetation control, species survey and removal, erosion control	Ongoing

Table J-10. City of Mesquite Mitigation Action Plan

Project Name: Emergency Power	
Description	Provide additional emergency power, such as a generator equipment, for new and existing critical facilities to operate continuously but cannot do so for long durations of power outage.
Additional Information	Generator power needed a primary shelter (City of Mesquite Fire & Rescue)
Administrator	Fire & Rescue
Timeframe	1 – 5 years
Potential Funding	FEMA Grants (PDM)

Appendix K – North Las Vegas

Table K-1. City of North Las Vegas Total: Land Area, Population, Residential Buildings and Critical Facilities and Infrastructure

Category	Number
Land (square miles)	97.9
Population	244,793
Residential Buildings	76,219
Critical Facilities & Infrastructure	196

Table K-2. City of North Las Vegas Vulnerability, Land Area

Hazard	Number (square miles)	% of Total
Earthquake – Very Strong Ground Shaking	97.9	100
Earthquake – Strong Ground Shaking	0	0
Earthquake – Liquefaction	3	3.1
Flood – 100 Year Floodplain	1.5	1.5
Flood – 500 Year Floodplain	2.2	2.2
Wildfire – Very High	0	0
Wildfire – High	0	0

Table K-3. City of North Las Vegas Vulnerability, Population

Hazard	Population	% of Total
Earthquake – Very Strong Ground Shaking	244,793	100
Earthquake – Strong Ground Shaking	0	0
Earthquake – Liquefaction	25,745	10.5
Flood – 100 Year Floodplain	4,034	1.6
Flood – 500 Year Floodplain	7,657	3.1
Wildfire – Very High	0	0
Wildfire – High	0	0

Table K-4. City of North Las Vegas Vulnerability, Residential Buildings

Hazard	Residential Buildings	% of Total
Earthquake – Very Strong Ground Shaking	76,219	100
Earthquake – Strong Ground Shaking	0	0
Earthquake – Liquefaction	4,591	6
Flood – 100 Year Floodplain	961	1.3
Flood – 500 Year Floodplain	2,071	2.7
Wildfire – Very High	0	0
Wildfire – High	0	0

Table K-5. City of North Las Vegas Vulnerability, Critical Facilities and Infrastructure

Hazard	Critical Facilities	% of Total
Earthquake – Very Strong Ground Shaking	196	100
Earthquake – Strong Ground Shaking	0	0
Earthquake – Liquefaction	28	14.3
Flood – 100 Year Floodplain	11	5.6
Flood – 500 Year Floodplain	17	8.7
Wildfire – Very High	0	0
Wildfire – High	0	0

Table K-6. City of North Las Vegas Human and Technical Resources for Hazard Mitigation

Staff/Personnel Resources	Department or Agency	Principal Activities Related to Hazard Mitigation
Planner(s), engineer(s) and technical staff with knowledge of land development, land management practices, and human-caused and natural hazards.	Public Works	Develops and maintains the General Plan, including the safety element. Develops area plans based on the General Plan, to provide more specific guidance for the development of more specific areas. Reviews private development projects and proposed capital improvements projects and other physical projects involving property for consistency and conformity with the General Plan. Anticipates and acts on the need for new plans, policies, and code changes. Applies the approved plans, policies, code provisions, and other regulations to proposed land uses.
Engineer(s), Building Inspectors/Code Enforcement Officers or other professional(s) and technical staff trained in construction requirements and practices related to existing and new buildings.	Department of Community Services and Development	Oversees the effective, efficient, fair, and safe enforcement of the Nevada Building Code
Engineers, construction project managers, and supporting technical staff.	Public Works	Provides direct or contract civil, structural, and mechanical engineering services, including contract, project, and construction management.
Engineer(s), project manager(s), technical staff, equipment operators, and maintenance and construction staff.	Public Works Department	Maintains and operates of a wide range of local equipment and facilities as well as providing assistance to members of the public. These include providing sufficient clean fresh water, reliable sewer services, street maintenance, storm drainage systems, street cleaning, street lights and traffic signals.
Floodplain Administrator	Public Works Department	Enforces the jurisdiction's floodplain management ordinance, which that new development proposals do not increase flood risk, and that new developments are not located below the 100 year flood level. In addition, the Floodplain Administrator is

Table K-6. City of North Las Vegas Human and Technical Resources for Hazard Mitigation

Staff/Personnel Resources	Department or Agency	Principal Activities Related to Hazard Mitigation
		responsible for planning and managing flood risk reduction projects throughout the jurisdiction.
Emergency Manager	Office of Emergency Management	Maintains and updates the Emergency Operations Plan for the local jurisdiction. In addition, coordinates local response and relief activities within the Emergency Operation Center, and works closely with County, state, and federal partners to support planning and training and to provide information and coordinate assistance.
Procurement Services Manager	Finance Department	Provides a full range of municipal financial services, administers several licensing measures, and functions as the local jurisdiction's procurement services manager.

Table K-7. City of North Las Vegas Financial Resources for Hazard Mitigation

Type	Administrator	Purpose	Amount
General Fund	Finance Department	Program operations and specific projects.	Variable.
General Obligation Bonds	Finance Department	General obligation bonds are appropriately used for the construction and/or acquisition of improvements to real property broadly available to residents and visitors. Such facilities include, but are not limited to, libraries, hospitals, parks, public safety facilities, and cultural and educational facilities.	Variable.
Lease Revenue Bonds	Finance Department	Lease revenue bonds are used to finance capital projects that 1) have an identified budgetary stream for repayment (e.g., specified fees, tax receipts); 2) generate project revenue but rely on a broader pledge of general fund revenues to reduce borrowing costs; or 3) finance the acquisition and installation of equipment for the local jurisdiction's general governmental purposes.	Variable.
Wildfire Emergency and Mitigation Funds	Nevada Division of Forestry	Administers funding from FEMA, BLM, and U.S. Forest Service for certain types of wildfire emergency and mitigation funding	Project-specific.
Earthquake Mitigation Funds	Nevada Earthquake Safety Council	Allocates FEMA money for earthquake mitigation efforts	Project-specific.
Water Preservation Funds	SNWA	Provides incentives to preserve water	Project-specific.
Hazard Mitigation Grant Program	FEMA	Supports pre- and post-disaster mitigation plans and projects. Available to Nevada communities after a presidentially declared disaster has occurred in Nevada.	Grant award based on specific projects as they are identified.
Pre-Disaster Mitigation grant program	FEMA	Supports pre-disaster mitigation plans and projects. Available on an annual basis as a nationally competitive grant.	Grant award based on specific projects as they are identified.
Flood Mitigation Assistance grant program	FEMA	Mitigates repetitively flooded structures and infrastructure. Available on an annual basis, distributed to Nevada communities by the Nevada DEM.	Grant award based on specific projects as they are identified.
Assistance to Firefighters Grant Program	FEMA/USFA	Provides equipment, protective gear, emergency vehicles, training, and other resources needed to protect the public and emergency personnel from fire and related hazards.	Grant awards based on specific projects as they are identified.

Table K-7. City of North Las Vegas Financial Resources for Hazard Mitigation

Type	Administrator	Purpose	Amount
		Available to fire departments and nonaffiliated emergency medical services providers.	
Community Block Grant Program Entitlement Communities Grants	U.S. HUD	Acquisition of real property, relocation and demolition, rehabilitation of residential and non-residential structures, construction of public facilities and improvements, such as water and sewer facilities, streets, neighborhood centers, and the conversion of school buildings for eligible purposes.	Grant award based on specific projects as they are identified.
Community Action for a Renewed Environment	U.S. EPA	Through financial and technical assistance offers an innovative way for a community to organize and take action to reduce toxic pollution (i.e., stormwater) in its local environment. Through this program, a community creates a partnership that implements solutions to reduce releases of toxic pollutants and minimize people's exposure to them.	Grant award based on specific projects as they are identified.
Clean Water State Revolving Fund	U.S. EPA	A loan program that provides low-cost financing to eligible entities within state and tribal lands for water quality projects, including all types of non-point source, watershed protection or restoration, estuary management projects, and more traditional municipal wastewater treatment projects.	Variable.
Public Health Emergency Preparedness Cooperative Agreement.	CDC	Funds are intended to upgrade state and local public health jurisdictions' preparedness and response to bioterrorism, outbreaks of infectious diseases, and other public health threats and emergencies.	Grant award based on specific projects as they are identified.
Homeland Security Preparedness Technical Assistance Program	FEMA/DHS	Build and sustain preparedness technical assistance activities in support of the four homeland security mission areas (prevention, protection, response, recovery) and homeland security program management.	Grant award based on specific projects as they are identified.

Table K-8. City of North Las Vegas Legal and Regulatory Resources for Hazard Mitigation

Name	Description (Effect on Hazard Mitigation)	Hazards Addressed	Emergency Management	Affects Development
General Plan: Safety Element (2011)	Describes hazard areas and regulates current and future development based on known hazard areas.	Hazards addressed are listed in the CNLV local jurisdiction's General Plan	Mitigation & Preparedness	Yes
Emergency Operations Plan (2011)	Describes what the local jurisdiction's actions will be during a response to an emergency. Includes annexes that describe in more detail the actions required of the local jurisdiction's departments/agencies. Further, this plan describes the role of the Emergency Operation Center (EOC) and the coordination that occurs between the EOC and the local jurisdiction's departments and other response agencies. Finally, this plan describes how the EOC serves as the focal point among local, state, and federal governments in times of disaster.	Flooding, Earthquakes	Response	No
Stormwater Quality Management Program (2011)	Describes measures that the local jurisdiction will take to minimize stormwater pollution. The SWQMP is required by the National Pollutant Discharge Elimination System Phase II regulations, which became effective in March 2003.	Stormwater	Mitigation & Preparedness	Yes
State of Nevada and Las Vegas Urban Area THIRA and SPR Report (2016)	Describes risks to a community's core capabilities, enabling them to determine desired outcomes, capability targets, and the resources required to achieve their capability targets.	Active Shooter, Chemical HazMat Release, Cyber Attack, Drought, Earthquake, Flood, Pandemic, Wildfire	Preparedness, Mitigation	Yes
Code of Ordinances	The purpose of this code is to establish the minimum requirements to safeguard public health, safety, and general welfare through structural strength, means of egress facilities, and stability; access for persons with disabilities, sanitation, adequate lighting, ventilation and energy conservation; and safety for life and property from fire and other hazards attributed to the built environment.	Fire, Hazardous Materials	Mitigation, Preparedness, and Response	Yes

Table K-9. City of North Las Vegas Recent Hazard Mitigation Projects and Programs

Status (Current, Ongoing, or Completed)	Project / Program Name	Description	Year(s)
Completed	Lake Mead @ Pecos Bridge	New Bridge	2012
Completed	Fire Station 50	New Station	2012
Completed	CCFD NLV 2 Channel Project Las Vegas Wash Main Branch Improvements	Converting to lined channel	2012-2013
Completed	Freeway Channel - Owens to Miller Ave.	Construct diversion pipe to handle excess storm flow	2012-2013
Ongoing	Turf Limits Program	Turf limits restrict or prohibit the amount of grass to be planted at new properties. The restrictions prohibiting types of grass that can be planted apply to all property owners.	Ongoing

Table K-10. City of North Las Vegas Mitigation Action Plan

Project Name: Flood Control	
Description	Alleviate the damage associated with flooding through new and reinforced flood control projects, including storm drains, culverts, drop inlets, channels, and detention basins.
Additional Information	Oak Island Storm Drain Mitigation Project: The City will eliminate the last residential Flood Zone “A” lots in the City’s jurisdiction; 100% capture of water flow; flow redirect directly into Lake Mead for precious resource conservation. Protect existing county/city assets and new developments from effects of floods within the 100-year floodplain.
Administrator	Public Works, City of North Las Vegas
Timeframe	Upon receipt of grant funding, within grant funding period.
Potential Funding	FEMA Grants with Match from Clark County Regional Flood Control District
Project Name: Emergency Power	
Description	Provide additional emergency power, such as a generator equipment, for new and existing critical facilities to operate continuously but cannot do so for long durations of power outage.
Additional Information	Emergency Generators for Critical Infrastructure and Sheltering Facilities
Administrator	Emergency Management, City of North Las Vegas
Timeframe	Grant Application Opportunities
Potential Funding	FEMA Grants; Potential CIP Funding

Appendix L – Clark County School District

Table L-1. Clark County School District Total: Critical Facilities and Infrastructure

Category	Number
Critical Facilities & Infrastructure	322

Table L-2. Clark County School District Vulnerability, Critical Facilities and Infrastructure

Hazard	Critical Facilities	% of Total
Earthquake – Very Strong Ground Shaking	254	78
Earthquake – Strong Ground Shaking	68	21
Earthquake – Liquefaction	122	38
Flood – 100 Year Floodplain	9	3
Flood – 500 Year Floodplain	24	7
Wildfire – Very High	0	0
Wildfire – High	2	< 1

Table L-3. Clark County School District Human and Technical Resources for Hazard Mitigation

Department or Agency	Principal Activities Related to Hazard Mitigation
Facilities Division	Provides facilities resource capabilities for the construction of new and modernization of 350 existing schools plus approximately 100 office and facilities buildings
Risk and Environmental Services	Conduct building inspections and ensures construction code compliance. Coordinates all environmental issues and ensures OSHA code compliance. Conduct equipment safety and provides equipment training.
Facilities Division	Manages all facility division records and retention program.
Capital Program Office, Facilities Division	Prepare architectural and construction contracts and ensure compliance with bid process and monitor compliance with construction certified payroll. Provides direct and/or contract architectural, civil, structural, electrical, and mechanical engineering services, including contract, project, and construction management. Manage new construction and modernization projects and ensure construction process and schedules are consistent with specifications and contractual agreement.
Maintenance Department	Maintain, conduct repairs, and operate a wide range of heavy duty equipment and all school, administrative and facility buildings in the district.
Special Projects and Renovation Services	Conduct small construction projects for facilities division planning and design and construction teams. These are project specific that normally would cost the district more money if they had to hire expertise from outside private constructors. Conduct portable classroom and office relocations and connections. Operate a wide-range of heavy duty equipment.
Operations and Grounds and Landscaping Department	Conduct custodial services for all school, administrative and facility buildings in the district and provide new and maintain existing landscaping services to district property
Energy Department	Responsible for all utility billings and energy savings programs in the district.
Office of Emergency Management, CCSD Police Department	Maintains and updates the Emergency Management Plan, annex plans, and appendices to the annex plans including the district Emergency Operations Plan and school crisis response plans. In addition, coordinates local response and relief activities within the Emergency Operation Center, and works closely with local response agencies, city, county, state, and federal partners to support planning and training and to provide information and coordinate assistance.
Grants Department	Provide a full service of grant development and management for the facilities division and for the Office of Emergency Management.

Table L-3. Clark County School District Human and Technical Resources for Hazard Mitigation

Department or Agency	Principal Activities Related to Hazard Mitigation
Operations, Finance and Accounting Capital Fund Financial Services	Oversee and manage all financial aspects of school district's general and capital funds
Purchasing and Warehousing Contracts	Manage all purchasing contracts; manage purchases, deliveries, and storage of all equipment and supplies in the district; and manage and provide reprographic services.

Table L-4. Clark County School District Financial Resources for Hazard Mitigation

Type	Administrator	Purpose	Amount
General Fund	Superintendent of Schools and Operations & Finance	Education program operations and educational specific projects. Funding includes administrative, support staffing, educators, operations expenses, student support services, health services, transportation, food services, police services, maintenance, custodial operations services, technical and skill trades, risk management, legal, purchasing and warehousing, and other as required for the daily operations of the district.	Varies
Capital Improvement Funds	Operations & Finance, and Capital Fund Financial Services	Can be used for future modernization, new construction, and hazard mitigation projects. Due to economic conditions and local and state cutbacks in the last three years, the present and future economic uncertainty, and the possibility of additional future cutbacks, the district cannot predict capital improvement fund sources.	Varies (depending on the economic condition at the time of mitigated hazard, provided that there is a valid mitigated hazard and available capital improvement funding resources for matching allocations).
Internal Service Funds	Risk Management	Provide some funding for safety improvements as they are associated with potential mitigated natural hazards.	The amount of funds may vary as the district encounters fewer insurance claims and makes more improvements associated with mitigated natural hazards that will reduce injuries, loss of life, damage to property, and loss of property.
Earthquake Mitigation Funds	Nevada Earthquake Safety Council	Allocates FEMA money for earthquake mitigation efforts	Project-specific.
Hazard Mitigation Grant Program	FEMA	Supports pre- and post-disaster mitigation plans and projects. Available to Nevada communities after a presidentially declared disaster has occurred in Nevada.	Grant award based on specific projects as they are identified.
Pre-Disaster Mitigation grant program	FEMA	Supports pre-disaster mitigation plans and projects. Available on an annual basis as a nationally competitive grant.	Grant award based on specific projects as they are identified.

Table L-4. Clark County School District Financial Resources for Hazard Mitigation

Type	Administrator	Purpose	Amount
Community Block Grant Program Entitlement Communities Grants	U.S. HUD	Acquisition of real property, relocation and demolition, rehabilitation of residential and non-residential structures, construction of public facilities and improvements, such as water and sewer facilities, streets, neighborhood centers, and the conversion of school buildings for eligible purposes.	Grant award based on specific projects as they are identified.
Community Action for a Renewed Environment	U.S. EPA	Through financial and technical assistance offers an innovative way for a community to organize and take action to reduce toxic pollution (i.e., stormwater) in its local environment. Through this program, a community creates a partnership that implements solutions to reduce releases of toxic pollutants and minimize people's exposure to them.	Grant award based on specific projects as they are identified.
Public Health Emergency Preparedness Cooperative Agreement.	CDC	Funds are intended to upgrade state and local public health jurisdictions' preparedness and response to bioterrorism, outbreaks of infectious diseases, and other public health threats and emergencies.	Grant award based on specific projects as they are identified.
Homeland Security Preparedness Technical Assistance Program	FEMA/DHS	Build and sustain preparedness technical assistance activities in support of the four homeland security mission areas (prevention, protection, response, recovery) and homeland security program management.	Grant award based on specific projects as they are identified.

Table L-5. Clark County School District Legal and Regulatory Resources for Hazard Mitigation

Name	Description (Effect on Hazard Mitigation)	Hazards Addressed	Emergency Management	Affects Development
CCSD Emergency Management, Basic Plan	This Basic Plan provides guidance for the Clark County School District (CCSD) in coordination with the Clark County Office of Emergency Management outlines the concept of operations, organizational planning , and responsibilities for managing and coordinating the occurrence or immediate threat of severe damage, injury, loss of life or property resulting from any natural or man-made disasters This emergency management, basic plan consists of a series of annex plans (A-Z) and a series of appendices associated with each of the annex plans. The format used in preparation is CPG 101, Version 2.0	All Hazards, Natural and Man-made	Mitigation, Preparedness, Response, and Recovery	No
Direction Control and Coordination, Annex N	The, defines the organization, operational concepts, responsibilities, and procedures necessary to accomplish Direction, Control, and Coordination for the CCSD. This annex describes our concept of operations and organization by assigning responsibilities for tasks that must be carried out to perform direction, control, and coordination functions.	All Hazards, Natural and Man-made	Mitigation, Preparedness, Response, and Recovery	No
Emergency Operations Plan, Appendix N01	The district Emergency Operations Plan, Appendix N01 to the Annex N, Direction, Control and Coordination Plan describes what the special district's actions will be during a response to an emergency. Further, this plan describes the role of the Emergency Operation Center (EOC) and the coordination that occurs between the EOC and district resource departments, local response and emergency agencies, and other response agencies. Finally, this plan describes how the EOC serves as the focal point among local, state, and federal governments in times of disaster.	All Hazards, Natural and Man-made	Response	No
Protective Actions, Annex E	The plan provides for all district students and employees in a coordinated effort and/or actions required to protect themselves from harm.	All Hazards, Natural and Man-made	Response	No

Table L-5. Clark County School District Legal and Regulatory Resources for Hazard Mitigation

Name	Description (Effect on Hazard Mitigation)	Hazards Addressed	Emergency Management	Affects Development
Instructional (School Based) and Non-Instructional (Office Based) Crisis Response Plans, Appendices E01 and E02	The crisis response plans have been developed per NRS 388.229 – 388.261 for the purpose of exercising and practicing actions taken during specific emergencies, such as what to do during a fire, or during an earthquake, and conducting evacuations, lock downs, and shelter-in-place, etc. In addition, the Crisis Response Plan has been developed in accordance with NIMS –ICS standards in order for administrators to understand the process and responsibilities aligned within the Incident Command Structure. This includes understanding ICS – EOC interface. Introducing NIMS-ICS to the District will make first responders’ jobs easier during disasters.	All Hazards, Natural and Man-made	Response	No
Other Annex and Appendix Plans	Various annex and appendix plans have been assigned to other Departments such as transportation, food services, school police, health services, risk management, legal, public information office will develop within the next 12 months	All Hazards, Natural and Man-made	Mitigation, Preparedness, Protection, Prevention, Response, and Recovery	No

Table L-6. Clark County School District Recent Hazard Mitigation Projects and Programs

Status (Current, Ongoing, or Completed)	Project / Program Name	Description	Year(s)
Completed	Installation of Seismic Gas Valves (the grant application for this project issued in 2011)	This project requires the replacement all gas valves with new seismic gas valves on all school properties, administrative and facility buildings, for the prevention of fires, explosions as triggered by leak(s) in the piping system. Potential problems such as this one will most likely rise from earthquakes.	Not Available
Completed	Installation of Seismic Bracing for the Las Vegas Academy Gym Building (the grant application for this project issued in 2011)	The Las Vegas Academy Gym was constructed in 1930s and considered as a Historical Building. This Historical Building is still being used during operational days housing approximately 100 and up to 600 students, faculty and parents during events. In order to prevent loss of life caused by an earthquake, maintain and preserve the building as the Las Vegas Valley's Historical Monument, it requires structural seismic bracing.	Not Available

Table L-7. Clark County School District Mitigation Action Plan

Project Name: Emergency Power	
Description	Provide additional emergency power, such as generator equipment, for new and existing critical facilities to operate continuously but is not possible for long durations of power outage.
Additional Information	Bus yards
Administrator	CCSD Police Department Office of Emergency Management
Timeframe	1 – 3 years
Potential Funding	FEMA grant funding

Appendix M – Clark County Water Reclamation District

Table M-1. Clark County Water Reclamation District Total: Critical Facilities and Infrastructure

Category	Number
Critical Facilities & Infrastructure	7*

* Non-confidential facilities

Table M-2. Clark County Water Reclamation District Vulnerability, Critical Facilities and Infrastructure

Hazard	Critical Facilities	% of Total
Earthquake – Very Strong Ground Shaking	3	43
Earthquake – Strong Ground Shaking	4	57
Earthquake – Liquefaction	1	14
Flood – 100 Year Floodplain	2	29
Flood – 500 Year Floodplain	1	14
Wildfire – Very High	0	0
Wildfire – High	1	14

Table M-3. Clark County Water Reclamation District Human and Technical Resources for Hazard Mitigation

Department or Division	Principal Activities Related to Hazard Mitigation
CCWRD Engineering and Construction	Provides direct or contract civil, structural, and mechanical engineering services, including contract, project, and construction management.
CCWRD Collection Systems & Maintenance	Maintains and operates of a wide range of local equipment and facilities as well as providing assistance to members of the public. These include providing sufficient clean fresh water, reliable sewer services, street maintenance, storm drainage systems, street cleaning, street lights and traffic signals.
CCWRD Finance & Technology, CCWRD Collection Systems & Maintenance	Maintains and updates the Emergency Operations Plan. In addition, coordinates local response and relief activities within the Emergency Operation Center, and works closely with county, state, and federal partners to support planning and training and to provide information and coordinate assistance.
Clark County Commissioners, CCWRD Finance & Technology	Establishes policy, approve budgets and conduct public hearings to establish the rates and fees charged by us.

Table M-4. Clark County Water Reclamation District Financial Resources for Hazard Mitigation

Type	Administrator	Purpose	Amount
Enterprise Fund	CCWRD	Program operations and specific projects.	Variable.
General Obligation Bonds	CCWRD	General obligation bonds are appropriately used for the construction and/or acquisition of improvements to real property for the district.	Variable.
Earthquake Mitigation Funds	Nevada Earthquake Safety Council	Allocates FEMA money for earthquake mitigation efforts	Project-specific.
Hazard Mitigation Grant Program	FEMA	Supports pre- and post-disaster mitigation plans and projects. Available to Nevada communities after a presidentially declared disaster has occurred in Nevada.	Grant award based on specific projects as they are identified.
Pre-Disaster Mitigation grant program	FEMA	Supports pre-disaster mitigation plans and projects. Available on an annual basis as a nationally competitive grant.	Grant award based on specific projects as they are identified.
Homeland Security Preparedness Technical Assistance Program	FEMA/DHS	Build and sustain preparedness technical assistance activities in support of the four homeland security mission areas (prevention, protection, response, recovery) and homeland security program management.	Grant award based on specific projects as they are identified.

Table M-5. Clark County Water Reclamation District Legal and Regulatory Resources for Hazard Mitigation

Name	Description (Effect on Hazard Mitigation)	Hazards Addressed	Emergency Management	Affects Development
CCWRD Written Emergency Management Plan	The written plan has all facets of the District's Emergency management outlined within to include mitigation, preparedness response and recovery. The written plan allows the staff to utilize information from mitigation to recovery phases of natural and manmade disasters. Within the response section of the overall plan the following hazards are addressed:	Loss of power, loss of major infrastructure, contamination of collection sewer system , security breach, loss of pressure of collection system, major hazardous spill, loss of personnel	All	Yes
DHS Protective Measures for Wastewater Treatment Facilities	Document/guide to assist with protective measures against common vulnerabilities within wastewater facilities.	Terrorist activities	Preparedness	Yes
EPA Security Guidelines to guard against security threats	Document/guide to assist with protective measures against common vulnerabilities within wastewater facilities.	Terrorist activities	Preparedness	Yes
DHS- Chemicals of Interest	Document/guide to assist with protective measures against common vulnerabilities within wastewater facilities.	Terrorist activities	Preparedness	No
WEF – Guidelines for Physical Security of Water Utilities	Document/guide to assist with protective measures against common vulnerabilities within wastewater facilities.	Terrorist activities	Preparedness	Yes
DHS – Cyber Resilience Review	Document/guide to assist with cyber protective measures at wastewater facilities.	Terrorist activities	Preparedness	No

Table M-6. Clark County Water Reclamation District Recent Hazard Mitigation Projects and Programs

Status (Current, Ongoing, or Completed)	Project / Program Name	Description	Year(s)
Completed, Ongoing	Inspection Program	Inspection program completed. An inspection analysis will be used to prioritize the repair, rehabilitation or replacement of existing pipelines.	Prior to 2014
Completed	Searchlight and Blue Diamond Treatment Ponds	Rehabilitate treatment ponds	2014 - 2015
Current	Laughlin Water Resource Facility	Rehabilitate systems, including emergency storage pond.	2014 - 2018

Table M-7. Clark County Water Reclamation District Mitigation Action Plan

Project Name: Emergency Power	
Description	Provide additional emergency power, such as generator equipment, for new and existing critical facilities to operate continuously but is not possible for long durations of power outage.
Additional Information	Not available at this time
Administrator	CCWRD Finance & Technology, CCWRD Collection Systems & Maintenance
Timeframe	1 – 3 years
Potential Funding	FEMA grant funding
Project Name: Mosquito Abatement Program	
Description	Continue the countywide Vector Surveillance Program for early warning disease introduction and the countywide long term abatement program to target treatment areas, particularly those prone to flooding.
Additional Information	Continue Mosquito Abatement Program to prevent and respond to mosquito infestations, including outreach to the general public and affected area residents.
Administrator	CCWRD Collection Systems & Maintenance
Timeframe	2018-2022
Potential Funding	PDM and Post-Event Mitigation funds, if applicable