

Appendix A: Meeting Notes and Handouts

- Meeting 1
- Meeting 2
- Meeting 3
- Meeting 3.5
- Meeting 4
- Mitigation Action Review Documents
- Presentations by Subject Matter Experts
 - Acts of Violence
 - Earthquake
 - Flooding in Carson City
 - Infectious Disease
 - Overview of Residential Development
 - Severe Weather
 - Wildland Fire

Appendix A: Meeting Notes and Handouts

- Meeting 1

**May 7 Meeting 1
Planning Team Invitations
Sent April 30, 2021**

Recipients

'naaker@carson.org'; Elizabeth Ashby <eashby@roanderson.com>; 'Kate Cunningham' <kcunningham@roanderson.com>; 'acyr@carson.k12.nv.us'; 'jdanen@carson.org'; 'cdepolo@unr.edu'; 'jerry@991fmtalk.com'; 'rfellows@carson.org'; 'dfogerson@dps.state.nv.us'; 'keith.forbes@agri.state.nv.us'; 'kfurlong@carson.org'; 'charjo@dps.state.nv.us'; 'hill.hemenway@redcross.org'; Eric T. Herron <eherron@roanderson.com>; 'shicks@carson.org'; Marie A. Hulse <mhulse@roanderson.com>; 'ahummel@carson.org'; 'tjesse@carson.org'; 'mlawton@carson.org'; 'alowe@carson.org'; 'hannah@pcccarson.org'; 'nmerritt@carson.org'; 'npaulson@carson.org'; 'pk.oneill@asm.state.nv.us'; 'taryn.peirce@carsontahoe.org'; 'mark.regan@nvenergy.com'; 'craig.robinson@wnc.edu'; 'druben@carson.org'; 'Keith E. Ruben' <kruben@roanderson.com>; 'rummel@carson.org'; 'rschneider@carson.org'; 'dschulz@carson.org'; 'jocelyn.seemann@redcross.org'; 'sslamon@carson.org'; 'chris.smallcomb@noaa.gov'; 'serrell.smokey@washotribe.us'; 'mark.stearns@usw.salvationarmy.org'; 'HSullivan@carson.org'; 'jtushbant@carson.org'; 'ewarnock@water.nv.gov'; 'swartgow@carson.org'; 'jwoodward@dps.state.nv.us'; 'dyohey@chromalloy.com'

Carson City 2021 HMP Update - Planning Team Meeting May 7, 2021

Greetings!

On behalf of Carson City Deputy Emergency Manager, Jason Danen, we are providing more information about our first Planning Team Meeting for the Carson City 2021 Hazard Mitigation Plan Update. Please note that the first meeting will be a hybrid one: in person attendance (with a mask) or virtual attendance (via Zoom). The zoom instructions will be distributed on or before Wednesday, May 5.

A preview of the agenda follows below. Draft handouts are available here: <https://roanderson.sharefile.com/d-s7e83dbcd3082467abfa00c389d1189bb>

If you have not yet sent your RSVP, please do so by replying to this email. Thank you!

**Meeting 1: Public Workshop & HMP Planning Team Meeting
1:30 to 4:30 pm, Friday, May 7, 2021**

Carson City Sheriff's Office Ormsby Room
East Musser Street, Carson City, NV

- 1.0 Introduction to Update Process and Schedule: Jason Danen, Deputy Emergency Manager**
- 2.0 Planning Process: R.O. Anderson (ROA)**
- 3.0 Outreach Overview: Rachael Schneider, Carson City Public Relations & ROA**
- 4.0 Future Growth: Hope Sullivan, Director of Community Development**

5.0 Subject Matter Expert (SME) Hazard Presentations

Presentations to address to why, where, when, how often, what happens, and potential solution(s) to reduce effects. Each presentation will be followed by a short discussion about the status of the 2016 HMP mitigation activities related to the hazard.

- Rob Fellows, Floodplain Manager: Floods
- Rodd Rummel, Wildland Fuels Management Officer: Wildfire
- Craig DePolo, Geologist, UNR: Earthquake, seiche, volcano, and landslides
- Chris Smallcomb, NOAA: Weather and Climate Change impacts (drought, severe weather, avalanche, floods, and others as identified by SME)
- Jerome Tushbant, Assistant Sheriff: Law Enforcement-Related Manmade Hazards (e.g. active shooter, civil unrest, terrorism, and others as identified by SME)
- Nicki Aker, Director, Carson City Health and Human Services: Epidemics

6.0 Hazard Identification & Ranking: R.O. Anderson Engineering

7.0 Task Assignments

8.0 Upcoming Meetings: WORKSHOP SCHEDULE

- **Thursday, May 27, 2021, 1:30 to 4:30 p.m.**
Fire Station 51
777 South Stewart Street, Carson City
HMP Planning Team Meeting 2: Capability Assessment, Integration, Future Growth, Asset Review, Vulnerability Assessment, and Preliminary Mitigation Strategy
- **Friday, June 18, 2021, 1:30 to 4:30 p.m.**
Fire Station 51
777 South Stewart Street, Carson City
HMP Planning Team Meeting 3: Rank Mitigation Actions and Strategy and Update Plan Maintenance Process
- **Thursday, July 22, 2021, 1:30 to 4:30 p.m.**
Fire Station 51
777 South Stewart Street, Carson City
HMP Planning Team Meeting 4: Final review and approval of incorporation of public comment

You are welcome to contact me with any questions.

Best,
Kate

May 7 Meeting 1
Regional Partners Invitation
Sent April 30, 2021

These invitations were sent via mail merge to the addresses below.

xing.liu@fema.dhs.gov

JoAnn.Scordino@fema.dhs.gov

jlwalker@dot.nv.gov

bwacker@admin.nv.gov

KEcheverria@washoecounty.us

tcarlini@eastforkfire.org

jpage@lyon-county.org

jcurtis@storeycounty.org

bmoline@forestry.nv.gov

Rebecca.Bodnar@ndep.nv.gov

ewarnock@water.nv.gov

Carson City 2021 Hazard Mitigation Plan Update

Regional Partners Invitation

To Erin Warnock, State Floodplain Manager:

On behalf of the Carson City Deputy Emergency Manager, Jason Danen, we invite you, as a representative of Division of Water Resources, to participate in the third Hazard Mitigation Plan Update process. As you know, federal regulations (Title 44, Chapter 1, Subpart D, Part 201 of the Code of Federal Regulations (CFR)) require local, state, and tribal governments to update their Hazard Mitigation Plan every five years. A FEMA approved Hazard Mitigation Plan (HMP) provides eligibility for Carson City to apply for pre- and post-disaster hazard mitigation, as well as post-disaster public assistance funding.

One of the major components of the plan update is having a good cross-section of participation from neighboring communities. We believe this planning process offers an opportunity to identify mitigation actions and activities that involve cooperation on a regional level. Collaborating to reduce risk to similar hazards impacting our communities will strengthen support for future funding opportunities.

For reference and planning purposes, the schedule for the Planning Team meetings and their tentative objectives are listed below.

Please note that the first meeting will be a hybrid one: in person attendance (with a mask) or virtual attendance (via Zoom). The zoom instructions will be distributed on or before Wednesday, May 5.

WORKSHOP SCHEDULE

- 1. Friday, May 7, 2021, 1:30 to 4:30 p.m.**
Sheriff's Office / Ormsby Room
911 E. Musser Street
Public Workshop & HMP Planning Team Meeting 1: Outreach, Future Growth, Hazard Identification and Ranking

Preview Workshop Handouts here: <https://roanderson.sharefile.com/d-s7e83dbcd3082467abfa00c389d1189bb>
- 2. Thursday, May 27, 2021, 1:30 to 4:30 p.m.**
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We hope you will participate in this important process for Carson City. Please do RSVP to Kate Cunningham whose contact info follows below.

RSVP to Kate Cunningham, Associate Planner

email: kcunningham@roanderson.com

desk: 775.392.1602

Your cooperation will assist us in welcoming you and including your name on the list of contributors.

Sincerely,

Jason Danen, Emergency Manager

Sent via Kate Cunningham, R.O. Anderson Engineering



Carson City 2021 Hazard Mitigation Plan Update
Planning Team Meeting 1: May 7, 2021
Sign-in-Sheet



Name	Firm/Agency	Phone Number	Email
Robb Fellows	CCPW	283-7370	RFellows@carson.org
Dave Spencer	SOSAIR	775-671-8907	carsoncitysr1@gmail.com
Stephanie Hicks	CCED	283-7904	shicks@carson.org
Lisa Schmette	CC Board of Sup	671-2413	lschmette@carson.org
Tom Raw	Deputy EM (RETIRED)	775 233 5107	traw1@aol.com
DAN STUCKY	CCPW	283-7084	dstucky@carson.org
Andy Hannel	CCPW	283 7 357	ahannel@carson.org
Pod Rummel	CCFD	283-7161	prummel@carson.org
James Underwood	CCIT	283-7006	junderwood@carson.org
Furlong	CCSO		



**Carson City 2021 Hazard Mitigation Plan Update
 Planning Team Meeting 1: May 7, 2021
 Sign-in-Sheet**



Name	Firm/Agency	Phone Number	Email
Ann Coge	Carson Schools	775-283-2006	acoge@carson.k12nv.us
HOPE SULLIVAN	CC CD	283-7922	HSULLIVAN@CARSON.ORG
Nicki Aaker	CE 14 HS	283-7704	naaker@carson.nv
DAVID FOGELW	NEVADA EMERGENCY MANAGER	687 5300	DFOGELW@PRJ.STATE.NV.US
Kelly Echeverria	WCERN	775-399-4811	kecheverria@washoecounty.us
Jeanne Freeman	CCHHS	283-7217	JMFreeman@carson.org
SEAN SLAMON	FIRE		
JEROME TUSHBANT	CCSO	283-7802	JTUSHBANT@CARSON.ORG
Jason Daren	CCFD	775-790-3288	JDaren@carson.org
Reynald Schneider	City	775 400 5162	rschneider@carson.org

Attendee Report

Report Generated:

5/10/2021 13:25

Topic	Webinar ID	Actual Start Time	Actual Duration (minutes)	# Registered	# Cancelled	Unique Vie Total Users	Max Concurrent Views
Meeting 1 - Carson City 2021 Hazard Mitigation Plan Update	943 8105 8598	5/7/2021 13:13		231	4	0 3	22 0

Host Details

Attended	User Name (Original Name)	Email	Join Time	Leave Time	Time in Session (minutes)	Country/Region Name
Yes	Kate Cunningham	kcunningham@roanderson.com		5/7/2021 13:13	5/7/2021 17:04	231 United States

Panelist Details

Attended	User Name (Original Name)	Email	Join Time	Leave Time	Time in Session (minutes)	Country/Region Name
Yes	Rachael Schneider	rschneider@carson.org		5/7/2021 13:25	5/7/2021 16:55	211 United States
Yes	Craig Depolo	eq_dude@sbcglobal.net		5/7/2021 13:25	5/7/2021 15:09	105 United States
Yes	Jim Walker	jlwalker@dot.nv.gov		5/7/2021 13:28	5/7/2021 17:04	216 United States
Yes	Chris Smallcomb	chris.smallcomb@noaa.gov		5/7/2021 13:25	5/7/2021 13:35	11 United States
Yes	Chris Smallcomb	chris.smallcomb@noaa.gov		5/7/2021 13:36	5/7/2021 15:52	136 United States
Yes	Dave Yohey	dyohey@chromalloy.com		5/7/2021 13:30	5/7/2021 13:33	4 United States
Yes	Dave Yohey	dyohey@chromalloy.com		5/7/2021 13:33	5/7/2021 15:47	134 United States
Yes	Joceyln Seeman	jocelyn.seemann@redcross.org		5/7/2021 13:32	5/7/2021 17:04	213 United States
Yes	Taryn Peirce	taryn.peirce@carsontahoe.org		5/7/2021 13:28	5/7/2021 17:03	215 United States
Yes	Craig Robinson	craig.robinson@wnc.edu		5/7/2021 13:36	5/7/2021 16:56	200 United States
Yes	Darren Schulz	dschulz@carson.org		5/7/2021 13:51	5/7/2021 15:38	107 United States
Yes	Marie Hulse	mhulse@roanderson.com		5/7/2021 13:27	5/7/2021 17:04	218 United States

Attendee Details

Attended	User Name (Original Name)	First Name	Last Name	Email	Registration Time	Approval St	Join Time	Leave Time	Time in Ses	Country/Re
No	Small C134748onference	Small	C134748onference	smallconf@roanderson.onmicrosoft.com	5/5/2021 15:29	approved	--	--	--	--
Yes	Randall Rice	Randall	Rice	rrice@carson.org	5/7/2021 11:19	approved	5/7/2021 13:31	5/7/2021 15:33	123	United Stat
Yes	Janell Woodward	Janell	Woodward	jwoodward@dps.state.nv.us	5/7/2021 13:33	approved	5/7/2021 13:34	5/7/2021 15:28	115	United Stat
Yes	Brian Wacker	Brian	Wacker	wackers2005@gmail.com	5/7/2021 13:27	approved	5/7/2021 13:27	5/7/2021 13:29	3	United Stat
Yes	Brian Wacker	Brian	Wacker	wackers2005@gmail.com			5/7/2021 13:30	5/7/2021 13:31	2	United Stat
Yes	Brian Wacker	Brian	Wacker	wackers2005@gmail.com			5/7/2021 13:31	5/7/2021 15:10	99	United Stat

Other Attended

User Name	Join Time	Leave Time	Time in Session (minutes)	Country/Region Name
13146807526	5/7/2021 13:30	5/7/2021 13:31	1	United States
17754334041	5/7/2021 13:35	5/7/2021 15:08	94	United States
17757621866	5/7/2021 13:36	5/7/2021 13:36	1	United States
17758464864	5/7/2021 13:28	5/7/2021 15:07	100	United States



AGENDA



Carson City 2021 Hazard Mitigation Plan Update

Meeting 1: Public Workshop & HMP Planning Team Meeting

1:30 to 4:30 pm, Friday, May 7, 2021

Carson City Sheriff's Office Ormsby Room
911 East Musser Street, Carson City, NV

- 1.0 Introduction to Update Process and Schedule: Jason Danen, Deputy Emergency Manager (Discussion Only)
- 2.0 Planning Process: R.O. Anderson (ROA) (Discussion Only)
- 3.0 Outreach Overview: Rachael Schneider, Carson City Public Relations & ROA (Discussion Only)
- 4.0 Future Growth: Hope Sullivan, Director of Community Development (Discussion Only)
- 5.0 Subject Matter Expert (SME) Hazard Presentations (Discussion Only)
Presentations to address to why, where, when, how often, what happens, and potential solution(s) to reduce effects. Each presentation will be followed by a short discussion about the status of the 2016 HMP mitigation activities related to the hazard.
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 - Rodd Rummel, Wildland Fuels Management Officer: Wildfire
 - Craig DePolo, Geologist, UNR: Earthquake, seiche, volcano, and landslides
 - Chris Smallcomb, NOAA: Weather and Climate Change impacts (drought, severe weather, avalanche, floods, and others as identified by SME)
 - Nicki Aaker, Director, Carson City Health and Human Services: Epidemics
 - Tom Raw, Retired Deputy Emergency Manager, Carson City; Quad County Hazardous Materials Coordinator: Hazardous Materials
 - Jerome Tushbant, Assistant Sheriff: Law Enforcement-Related Manmade Hazards (e.g. active shooter, civil unrest, terrorism, and others as identified by SME)
- 6.0 Questions and Answers (Q & A) (Discussion Only)
- 7.0 Public Comment 1. No action may be taken upon a matter raised under this item of the agenda until the matter is specifically included on an agenda as an action item. Public comments may be limited to three minutes per person. Comments will not be restricted based on viewpoint.
- 8.0 Hazard Identification & Ranking: R.O. Anderson Engineering (Discussion/For Possible Action)

Continued -> -> -> If you have not yet done so, please RSVP to kcunningham@roanderson.com.



AGENDA



Carson City 2021 Hazard Mitigation Plan Update

9.0 Public Comment 2. No action may be taken upon a matter raised under this item of the agenda until the matter is specifically included on an agenda as an action item. Public comments may be limited to three minutes per person. Comments will not be restricted based on viewpoint.

10.0 Task Assignments

11.0 Upcoming Meetings: WORKSHOP SCHEDULE (Discussion Only)

- **Thursday, May 27, 2021, 1:30 to 4:30 p.m.**
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Fire Station 51
777 South Stewart Street, Carson City
HMP Planning Team Meeting 4: Final review and approval of incorporation of public comment

If you have not yet done so, please RSVP to kcunningham@roanderson.com.

This is a public meeting. In conformance with the Nevada Public Meeting Law and pursuant to Section 3 and 4 of the Declaration of Emergency Directive 006 signed on March 12, 2020, as extended by Declaration of Emergency Directive 029, signed July 31, 2021, this agenda was posted or caused to be posted on or before 9:00 am on May 4, 2021, at the following locations.

- Carson City Online: carson.org/hazardplan
- Physical Locations: Carson City Sheriff's Office (911 East Musser Street, Carson City, NV), Carson City, City Hall (201 N. Carson Street, Carson City, NV) and Fire Station 51 (777 South Stewart Street, Carson City, NV).

We are pleased to make reasonable accommodations for members of the public who have disability or access requirements. Please contact Nancy Merritt, Administrative Support, Carson City Fire Department, 777 S. Stewart St., Carson City, NV. 89701, 775-283-7947, nmerritt@carson.org.

Continued -> -> -> If you have not yet done so, please RSVP to kcunningham@roanderson.com.



Meeting 1 Outcomes

Carson City 2021 Hazard Mitigation Plan Update

Meeting 1: Public Workshop & HMP Planning Team Meeting

1:30 to 4:30 pm, Friday, May 7, 2021

Carson City Sheriff's Office Ormsby Room
911 East Musser Street, Carson City, NV

1.0 Introduction to Update Process and Schedule: Jason Danen, Deputy Emergency Manager (Discussion Only)

Jason Danen, Carson City Deputy Emergency Manager, provided a brief history of the 2021 HMP Update, introduced the range of Planning Team Members representing various agencies and departments, discussed the purpose of the plan, the importance of community engagement, and the necessity to be responsive due to the very tight timeline for the update.

2.0 Planning Process: R.O. Anderson (ROA) (Discussion Only)

Elizabeth Ashby, R.O. Anderson Senior Hazard Mitigation Planner, provided an overview of the planning process in terms of its components, goals, and compliance with FEMA requirements. Kate Cunningham, R.O. Anderson Associate Planner, outlined the means of sharing information via ShareFile and email.

3.0 Outreach Overview: Rachael Schneider, Carson City Public Relations & ROA (Discussion Only)

Rachael Schneider, Digital Media Coordinator for Carson City, presented an overview of her role in facilitating public outreach as well as her role in promoting the Hazard Mitigation Plan including the sponsored page carson.org/hazardplan where the public can access copies of the existing plan, links to public workshop agendas, and a survey. She also published an article in Nevada Appeal promoting public engagement with the Carson City 2021 Hazard Mitigation Plan Update.

4.0 Future Growth: Hope Sullivan, Director of Community Development (Discussion Only)

Hope Sullivan, Director, Carson City Community Development, provided an overview of the City's policy and process for managing development, pointing out the greenbelt directing development toward infill. She pointed out the role Community Development plays in integrating feedback from the fire department, the floodplain manager, the health department, and other experts during the review and approval process for proposed projects. The presentation focused on residential development in progress or in the entitlement stage. She also touched on planned development for non-residential districts—projects also directed toward infill.

5.0 Subject Matter Expert (SME) Hazard Presentations (Discussion Only)

Presentations to address to why, where, when, how often, what happens, and potential solution(s) to reduce effects. Each presentation will be followed by a short discussion about the status of the 2016 HMP mitigation activities related to the hazard.

- **Robb Fellows, Floodplain Manager: Floods**

Robb Fellows, Carson City Floodplain Manager, provided an overview of the flood events over the last five years and their impacts and emphasized the importance of intercepting runoff from the mountains before it travels to developed areas.

- **Rodd Rummel, Wildland Fuels Management Officer: Wildfire**

Rodd Rummel, Carson City Fire Department, presented the necessity of managing vegetation to decrease available fuel and the increasing impacts of fire on soil hydrology,



Meeting 1 Outcomes

Carson City 2021 Hazard Mitigation Plan Update

creating water repellent (hydrophobic) soil which leads to runoff and loss of fertile topsoil and contributes to post-fire debris flows.

- **Craig DePolo, Geologist, UNR: Earthquake, seiche, volcano, and landslides**
Craig DePolo, UNR Geologist, presented on the history, magnitude, and available impacts from Carson City earthquakes since 1857. Based on Carson City history, an event of Intensity VI occurs every 12 years making Carson City the area with the highest risk of an earthquake in the Basin. A number of mitigation actions were recommended for earthquakes. Mr. DePolo also discussed Carson City's risk in relation to volcanoes, tsunamis/seiche events, and landslides.
- **Chris Smallcomb, NOAA: Weather and Climate Change impacts (drought, severe weather, avalanche, floods, and others as identified by SME)**
Chris Smallcomb, NOAA, presented on severe weather, including drought, avalanche, high winds, heavy snow, flooding and heavy rain, and thunderstorms as well as the secondary effects of certain hazards, such as post-fire debris flows and wildfire smoke.
- **Nicki Aaker, Director, Carson City Health and Human Services: Epidemics**
Nicki Aaker, Director of Carson City Health and Human Services, discussed recent outbreaks including a measles outbreak at UNR as well as outbreaks of norovirus, rabies (in pets), and a GI outbreak of undetermined origin. Mitigation efforts include ongoing mosquito abatement which has helped to reduce outbreaks of the West Nile virus. Carson City Health & Human Services also participates in the Quad County Public Health Preparedness initiative which is 100% grant funded.
- **Tom Raw, Retired Deputy Emergency Manager, Carson City; Quad County Hazardous Materials Coordinator: Hazardous Materials**
Tom Raw, Retired Deputy Emergency Manager for Carson City and former Quad County Hazardous Materials Coordinator discussed hazmat events in Carson City. He explained that HazMat events are every day responses at the engine company level. Major events are generally confined to light industrial areas, typically located off of Highway 50 or along Hwy 580/395 corridor. Major hazard events that local teams have responded to in the last five years are generally located outside Carson City's boundaries—in the Quad Counties or at Lake Tahoe. Hazardous materials events may occur anywhere—and their likelihood and/or location is generally unpredictable. Neighboring jurisdictions and local civil support are available to back up the Carson City hazmat responders.
- **Jerome Tushbant, Undersheriff: Law Enforcement-Related Manmade Hazards (e.g. active shooter, civil unrest, terrorism, and others as identified by SME)**
The Carson City Undersheriff, Jerome Tushbant, identified and defined three aspects of Acts of Terrorism: civil disorder/riotous behavior, terrorism, and human-caused mass casualties. He illustrated these behaviors in relation past events, from ongoing protests in Carson City in 2020 to the IHOP shooting in 2011 and the Route 91 Harvest Festival mass casualty event in Las Vegas.
- **James Underwood, Chief Information Officer, Carson City: Cyberattacks**
As the CCCIO, James Underwood provided an impromptu presentation on the importance of pro-actively planning for and identifying mitigation strategies to prevent and reduce the



Meeting 1 Outcomes

Carson City 2021 Hazard Mitigation Plan Update

impact of cyberattacks. As a result of his presentation, cyberattacks were added as a hazard category for the ranking . However, later discussions with City Management about the condensed timeline led to holding this hazard for addition to future iterations of this hazard mitigation plan.

- **Jason Danen, Deputy Emergency Manager, Carson City: Public Safety Outages Management**

Mr. Danen provided information about NV Energy's Public Safety Outages Management program which will work with local agencies to determine the power outages for areas potentially impacted by weather warnings.

6.0 Questions and Answers (Q & A) (Discussion Only)

Participants in the meeting asked a few questions and shared information about available grant funding and recommendations for aligning priorities with state and federal trends.

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No public comment was provided.

8.0 Hazard Identification & Ranking: R.O. Anderson Engineering (Discussion/For Possible Action)

The ROA team briefly presented the existing rankings for Carson City and the State of Nevada as well as the criteria for evaluating each hazard. The group discussed the addition of cyberattacks and potential options for the title of the section currently named "Acts of Violence." The meeting was extended past 5 p.m. to discuss rankings—and attendees were asked to complete the ranking forms by 5 p.m. on Monday.

Planning Team members and invited guests received an email on Tuesday, May 11, 2021, encouraging them to complete the ranking forms. The email included a link to the meeting video. A follow-up email sent out a fillable version of the hazard ranking sheet.

9.0 Public Comment 2. No action may be taken upon a matter raised under this item of the agenda until the matter is specifically included on an agenda as an action item. Public comments may be limited to three minutes per person. Comments will not be restricted based on viewpoint.

No public comment was provided.

10.0 Task Assignments

Draft sections of the plan will be sent for review in the coming week/s.

11.0 Upcoming Meetings: WORKSHOP SCHEDULE (Discussion Only)

The upcoming schedule was not discussed at the end of the meeting.



AGENDA

Carson City 2021 Hazard Mitigation Plan Update



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Carson City 2021 Hazard Mitigation Plan Update



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This is a public meeting. In conformance with the Nevada Public Meeting Law and pursuant to Section 3 and 4 of the Declaration of Emergency Directive 006 signed on March 12, 2020, as extended by Declaration of Emergency Directive 029, signed July 31, 2021, this agenda was posted or caused to be posted on or before 9:00 am on May 4, 2021, at the following locations.

- Carson City Online: carson.org/hazardplan
- Physical Locations: Carson City Sheriff's Office (911 East Musser Street, Carson City, NV), Carson City, City Hall (201 N. Carson Street, Carson City, NV) and Fire Station 51 (777 South Stewart Street, Carson City, NV)

We are pleased to make reasonable accommodations for members of the public who have disability or access requirements. Please contact Nancy Merritt, Administrative Support, Carson City Fire Department, 777 S. Stewart St., Carson City, NV. 89701, 775-283-7947, nmerritt@carson.org.



Carson City Hazard Mitigation Plan Update



**Jason Danen, Deputy Emergency Manager
Carson City Fire Department**

Introductions & Overview

May 7, 2021

Planning Team Meeting 1



Meeting 1 2021 Carson City Hazard Mitigation Plan Update



Welcome & Introductions

- Jason Danen, Deputy Emergency Manager
- LEPC Members
- Additional Planning Team Members
- Members of the public
- R.O. Anderson Team

Please be sure to sign-in!

ROAnderson



Welcome to the 2021 HMP Update Planning Team!



Who is on the Planning Team?

Members of the Local Emergency Planning Committee (LEPC), a well-rounded group with representatives from a range of local agencies and entities, as well as subject-matter experts from across northern Nevada.



What is the purpose of a Hazard Mitigation Plan?



Save lives and protect property.

How will we do this?

- 1. An updated HMP opens opportunities for pre- and post-disaster funding (FEMA).**
- 2. The updated strategic plan will guide mitigation actions over the next five years.**



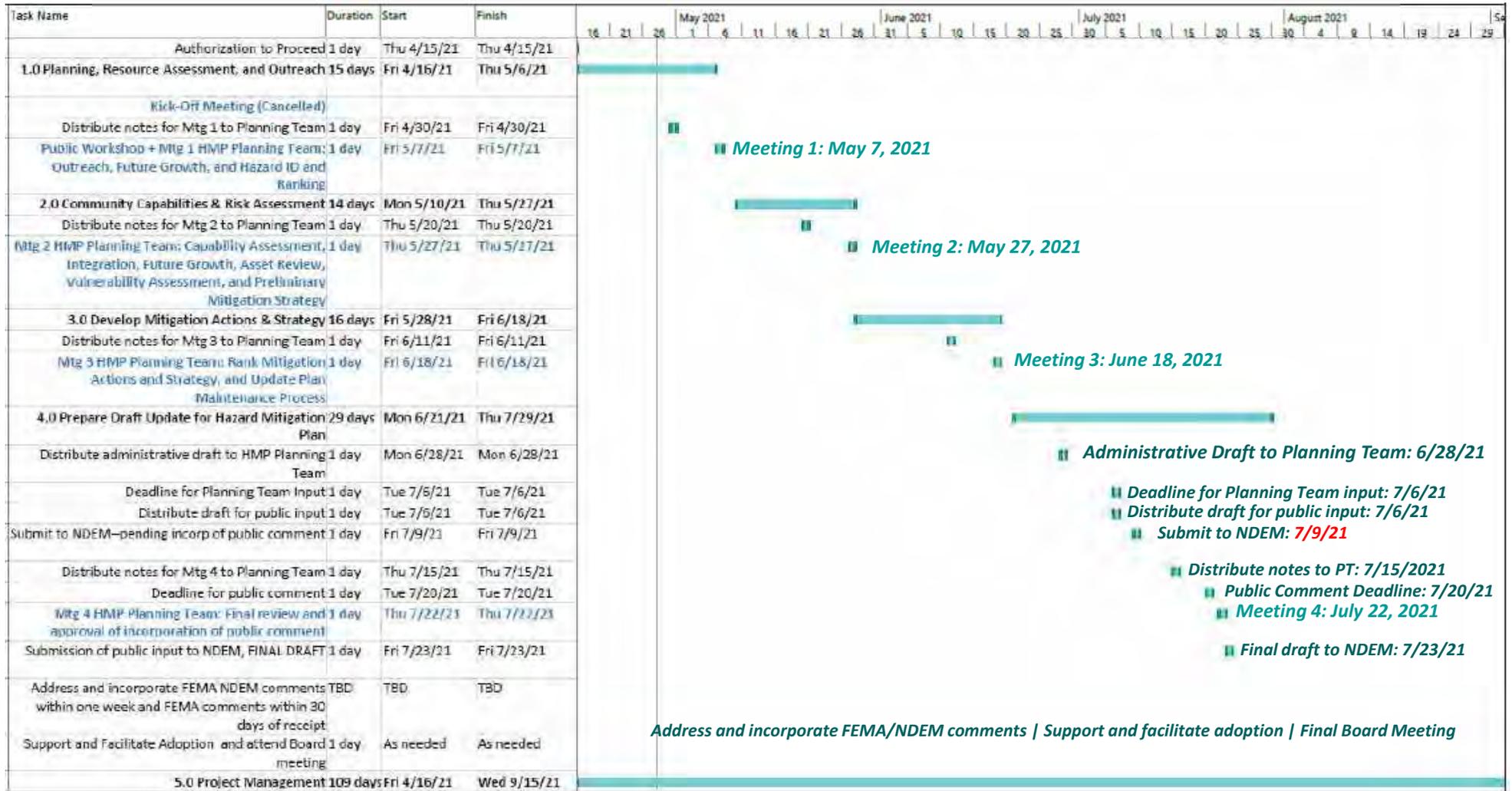
Public Participation



Community Engagement

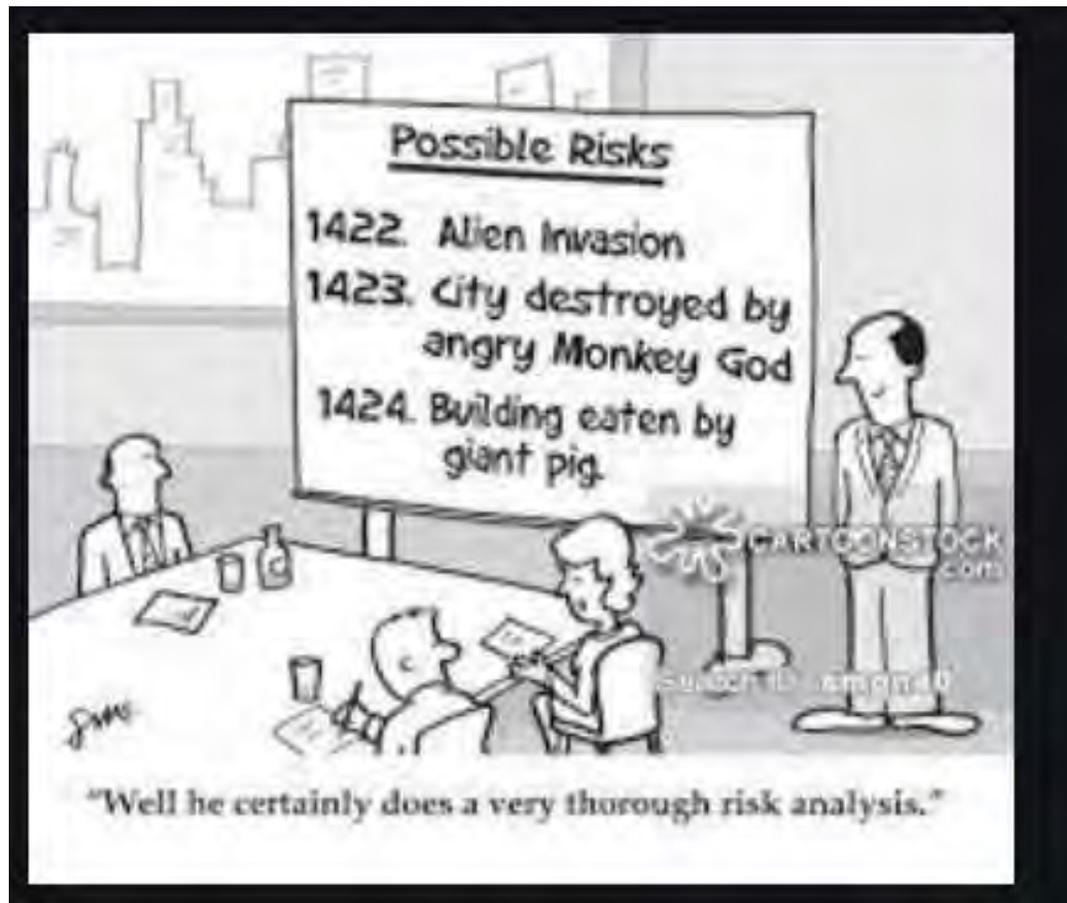
1. The plan intends to serve the whole community.
2. Community involvement cultivates hazard and mitigation awareness.
3. FEMA requires documentation of community engagement.

We have a tight timeline!



Expiration Date: August 4, 2021
We need your help. Here's how. . .

- *Timely Communication*
 - *As we reach out to invite your input as a subject matter expert, please respond at your earliest opportunity.*
- *Draft Reviews*
 - *Draft sections of the plan will be distributed to the Planning Team for review, input, and final approval. Please respond at your earliest opportunity*
- *Task Assignments*
 - *We will be asking volunteers to assist with specific tasks at the end of the meeting and may follow up with additional requests as the process unfolds.*
- *Feedback & Questions*
 - *Your comments, questions, and suggestions are welcome throughout the planning process. Please do reach out to the ROA team as needed.*



Carson City Hazard Mitigation Plan Update Process

44 CFR §201.6(d)(3): A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within five (5) years in order to continue to be eligible for mitigation project grant funding.

The Planning Process

ELEMENT A: Planning Process

ELEMENT B: Hazard Identification and Risk Assessment

ELEMENT C: Mitigation Strategy

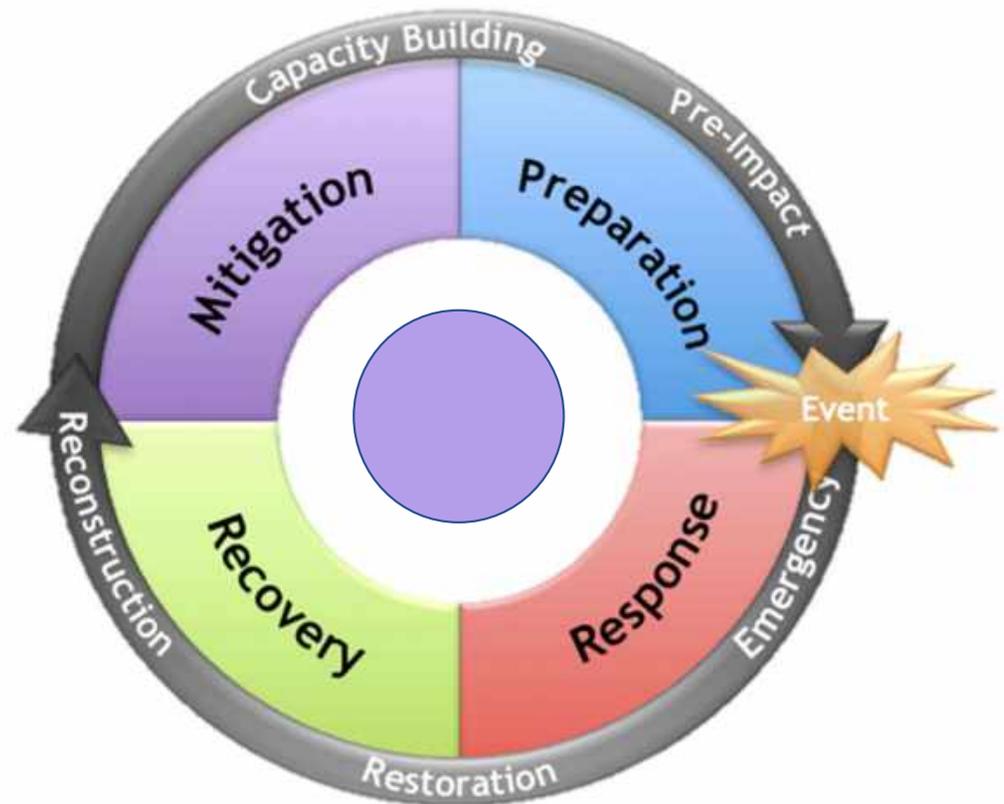
ELEMENT D: Plan Review, Evaluation, and Implementation

ELEMENT E: Plan Adoption

What is hazard mitigation?

A sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards.

- Local plans and regulations.
- Structural projects.
- Natural systems protection.
- Education programs.
- Preparedness and response **actions**.



Benefits of Updating the Hazard Mitigation Plan (HMP)

✓ Eligibility for Pre-Disaster FEMA Programs

- ✓ Hazard Mitigation Assistance funding
 - ✓ Building Resilient Infrastructure in Communities
 - ✓ Flood Mitigation Assistance
 - ✓ Emergency Management Performance Grant

■ Eligibility for Post-Disaster FEMA Programs

- Public Assistance funding to (repair or replace) Categories C-G after a Presidential disaster declaration (A=Debris Removal; B=Emergency Protective Measures)
 - C=Roads & Bridges
 - D=Water Control Facilities
 - F=Buildings & Equipment
 - G=Utilities
- Section 406 Hazard Mitigation Funding
- Hazard Mitigation Grant Program
- Fire Assistance Mitigation Grant

Examples of Eligible Mitigation projects

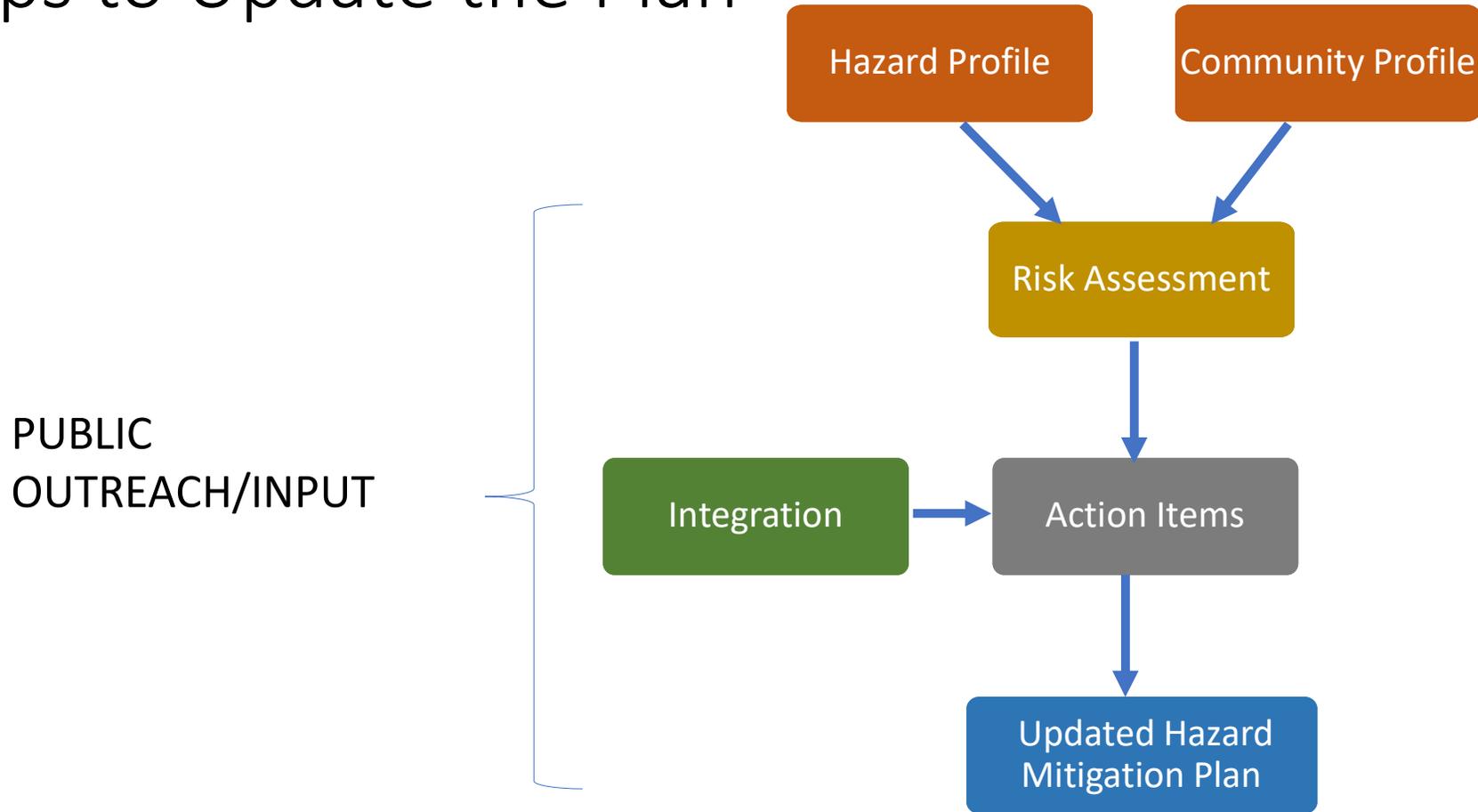
- ◆ Property acquisition in risk prone areas
- ◆ Adoption of International Building Codes
- ◆ Relocation of structures to lower risk area
- ◆ Elevation of existing structures
- ◆ Retrofitting existing structures
- ◆ Protective measures for utilities, water and sanitary sewer systems, and/or infrastructure
- ◆ Stormwater management projects & localized flood reduction projects
- ◆ Hazardous fuels reduction in areas at risk for wildfire

Value of Hazard Mitigation

National Benefit-Cost Ratio (BCR) Per Peril <small>*BCR numbers in this study have been rounded</small>		Beyond Code Requirements	Federally Funded
Overall Hazard Benefit-Cost Ratio		\$4:1	\$6:1
 Riverine Flood		\$5:1	\$7:1
 Hurricane Surge		\$7:1	Too few grants
 Wind		\$5:1	\$5:1
 Earthquake		\$4:1	\$3:1
 Wildland-Urban Interface Fire		\$4:1	\$3:1

Natural hazard mitigation saves \$6 on average for every \$1 spent on federal mitigation grants, according to an analysis by the National Institute of Building Sciences (2018). An earlier (2005) study by NIBS found a benefit-cost ratio (BCR) of 4:1

Steps to Update the Plan

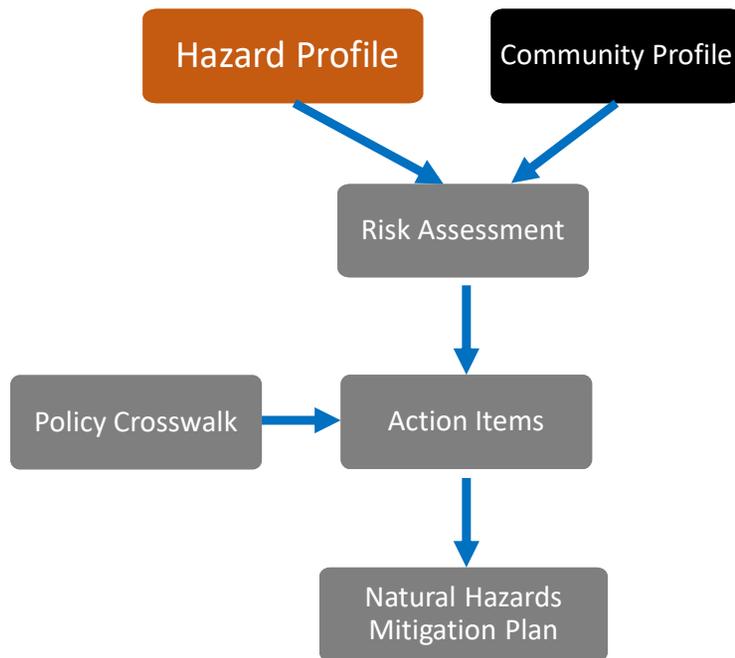


Step 1: Community Profile



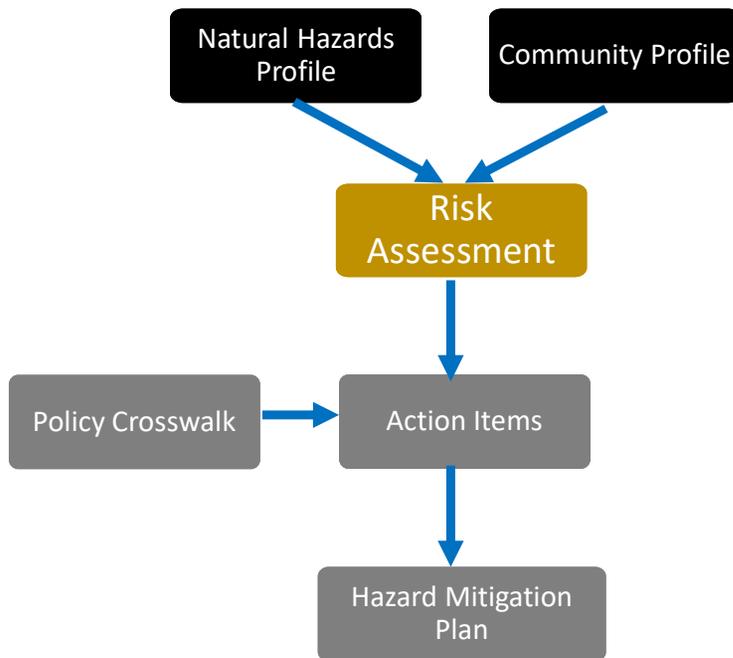
- ◆ Local geography
- ◆ Climate
- ◆ Population characteristics
- ◆ Employment
- ◆ Economics
- ◆ Housing
- ◆ Transportation
- ◆ Infrastructure
- ◆ Cultural resources
- ◆ Government structure

Step 2: Hazard Profile



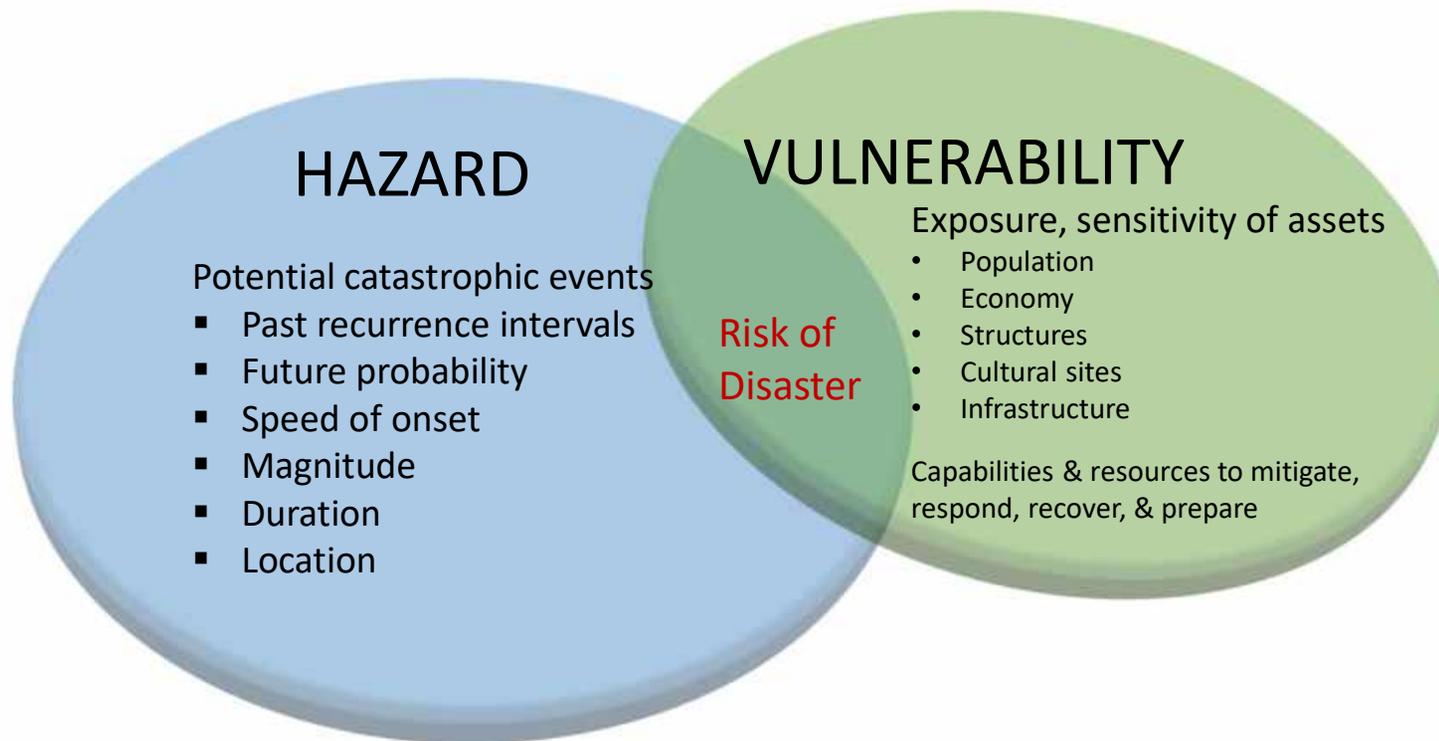
- ◆ Update hazard history
- ◆ Review 2016 hazard profiles
- ◆ Update hazard maps
- ◆ Hazard ID Plan Update Requirements
- ◆ Description of the hazard
- ◆ ID the location
- ◆ ID extent of hazard
- ◆ Provide information on previous occurrences and probability of future occurrences

Step 3: Risk Assessment

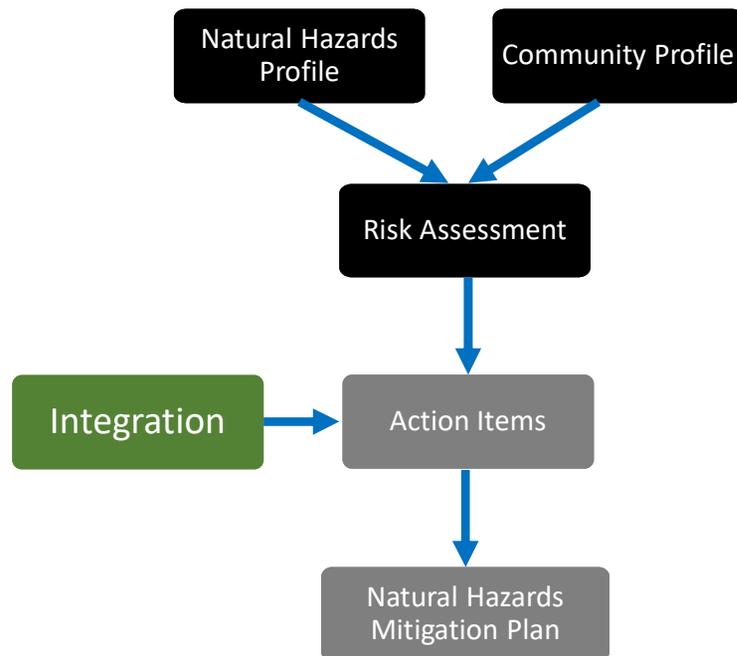


- ◆ Risk Assessment: Identifies natural hazards and the community's vulnerability (assets and their exposure).
- ◆ The vulnerability results are used to build the mitigation strategy.

Hazard Vulnerability & Risk

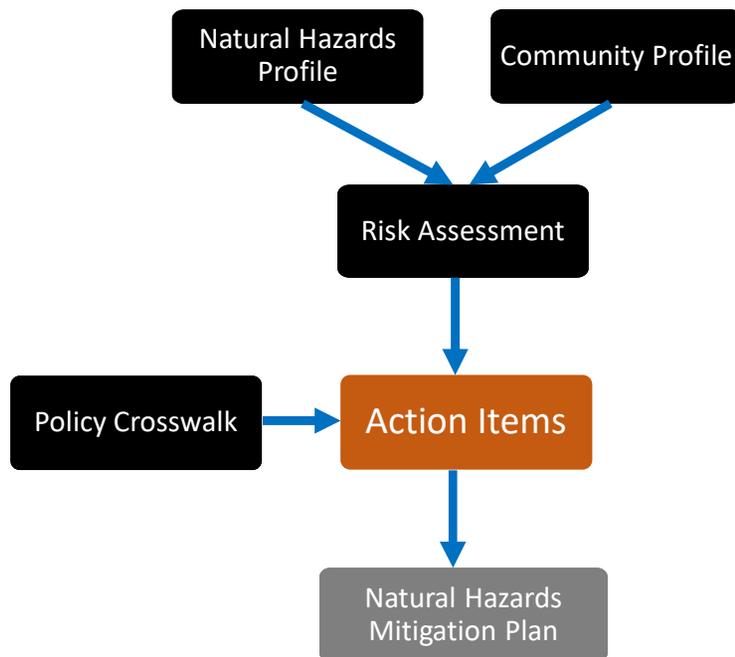


Step 4: Integration of Mitigation Principles



- ◆ Identifies elements of existing plans and policies that may support mitigation strategies
- ◆ Example plans
 - ◆ Comprehensive plan
 - ◆ Capital improvement plan
 - ◆ Community wildfire protection plan
 - ◆ Parks and open space plan
 - ◆ Floodplain ordinances
 - ◆ Emergency operations plan
 - ◆ Stormwater mgmt plan

Step 5: Mitigation Strategy



Action items guide the community's strategy for addressing vulnerabilities and risks.

- Local plans and regulations.
- Structural projects.
- Natural systems protection.
- Education programs.
- Preparedness and response **actions**.

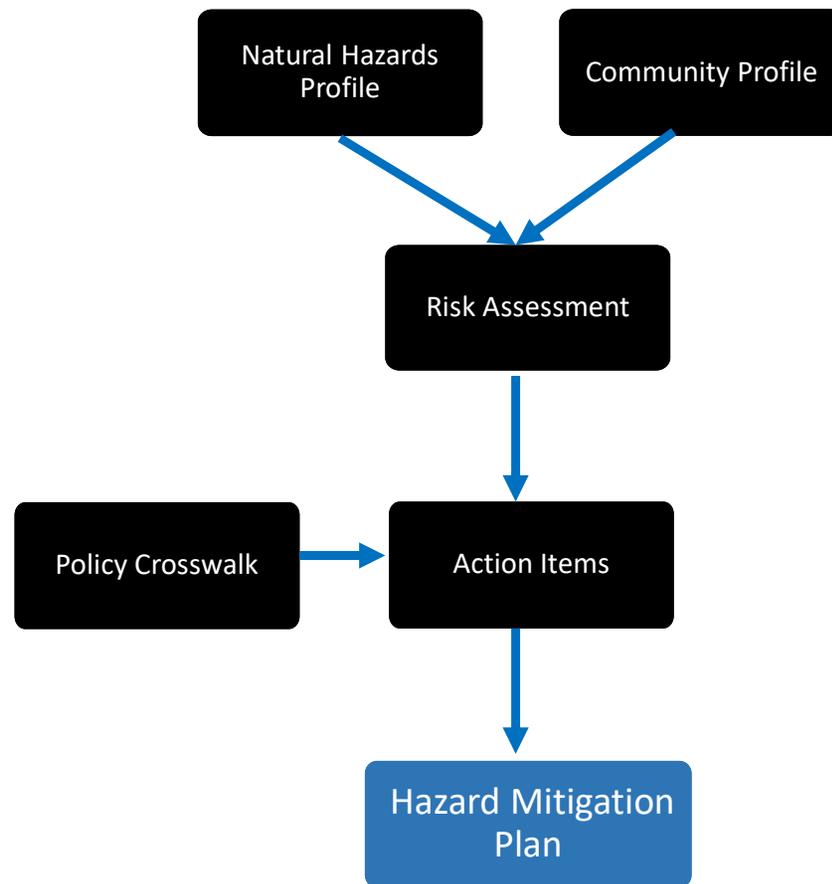
FEMA PLAN REVIEW TOOL

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))				
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))				
<u>ELEMENT A: REQUIRED REVISIONS</u>				

FEMA PLAN REVIEW TOOL

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))				
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))				
<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))				
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))				
<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>				

Step 6: Updated Hazard Mitigation Plan







AGENDA



Carson City 2021 Hazard Mitigation Plan Update

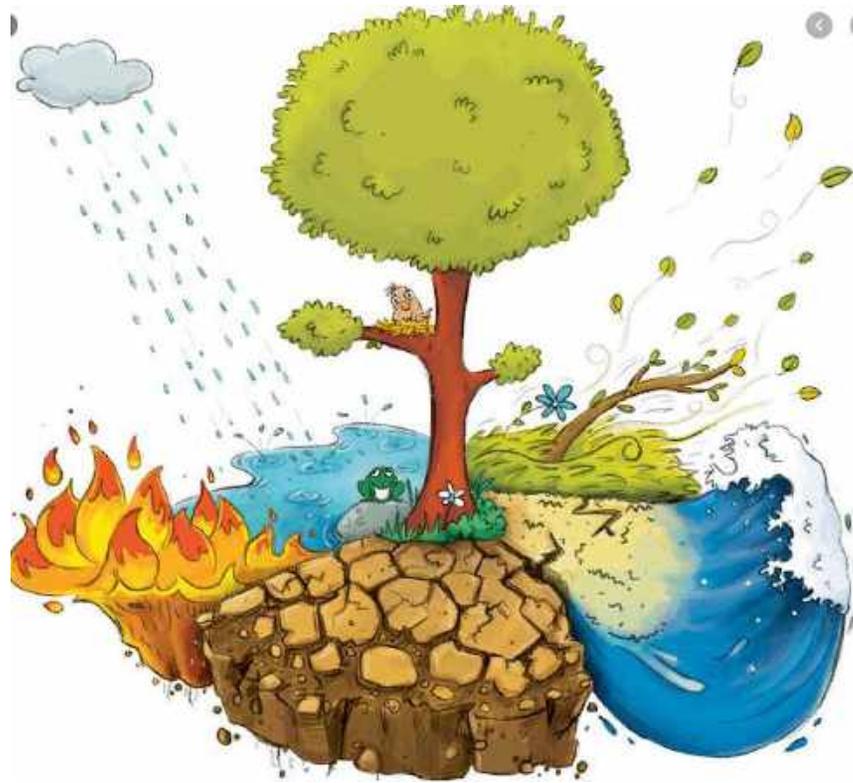
3.0 Outreach Overview: Rachael Schneider, Carson City Public Relations & ROA (Discussion Only)

4.0 Future Growth: Hope Sullivan, Director of Community Development (Discussion Only)

5.0 Subject Matter Expert (SME) Hazard Presentations (Discussion Only)

Presentations to address to why, where, when, how often, what happens, and potential solution(s) to reduce effects. Each presentation will be followed by a short discussion about the status of the 2016 HMP mitigation activities related to the hazard.

- Robb Fellows, Floodplain Manager: Floods
- Rodd Rummel, Wildland Fuels Management Officer: Wildfire
- Craig DePolo, Geologist, UNR: Earthquake, seiche, volcano, and landslides
- Chris Smallcomb, NOAA: Weather and Climate Change impacts (drought, severe weather, avalanche, floods, and others as identified by SME)
- Nicki Aaker, Director, Carson City Health and Human Services: Epidemics
- Tom Raw, former Hazardous Materials Coordinator: Hazardous Materials
- Jerome Tushbant, Assistant Sheriff: Law Enforcement-Related Manmade Hazards (e.g. active shooter, civil unrest, terrorism, and others as identified by SME)





AGENDA



Carson City 2021 Hazard Mitigation Plan Update

6.0 Questions and Answers (Q & A) (Discussion Only)

7.0 Public Comment 1. No action may be taken upon a matter raised under this item of the agenda until the matter is specifically included on an agenda as an action item. Public comments may be limited to three minutes per person. Comments will not be restricted based on viewpoint.

8.0 Hazard Identification & Ranking: R.O. Anderson Engineering (Discussion/For Possible Action)

9.0 Public Comment 2. No action may be taken upon a matter raised under this item of the agenda until the matter is specifically included on an agenda as an action item. Public comments may be limited to three minutes per person. Comments will not be restricted based on viewpoint.

Hazard Identification

Rankings for State of Nevada 2018 & 2013

2018 Risk Categories Assigned to State of Nevada Hazards		
High Risk	Medium/Significant Risk	Low Risk
Earthquake	Extreme heat	Tsunami/seiche
Wildfire	Hazardous materials	Hail and thunderstorm
Flood	Drought	Avalanche
	Severe storms, extreme snowfall, windstorms	Epidemic
		Landslide
		Tornado
		Infestation
		Land subsidence and ground failure
		Volcano
		Expansive soil

STATE OF NEVADA

2013 Risk Categories Assigned to State of Nevada Hazards		
High Risk	Medium/Significant Risk	Low Risk
Earthquake	Terrorism/WMD	Tsunami/seiche
Flood	Hazardous materials	Hail and thunderstorm
Wildfire	Drought	Avalanche
	Severe winter storm and extreme snowfall	Epidemic
		Windstorm
		Landslide
		Heat, extreme
		Tornado
		Infestation
		Land subsidence
		Volcano
		Expansive soil

STATE OF NEVADA

Rankings for Carson City 2016 & 2010

2016 Carson City Hazard Ranking			
		Identified Hazards	Score/Ranking
HIGH	1	Earthquakes (+Seiche)	212
	2	Wildland Fire	184
	3	Floods	165
	4	Severe Weather	152
	5	Landslides	146
	6	Acts of Violence	146
	7	Hazardous Materials	134
LOW	8	Utility Loss	129
	9	Drought	126
	10	Seiche	120
	11	Infectious Disease	117
	12	Avalanche	111
	13	Volcanic Activity	97

2010 Carson City Hazard Ranking			
		Identified Hazards	Score/Ranking
HIGH	1	Wildland Fire	253
	2	Earthquake	251
	3	Epidemic	228
	4	Terrorism/WMD	229
	5	Flood	216
	6	Severe Weather	200
	7	Hazmat	192
LOW	8	Drought	186
	9	Utility Loss	172
	10	Volcano	140
	11	Landslide	116
	12	Seiche	98
	13	Avalanche	90

Hazard Ranking Tool

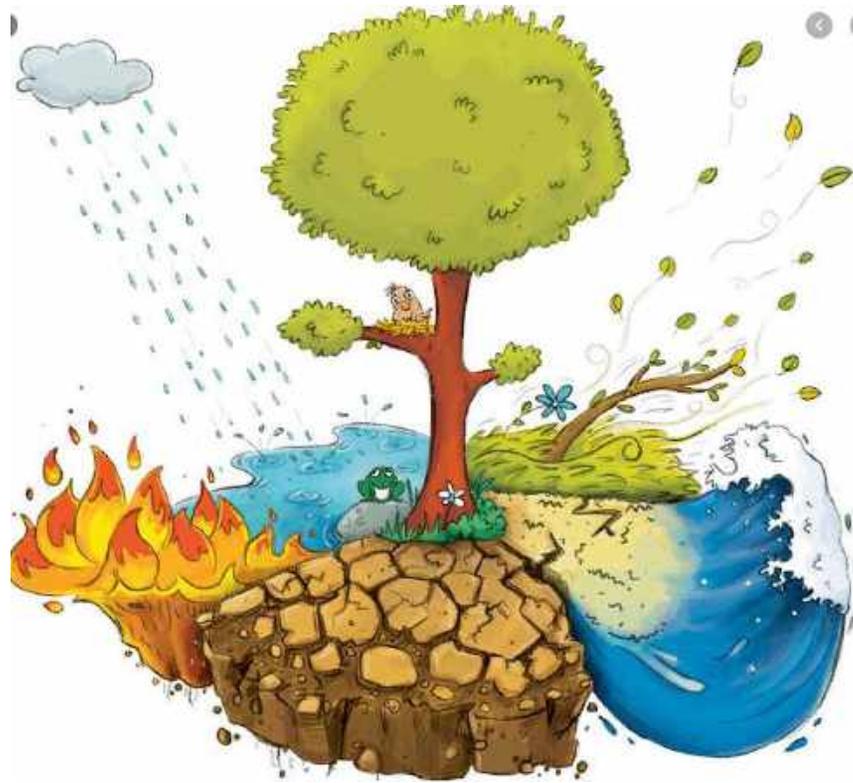
Hazard Type*	Probability / Frequency	Magnitude / Severity	Warning Time	Duration of loss of critical facilities & services	Risk Update >, <, =	Total
Acts of Violence						
Avalanche						
Climate Change						
Drought						
Earthquake						
Floods						
Hazardous materials event						
Infectious Disease						
Landslide						
Severe Weather: Storms, dry lightning, extreme heat, high wind						
Wildland Fire						
Volcano						
Other						

* Cascading effects such as utility loss, seiche, and other impacts will be discussed under primary hazards as appropriate.

Criteria	Value	Category	Description
Probability / Frequency	1	Very Low	Occurs less than once in 1000 years.
	2	Low	Occurs less than once in 100 to once in 1000 years.
	3	Medium	Occurs less than once in 10 to once in 100 years.
	4	High	Occurs less than once in 5 to once in 100 years.
	5	Very High	Occurs more frequently than once in 5 years.
Magnitude/ Severity • Economic Impact • Area Affected • Vulnerability	1	Very Low	<ul style="list-style-type: none"> Negligible property damages (less than 5% of all buildings and infrastructure). No deaths and injuries/illnesses treatable with first aid and do not require hospitalization. Negligible loss of quality of life. Economic and geographic effects are localized.
	2	Low	<ul style="list-style-type: none"> Slight property damages (5% to 15%) of all buildings and infrastructure). No deaths and few injuries/illnesses require hospitalization. Slight loss of quality of life. Economic and geographic effects felt at the city or community.
	3	Medium	<ul style="list-style-type: none"> Moderate property damages (15% to 30% of all buildings and infrastructure). Fewer than 5 deaths and multiple injuries/illnesses require hospitalization. Some loss of quality of life. Economic and geographic effects felt countywide.
	4	High	<ul style="list-style-type: none"> Moderate property damages (30% to 50% of all buildings and infrastructure). More than 5 deaths and considerable injuries/illnesses require hospitalization in multiple facilities with some resulting in permanent disability. Moderate loss of quality of life. Economic and geographic effects felt statewide.
	5	Very High	<ul style="list-style-type: none"> Moderate property damages (30% to 50% of all buildings and infrastructure). Significant number of deaths and injuries/illnesses requiring hospitalization in multiple facilities with some resulting in permanent disability. Significant loss of quality of life. Economic and geographic effects felt at the Region IX level.
Warning Time	1	Very Low	Greater than 30 days of warning
	2	Low	5-30 days of warning
	3	Medium	1-5 days of warning
	4	High	1 to 10 hours of warning
	5	Very High	No warning
Duration of Loss of Critical Facilities and Services	1	Very Low	1 to 3 days
	2	Low	4 to 7 days
	3	Medium	8 to 14 days
	4	High	15 to 20 days
	5	Very High	More than 20 days
Frequency in the Future	1	Very Low	Highly unlikely to increase probability of this hazard
	2	Low	Unlikely to increase probability of this hazard
	3	Medium	Could increase probability of this hazard
	4	High	Likely to increase probability of this hazard
	5	Very High	Highly likely to increase probability of this hazard

Hazard Prioritization Criteria

- Natural hazards include geophysical and biological events that threaten lives, property, and other assets.
- Manmade hazards include events caused by human actions that threaten lives, property, and other assets.
- Identifying and understanding where, when, and how a hazard impacts a specific community can help reduce the threat that hazard poses to lives, property, and assets.



Select presentations and handouts
from this meeting are available via the ShareFile
link below.

[https://roanderson.sharefile.com/d-
s3d0f30ef5eff40828d5a2d63018df805](https://roanderson.sharefile.com/d-s3d0f30ef5eff40828d5a2d63018df805)

Hazard Ranking

If the hazard ranking was not completed during our meeting, please rank the hazards as listed in the ranking tool and guided by the provided criteria. . .

and. . .

. . . send to kcunningham@roanderson.com
by 5 p.m. on Monday, May 10.

We have a tight timeline!

Task Name	Duration	Start	Finish	Timeline (May 2021 - August 2021)																											
Authorization to Proceed	1 day	Thu 4/15/21	Thu 4/15/21	[Timeline grid with dates from 16 to 29]																											
1.0 Planning, Resource Assessment, and Outreach	15 days	Fri 4/16/21	Thu 5/6/21	[Task bar]																											
Kick-Off Meeting (Cancelled)																															
Distribute notes for Mtg 1 to Planning Team	1 day	Fri 4/30/21	Fri 4/30/21	[Task bar]																											
Public Workshop + Mtg 1 HMP Planning Team: Outreach, Future Growth, and Hazard ID and Ranking	1 day	Fri 5/7/21	Fri 5/7/21	<ul style="list-style-type: none"> Meeting 1: May 7, 2021 																											
2.0 Community Capabilities & Risk Assessment	14 days	Mon 5/10/21	Thu 5/27/21	[Task bar]																											
Distribute notes for Mtg 2 to Planning Team	1 day	Thu 5/20/21	Thu 5/20/21	[Task bar]																											
Mtg 2 HMP Planning Team: Capability Assessment, Integration, Future Growth, Asset Review, Vulnerability Assessment, and Preliminary Mitigation Strategy	1 day	Thu 5/27/21	Thu 5/27/21	<ul style="list-style-type: none"> Meeting 2: May 27, 2021 																											
3.0 Develop Mitigation Actions & Strategy	16 days	Fri 5/28/21	Fri 6/18/21	[Task bar]																											
Distribute notes for Mtg 3 to Planning Team	1 day	Fri 6/11/21	Fri 6/11/21	[Task bar]																											
Mtg 3 HMP Planning Team: Rank Mitigation Actions and Strategy, and Update Plan Maintenance Process	1 day	Fri 6/18/21	Fri 6/18/21	<ul style="list-style-type: none"> Meeting 3: June 18, 2021 																											
4.0 Prepare Draft Update for Hazard Mitigation Plan	29 days	Mon 6/21/21	Thu 7/29/21	[Task bar]																											
Distribute administrative draft to HMP Planning Team	1 day	Mon 6/28/21	Mon 6/28/21	<ul style="list-style-type: none"> Administrative Draft to Planning Team: 6/28/21 																											
Deadline for Planning Team Input	1 day	Tue 7/6/21	Tue 7/6/21	<ul style="list-style-type: none"> Deadline for Planning Team input: 7/6/21 																											
Distribute draft for public input	1 day	Tue 7/6/21	Tue 7/6/21	<ul style="list-style-type: none"> Distribute draft for public input: 7/6/21 																											
Submit to NDEM--pending incorp of public comment	1 day	Fri 7/9/21	Fri 7/9/21	<ul style="list-style-type: none"> Submit to NDEM: 7/9/21 																											
Distribute notes for Mtg 4 to Planning Team	1 day	Thu 7/15/21	Thu 7/15/21	<ul style="list-style-type: none"> Distribute notes to PT: 7/15/2021 																											
Deadline for public comment	1 day	Tue 7/20/21	Tue 7/20/21	<ul style="list-style-type: none"> Public Comment Deadline: 7/20/21 																											
Mtg 4 HMP Planning Team: Final review and approval of incorporation of public comment	1 day	Thu 7/22/21	Thu 7/22/21	<ul style="list-style-type: none"> Meeting 4: July 22, 2021 																											
Submission of public input to NDEM, FINAL DRAFT	1 day	Fri 7/23/21	Fri 7/23/21	<ul style="list-style-type: none"> Final draft to NDEM: 7/23/21 																											
Address and incorporate FEMA NDEM comments within one week and FEMA comments within 30 days of receipt	TBD	TBD	TBD	<ul style="list-style-type: none"> Address and incorporate FEMA/NDEM comments Support and facilitate adoption Final Board Meeting 																											
Support and Facilitate Adoption and attend Board meeting	1 day	As needed	As needed																												
5.0 Project Management	109 days	Fri 4/16/21	Wed 9/15/21	[Task bar]																											



CARSON CITY, NEVADA Hazard Ranking History



The rankings for Carson City from 2016 and 2010 follow below.

2016 Carson City Hazard Ranking			
		Identified Hazards	Score/Ranking
HIGH	1	Earthquakes (+Seiche)	212
	2	Wildland Fire	184
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STATE OF NEVADA Hazards Lists



2018 Risk Categories Assigned to State of Nevada Hazards

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Flood	Drought	Avalanche
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		Tornado
		Infestation
		Land subsidence and ground failure
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STATE OF NEVADA

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		Windstorm
		Landslide
		Heat, extreme
		Tornado
		Infestation
		Land subsidence
		Volcano
		Expansive soil

STATE OF NEVADA



Guidelines for Hazard Prioritization

HAZARD PRIORITIZATION CRITERIA



Criteria	Value	Category	Description
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	2	Low	Occurs less than once in 100 to once in 1000 years.
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	2	Low	<ul style="list-style-type: none"> Slight property damages (5% to 15%) of all buildings and infrastructure). No deaths and few injuries/illnesses require hospitalization. Slight loss of quality of life. Economic and geographic effects felt at the city or community.
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	4	High	1 to 10 hours of warning
	5	Very High	No warning
Duration of Loss of Critical Facilities and Services	1	Very Low	1 to 3 days
	2	Low	4 to 7 days
	3	Medium	8 to 14 days
	4	High	15 to 20 days
	5	Very High	More than 20 days
Frequency in the Future	1	Very Low	Highly unlikely to increase probability of this hazard
	2	Low	Unlikely to increase probability of this hazard
	3	Medium	Could increase probability of this hazard
	4	High	Likely to increase probability of this hazard
	5	Very High	Highly likely to increase probability of this hazard



CARSON CITY, NEVADA Hazard Ranking Tool



Name: _____

Date: _____

Agency: _____

Specialty: _____

Hazard Type*	Probability / Frequency	Magnitude / Severity	Warning Time	Duration of loss of critical facilities & services	Risk Update >, <, =	Total
Acts of Violence						
Avalanche						
Climate Change						
Drought						
Earthquake						
Flood						
Hazardous materials event						
Infectious Disease						
Landslide						
Severe Weather: Storms, dry lightning, extreme heat, high wind						
Wildland Fire						
Volcano						
Cyberattack						

* Cascading effects such as utility loss, seiche, and other impacts will be discussed under primary hazards as appropriate.

Carson City HMP Update

Incorporation of HM Principles into Other Plans

Web/PDF	Name of Plan/Study
Web	Carson City Building Code (December 2020) https://library.municode.com/nv/carson_city/codes/code_of_ordinances
Web	Carson City Fire Code (February 2021) https://library.municode.com/nv/carson_city/codes/code_of_ordinances?nodeId=TIT14FI
Web	Carson City Master Plan (April 2006) https://www.carson.org/government/departments-a-f/community-development/planning-division/master-plan
Web	Carson City Strategic Plan 2021-2025 https://www.carson.org/transparency/carson-city-strategic-plan-draft
	Carson City Mass Illness Plan
PDF	Carson City Sandbagging Plans
PDF	Carson City Stormwater Management Plan
Web	Carson River Watershed Regional Floodplain Management Plan (Carson Water Subconservancy District 2018) http://www.cwsd.org/wp-content/uploads/2018/10/2018-10-18-RFMP-Bd-Approved-Final.pdf
Web	Carson City Community Wildfire Protection Plan (2009) https://www.carson.org/home/showpublisheddocument?id=21209
PDF	Emergency Operations Plan
PDF	Carson River Geographic Response Plan
PDF	Carson City Hazardous Materials Emergency Response Plan
PDF	Carson City Emergency Action Plan (Brunswick Canyon Dam)
	Carson City Emergency Action Plan (Eagle Valley Dam)
PDF	EAP Combs Canyon Creek and Eagle Valley Creek Levees
	Carson City Emergency Action Plan (Shannadoah Heights Dam)
	Carson City Hazardous Materials Transportation Commodities Study
PDF	EAP Shenandoah Detention Basin

Carson City HMP Update

Incorporation of HM Principles into Other Plans

Web/PDF	Name of Plan/Study
PDF	Record of Changes: Shenandoah Detention Basin Dam Emergency Action Plan
PDF	Brunswick Canyon Wastewater Reservoir
	FEMA Flood Insurance Study for Carson City, NV (FEMA 2009)
	State of Nevada Multi-hazard Mitigation Plan (Enhanced)
	FEMA Flood Insurance Study for Carson City, NV FEMA 2009
	Washoe Tribe of NV & CA Hazard Mitigation Plan (????)

Please upload additional documents via the link below.

<https://roanderson.sharefile.com/r-r478a401bd7634de1a1101e76b3fe0ab4>

Appendix A: Meeting Notes and Handouts

- Meeting 2

May 27, 2021 Meeting 2
Planning Team Invitations
Sent May 25, 2021

naaker@carson.org; eashby@roanderson.com; Rebecca.Bodnar@ndep.nv.gov; elizabeth.breeden@nvenergy.com; tcarlini@eastforkfire.org; Kate Cunningham <kcunningham@roanderson.com>; jcurtis@storeycounty.org; acyr@carson.k12.nv.us; jdanen@carson.org; eq_dude@sbcglobal.net; KEcheverria@washoecounty.us; jerry@991fmtalk.com; rfellows@carson.org; dfogerson@dps.state.nv.us; keith.forbes@agri.state.nv.us; jmfreeman@carson.org; kfurlong@carson.org; charjo@dps.state.nv.us; Eric T. Herron <eherron@roanderson.com>; shicks@carson.org; Marie A. Hulse <mhulse@roanderson.com>; ahummel@carson.org; tjesse@carson.org; xing.liu@fema.dhs.gov; alowe@carson.org; lmaloney@carson.org; Stefanie.McCaffrey@nvenergy.com; hannah@pcccarson.org; nmerritt@carson.org; npaulson@carson.org; Katie.Nannini@nvenergy.com; pk.oneill@asm.state.nv.us; jpage@lyon-county.org; taryn.peirce@carsontahoe.org; tomraw58@gmail.com; rrice@carson.org; craig.robinson@wnc.edu; druben@carson.org; Keith E. Ruben <kruben@roanderson.com>; rrummel@carson.org; rschneider@carson.org; lschuetter@carson.org; dschulz@carson.org; JoAnn.Scordino@fema.dhs.gov; jocelyn.seemann@redcross.org; sslamon@carson.org; chris.smallcomb@noaa.gov; serrell.smokey@washoetribe.us; carsoncitysr1@gmail.com; mark.stearns@usw.salvationarmy.org; DStucky@carson.org; HSullivan@carson.org; jtushbant@carson.org; junderwood@carson.org; bwacker@admin.nv.gov; jlwalker@dot.nv.gov; ewarnock@water.nv.gov; swartgow@carson.org; jwoodward@dps.state.nv.us; dyohey@chromalloy.com

This email went out to the Planning Team and Regional Partners.

Greetings Planning Team!

Please join us at Station 51 on Thursday afternoon at 1:30 for Planning Team Meeting 2 where we will continue our progress on the Carson City HMP Update. Attached please find the agenda (also below) and a worksheet for our discussion of capabilities. Additional handouts will be available at the meeting.

Meeting 2: Public Workshop & HMP Planning Team Meeting

1:30 to 4:30 pm, Thursday, May 27, 2021

Fire Station 51, 777 South Stewart Street, Carson City

In-person meeting

- 1.0 Introductions (Discussion). 10 mins.**
- 2.0 Hazard Ranking Outcome (Discussion & Possible Action). 10 mins.**
- 3.0 2021 Hazard Mitigation Plan Update, Section 1: Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson. 5 mins.**

4.0 2021 Hazard Mitigation Plan Update, Section 2: Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson. 5 mins.

5.0 Carson City Assets: Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson. 15 mins.

6.0 Vulnerability/Exposure: Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson. 15 mins.

7.0 Future Growth Vulnerability/Exposure: Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson. 15 mins.

8.0 BREAK

9.0 Preliminary Mitigation Actions Review and Discussion – Small Group Discussion (Discussion Only). 30 mins.

9.1 Problem statement

9.2 Solutions to problem

10.0 Capability Assessment & Integration: Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson. 30 mins.

10.1 Legal and Regulatory Resources

10.2 Administrative and Technical Resources

10.3 Financial Resources

10.4 Education and Outreach

11.0 Questions and Answers (Q & A) (Discussion Only) – 10 mins.

12.0 Public Comment. No action may be taken upon a matter raised under this item of the agenda until the matter is specifically included on an agenda as an action item. Public comments may be limited to three minutes per person. Comments will not be restricted based on viewpoint. **10 mins.**

13.0 Task Assignments. 10 mins.

14.0 Upcoming Meetings: WORKSHOP SCHEDULE (Discussion Only)

- **Friday, June 18, 2021, 1:30 to 4:30 p.m.**
Fire Station 51
777 South Stewart Street, Carson City
HMP Planning Team Meeting 3: Rank Mitigation Actions and Strategy and Update Plan Maintenance Process
- **Thursday, July 22, 2021, 1:30 to 4:30 p.m.**
Fire Station 51

777 South Stewart Street, Carson City
HMP Planning Team Meeting 4: Final review and approval of incorporation of public
comment.

You are welcome but not required to RSVP to kcunningham@roanderson.com.

Also, please take a minute to put the upcoming meetings (above) on your calendar! 😊

Thank you!

Kate & Elizabeth



Carson City 2021 Hazard Mitigation Plan Update
 Planning Team Meeting 2: May 27, 2021
 Sign-in-Sheet



Name	Firm/Agency	Phone Number	Email
Jason Danen	Carson City Fire	775 790-3288	JDanen@carson.org
Nancy Merritt	Carson city Fire	775-283-7947	nmerritt@carson.org
Dustin Booth	CC Health	283-7220	dbooth@carson.org
Robb Fellows	CCPW	283-7370	RFellows@carson.org
Andy Hummel	CCPW	283-7357	Ahummel@carson.org
Shelby Price	Carson Fire	283-7148	sprice@carson.org
JEROME TUSKANT	CCSO	283-7802	JTUSKANT@CARSON-ORG
Taryn Peirce	Carson Tahoe Hospital	775-445-7303	taryn.peirce@carson-tahoe.org
JIM WALKER	NDOT	775-888-7837	jwalker@dot.nv.gov
ANN CYR	CARSON CITY SCHOOL DIST.	775 342-3234	acyr@carson.k12.nv.us
Lisa Schmette	Board of Sups	775-671-2413	lschmette@carson.org
Jim White	CCFP	887-2210	jwhite@carson.org



AGENDA



Carson City 2021 Hazard Mitigation Plan Update

Meeting 2: Public Workshop & HMP Planning Team Meeting

1:30 to 4:30 pm, Thursday, May 27, 2021

Fire Station 51, 777 South Stewart Street, Carson City

In-person meeting

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- 4.0 2021 Hazard Mitigation Plan Update, Section 2: Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson. 5 mins.
- 5.0 Carson City Assets: Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson. 15 mins.
- 6.0 Vulnerability/Exposure: Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson. 15 mins.
- 7.0 Future Growth Vulnerability/Exposure: Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson. 15 mins.
- 8.0 BREAK
- 9.0 Preliminary Mitigation Actions Review and Discussion – Small Group Discussion (Discussion Only). 30 mins.
 - 9.1 Problem statement
 - 9.2 Solutions to problem



AGENDA



Carson City 2021 Hazard Mitigation Plan Update

10.0 Capability Assessment & Integration: Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson. 30 mins.

- 10.1 Legal and Regulatory Resources
- 10.2 Administrative and Technical Resources
- 10.3 Financial Resources
- 10.4 Education and Outreach

11.0 Questions and Answers (Q & A) (Discussion Only) – 10 mins.

12.0 Public Comment. No action may be taken upon a matter raised under this item of the agenda until the matter is specifically included on an agenda as an action item. Public comments may be limited to three minutes per person. Comments will not be restricted based on viewpoint. 10 mins.

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- **Thursday, July 22, 2021, 1:30 to 4:30 p.m.**
Fire Station 51
777 South Stewart Street, Carson City
HMP Planning Team Meeting 4: Final review and approval of incorporation of public comment.

This is a public meeting. In conformance with the Nevada Public Meeting Law and pursuant to Section 3 and 4 of the Declaration of Emergency Directive 006 signed on March 12, 2020, as extended by Declaration of Emergency Directive 029, signed July 31, 2021, this agenda was posted or caused to be posted on or before 9:00 am on May 24, 2021, at the following locations.

- Carson City Online: carson.org/hazardplan
- Physical Locations: Carson City Sheriff's Office (911 East Musser Street, Carson City, NV), Carson City, City Hall (201 N. Carson Street, Carson City, NV) and Fire Station 51 (777 South Stewart Street, Carson City, NV).

We are pleased to make reasonable accommodations for members of the public who have disability or access requirements. Please contact Nancy Merritt, Administrative Support, Carson City Fire Department, 777 S. Stewart St., Carson City, NV. 89701, 775-283-7947, nmerritt@carson.org.



Meeting 2 Outcomes

Carson City 2021 Hazard Mitigation Plan Update



Meeting 2: Public Workshop & HMP Planning Team Meeting
1:30 to 4:30 pm, Thursday, May 27, 2021
Fire Station 51
777 South Stewart Street, Carson City
In-person meeting

1.0 Introductions (Discussion) 10 mins.

Jason Danen welcomed the participants, went over housekeeping issues, and invited attendees to introduce themselves.

2.0 Hazard Ranking Outcome (Discussion & Possible Action) 10 mins.

Kate Cunningham presented outcomes from the Carson City HMP Survey as context for the review of the Hazard Ranking Outcome. Comments on the results included a recommendation that future iterations of the plan Dave Yohey recommended that future iterations of the plan consider reviewing and possibly revising the ranking criteria. Anny Cyr pointed out that the school district is seeing insurance rates rise significantly for earthquake and cybersecurity coverage.

3.0 2021 Hazard Mitigation Plan Update, Section 1: Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson – 5 mins.

ROA presented the changes to Section 1 (available in Meeting 2 PPT in Appendix A). PT reviewed and approved changes. A PT member asked whether the Carson Watershed Subconservancy District Annex to the Storey County Plan would allow the CWSD to request grants for projects in Carson City under the Storey County Plan. Elizabeth Ashby, Senior Hazard Mitigation Planner, confirmed that this would be allowed.

4.0 2021 Hazard Mitigation Plan Update, Section 2: Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson – 5 mins.

ROA provided a review of the changes in PowerPoint slides. PT voted to approve.

5.0 Carson City Assets: Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson- 15 mins.

ROA presented Updated Critical Facilities Map. Planning Team raised questions about additional/missing facilities listed below.

- *Spaces that provide support during emergency events (shelter, coordination, etc.)*
 - *Community Center*
 - *Fuji Park*
- *Critical Infrastructure: Discussion pointed out that infrastructure is different than critical facilities. **Note: The location of certain critical facilities may need to remain anonymous.***
 - *NVEnergy Substations*
 - *Brunswick Dam (infrastructure?)*
 - *Quill Water Treatment (infrastructure?)*
 - *Shenandoah Basin Dam (infrastructure?)*
 - *Airport (infrastructure)*
- *School District structures and value – Ann Cyr*
- *Livestock facilities, grocery stores and gas stations*



Meeting 2 Outcomes

Carson City 2021 Hazard Mitigation Plan Update

- Identified as essential but not critical
- Urgent Care Centers
 - New centers may not be on the map
 - How many medical centers should be included? Is there a threshold for identifying those that are “critical”?

Updated maps for critical facilities and flood were presented. Existing maps for earthquake, hazardous materials, land use, population density, public land ownership, wildland fire fuel hazards, and wildland fire threat (FTI, FRI, FTI) maps were discussed. The need for additional data was noted by the appropriate department representatives for submittal to the Consultant.

- Comments/Qs for Hazardous Substance Facilities.
 - How large is the prison farm property?
 - Hospitals may house hazardous substances. Why are they not included?
 - Existing hazardous materials permits are on record with the Fire Department. A list of new facilities (and expired old ones) will be provided by the Fire Department.
- Comments for Wildland Fire
 - Data layers available from the Fire Department – to follow.

6.0 Vulnerability/Exposure: Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson- 15 mins.

ROA presented the Critical Facilities and Infrastructure Table from 2016 HMP. Comments/Qs on the table follow below.

- Define EOC / Where does Sheriff's Dispatch facility fit?
- Do not show Communication Facilities on maps.
- Community College is an asset of the State (not the City, and not a critical facility for the City)
- Value of schools is assessed as 300 million (vs \$169m in 2016)

7.0 Future Growth Vulnerability/Exposure: Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson - 15 mins.

ROA presented a draft map reflecting the planned uses in the updated Master Plan. It was determined that additional research/coordination with Planning is needed.

8.0 Preliminary Mitigation Actions Review and Discussion – Small Group Discussion (Discussion Only).

ROA presented the Unreinforced Masonry Building Map to illustrate the need for mitigation action items that will address the threat to these structures. The PT members present reviewed the 2021 Plan Goals and approved a small change to Goal No. 2. Goals 1 to 11 were discussed. PT members suggested changes to select mitigation action items that clarified or updated the action items. ROA reps recorded these notes and updated the appropriate documents. ROA requested the estimated cost and timeline for existing and proposed mitigation action items—as well as the status of existing action items. (This information was gathered via virtual meetings, by phone, or by email correspondence over the following weeks.)



Meeting 2 Outcomes



Carson City 2021 Hazard Mitigation Plan Update

9.0 Capability Assessment & Integration: Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson 30 mins.

- 9.1 Legal and Regulatory Resources
- 9.2 Administrative and Technical Resources
- 9.3 Financial Resources
- 9.4 Education and Outreach

Small groups were assigned to review and complete the Capability Assessment & Integration Worksheets for three of the four types of capabilities for the City: Administrative and Technical, Planning and Regulatory, and Education and Outreach. Financial capability was reviewed by the Carson City CFO after the meeting.

10.0 Questions & Answers: None

11.0 Public Comment: None

12.0 Task Assignments: None

13.0 Upcoming Meetings: Not discussed



Carson City Hazard Mitigation Plan Update

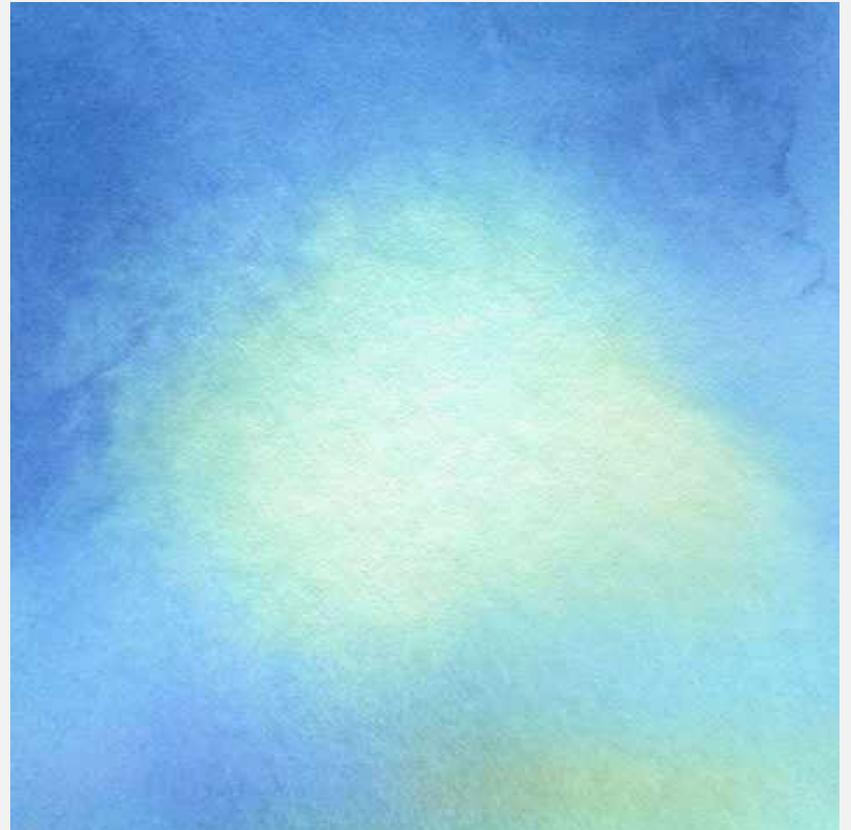
PLANNING TEAM

HOUSEKEEPING

Bathrooms

Emergency Exits

Breaks



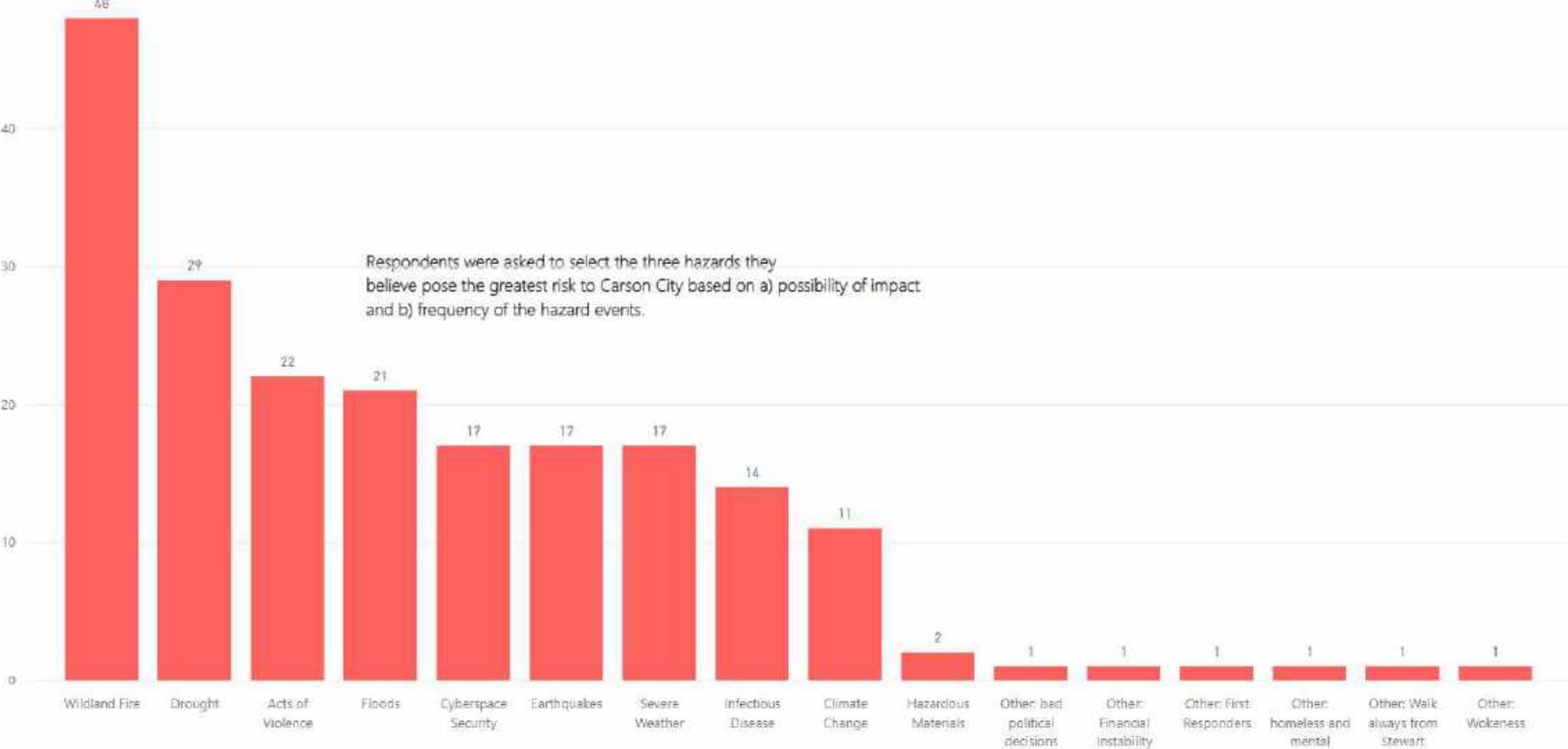
Introductions

- Name
- Title
- Organization

SURVEY OUTCOME

Bonus!

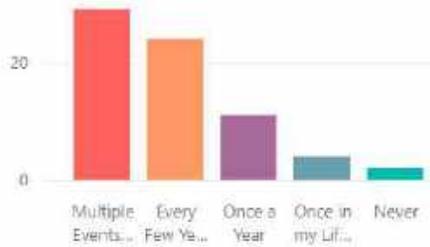
Carson City Survey Results: 71 respondents, 38 city government employees, 3 elected officials, 3 state government employees, 1 business operator, 1 federal employee, 1 retiree



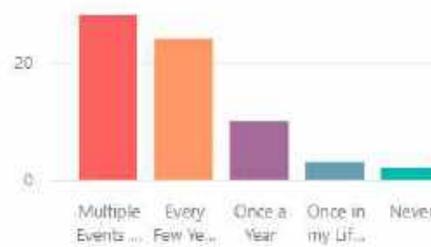
Respondents were asked to check a box for each hazard to reflect their experience with the frequency of the hazards listed.

The options were:
 a.) Multiple Events in One Year
 b.) Once a Year
 c.) Every Few Years
 d.) Once in my Lifetime
 e.) Never

Wildland Fire



Earthquakes



Severe Weather



Cyberspace Security



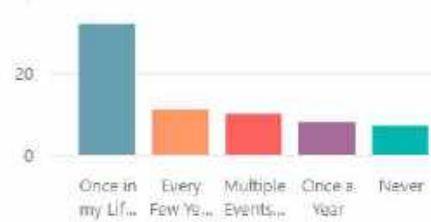
Floods



Drought



Infectious Disease



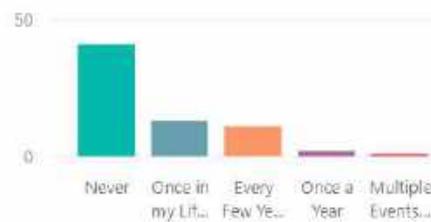
Acts of Violence



Hazardous Materials



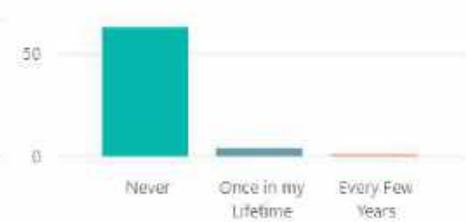
Landslides



Avalanche



Volcanic Activity

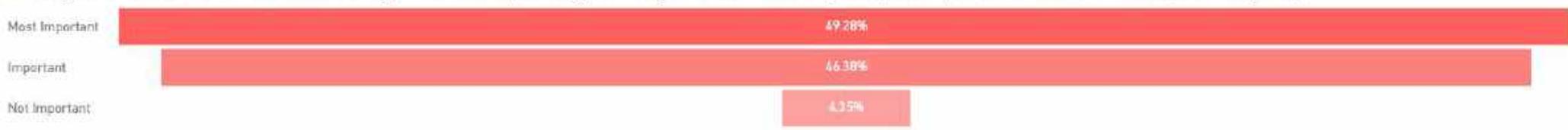


Five types of hazard mitigation activities reduce risk of natural hazards in a community. Respondents were asked to rate the importance of each activity for Carson City's Hazard Mitigation Plan Team to pursue.

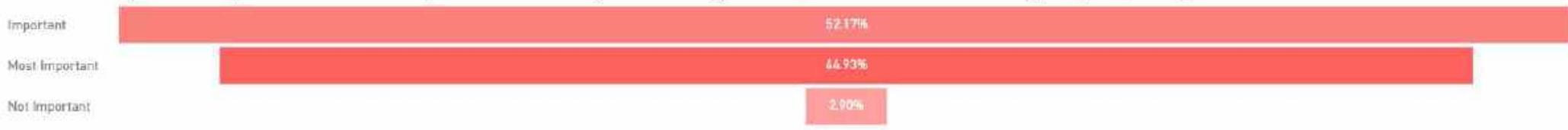
Preparedness and Response Actions: Emergency response or operational preparedness actions such as mutual aid agreements, communications, procedures for notifying citizens of shelter locations).



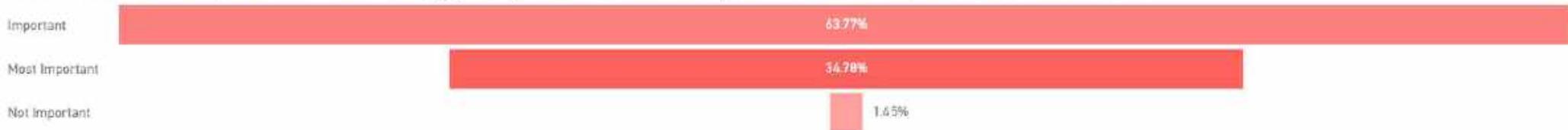
Natural Systems Protection: These actions minimize damage and losses while preserving or restoring the functions of natural systems (for example: sediment and erosion control, forest management).



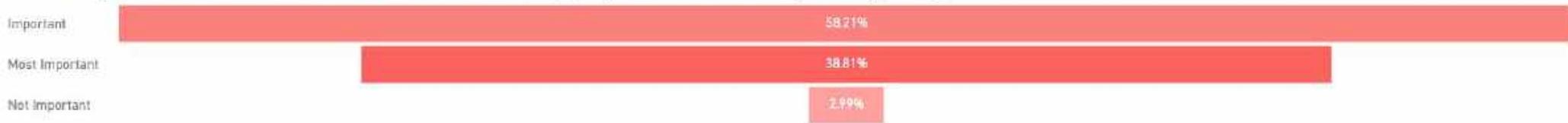
Local Plans and Regulations: Local plans ordinances and review processes influence the way land and buildings are developed and built. Coordination among plans, policies, and regulations leads to sustainable and resilient communities.



Structure and Infrastructure Projects: These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area.



Education Programs: Actions that inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them.



HAZARD RANKING OUTCOME

2.0

Hazard Ranking Outcome

High
Moderate
Low

Carson City HMP Update - 2021

HAZARD RANKING RESULTS	Total	Planing Significance	2021 Order	2016 Order
Cyberattacks	19	High	1	Earthquake & Seiche
Earthquake & Seiche	19		2	Wildland Fire
Wildfire	19		3	Flood
Flood	16		4	Severe Weather
Severe Weather	16		5	Acts of Violence
Acts of Violence	16		6	Landslide
Infectious Disease	15	Moderate	7	Hazardous Materials Event
Drought	14		8	Utility Loss
Hazardous Materials	14		9	Drought
Climate Change	13		10	Infectious Disease
Landslides	12	Low	11	Avalanche
Avalanche	10		12	Volcanic Activity
Volcano	10		13	

REVIEW OF CHANGES IN SECTION ONE

3.0

SECTION ONE Revisions

~~1.3 Adoption by the Local Governing Body & Supporting Documentation~~

1.3 Planning Area

1.4 Adoption by the Local Governing Body

1.5 Adoption Supporting Documentation

SECTION ONE Revisions

1.3 Planning Area

The Consolidated Municipality of Carson City, to be referred to as Carson City or the City throughout this plan, is the sole jurisdiction represented in this HMP. *The extremely short timeline for the finalization of the update process for this iteration does not allow the development of a multi-jurisdictional hazard mitigation plan. A multi-jurisdictional HMP would include an annex for each: the Carson City School District and the Airport Authority. This issue will be addressed through the development of an amendment to the 2021 Carson City HMP update after its approval by FEMA.* Currently, there are no other political subdivisions within Carson City.

The 2021 iteration of the Carson City HMP meets the requirements of Section 409 of the Stafford Act and Section 322 of the DMA 2000.

Note that the Carson River Subconservancy District (CRSD), which is based in Carson City, is addressed as an annex in the 2020 version of the Storey County Hazard Mitigation Plan. The CRSD is a unique multi-county, bi-state agency supporting management solutions for a robust Carson River Watershed.

SECTION ONE Revisions

1.4 Adoption by the Local Governing Body

ELEMENT	REQUIREMENTS
<p>E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? 44 CFR 201.6(c)(5)</p> <p><i>Intent: To demonstrate the jurisdiction's commitment to fulfilling the hazard mitigation goals outlined in the plan, and to authorize responsible agencies to execute their responsibilities.</i></p>	<p>a. The plan must include documentation of plan adoption, usually a resolution by the governing body or other authority.</p> <p>If the local jurisdiction has not passed a formal resolution, or used some other documentation of adoption, the clerk or city district attorney must provide written confirmation that the action meets their community's legal requirements for official adoption and/or the highest elected official or their designee must submit written proof of the adoption. The signature of one of these officials is required with the explanation or other proof of adoption.</p> <p>Minutes of a council Supervisors' or other meeting during which the plan is adopted will be sufficient if local law allows meeting records to <u>be submitted</u> as documentation of adoption. The clerk of the governing body, or city district attorney, must provide a copy of the law and a brief, written explanation such as, "in accordance with section ___ of the city code/ordinance, this constitutes formal adoption of the measure," with an official signature.</p> <p>If adopted after FEMA review, adoption must take place within one calendar year of receipt of FEMA's "Approval Pending Adoption."</p>

SECTION ONE Revisions

1.5 Adoption Supporting Document

The executed adoption document is shown in Figure 1-1 below.

Figure 1-1

(INSERT COPY OF THE ADOPTION RESOLUTION DOCUMENT HERE)

REVIEW TO CHANGES IN SECTION TWO

4.0

SECTION TWO Revisions

2. Purpose of the Plan, Mitigation Programs, & Organization of the Plan

This section provides an overview of the City's HMP purpose, current Hazard Mitigation Assistance Programs, and the plan's organization.

Carson City has authority as a local jurisdiction under its emergency management regulations for building strategies to protect its residents and property (Title 6 Emergency Management), to increase resiliency of the community, and to review and revise this plan based on hazard events, growth, and planned development. The timely update of this HMP will allow the continuation of Carson City's eligibility for all (pre- and post-disaster) Hazard Mitigation Assistance Program funding ~~as well as the repair/replace funds from FEMA's Public Assistance program's categories C-G~~. Please see Table 2-1 in Section 2.2 FEMA Funding Programs Requiring a Hazard Mitigation Plan.

Benefits of Updating the Hazard Mitigation Plan (HMP)

Eligibility for **Pre-Disaster** FEMA Programs

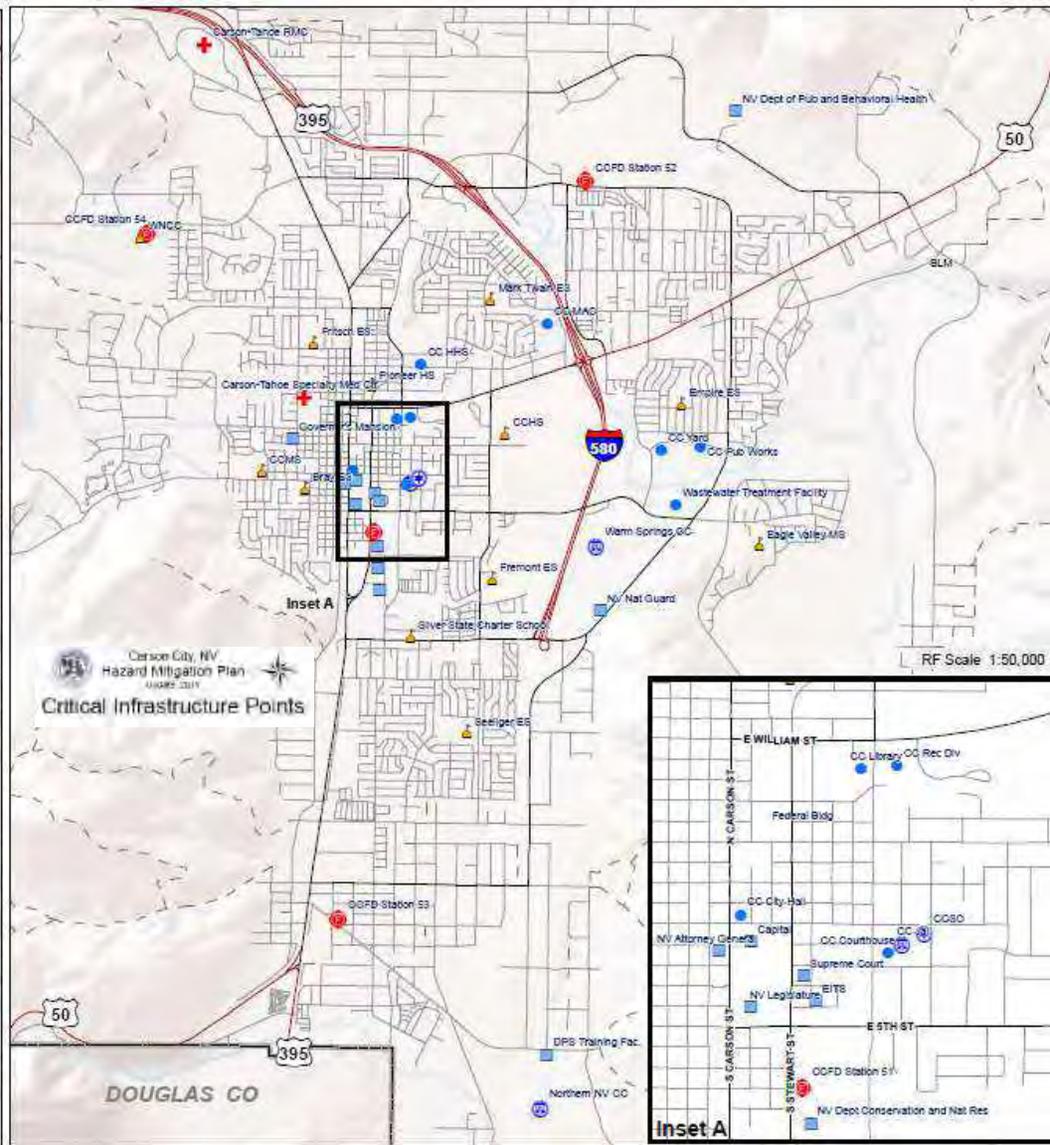
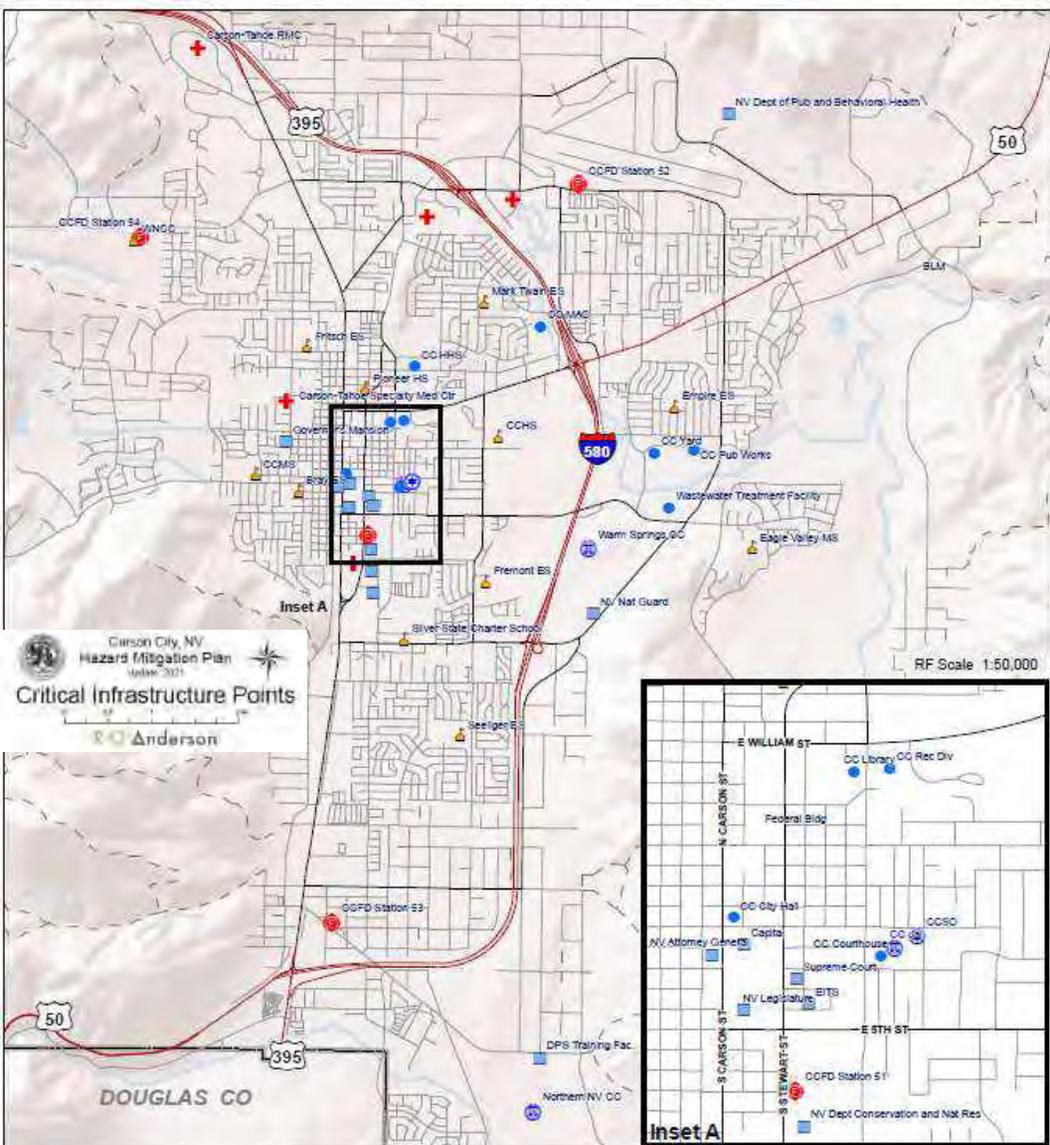
- ✓ Hazard Mitigation Assistance funding
 - ✓ Building Resilient Infrastructure in Communities
 - ✓ Flood Mitigation Assistance
 - ✓ Emergency Management Performance Grant

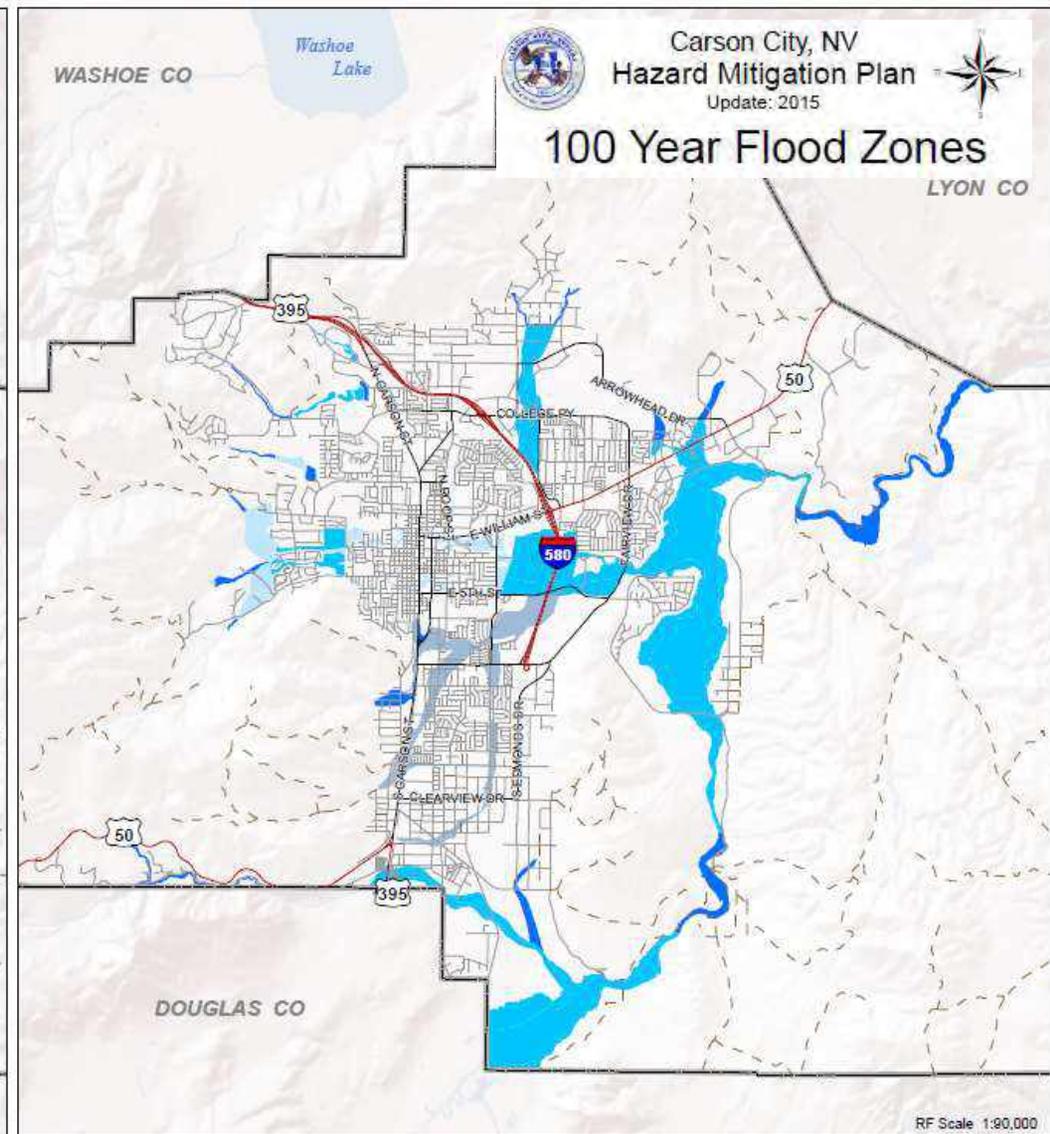
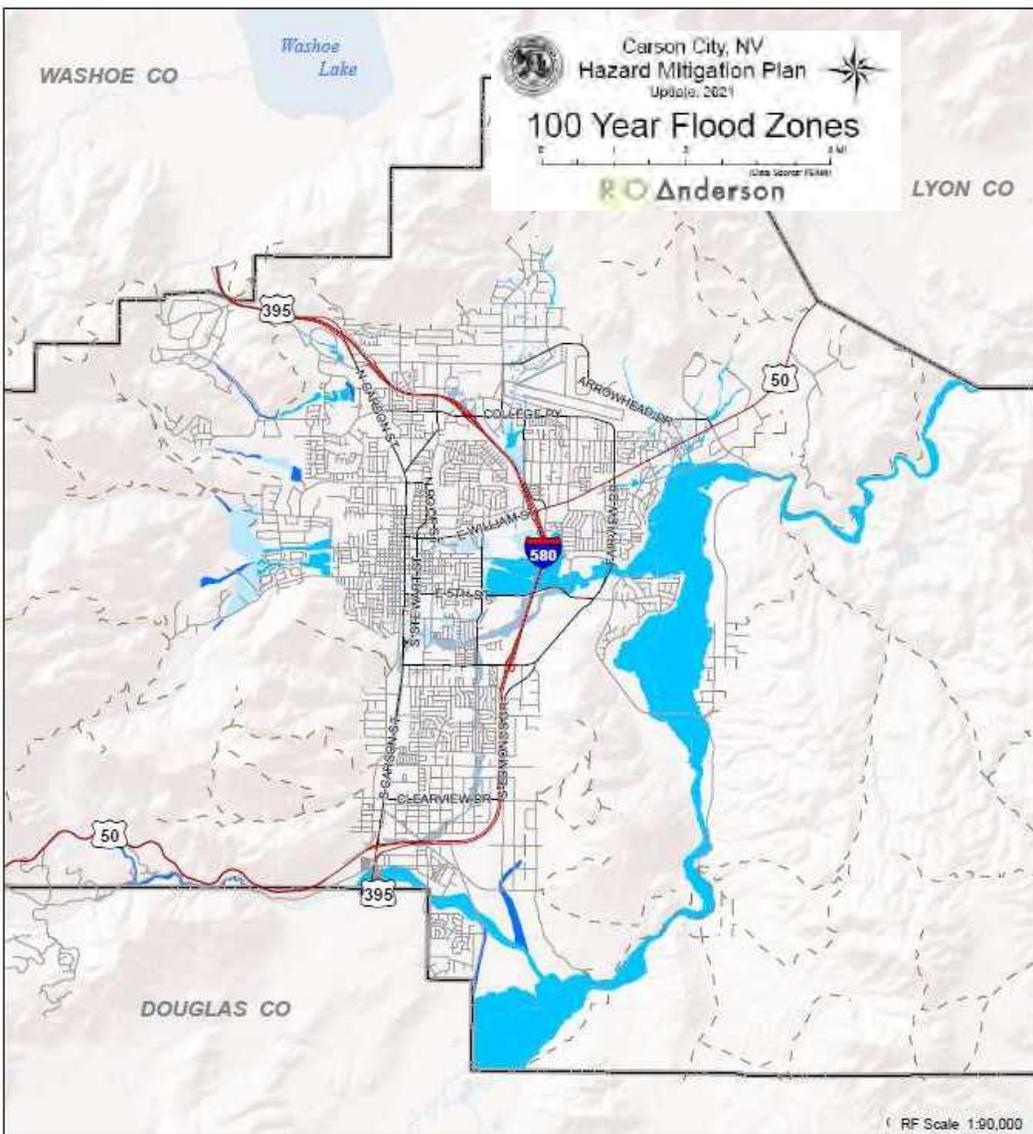
Eligibility for **Post-Disaster** FEMA Programs

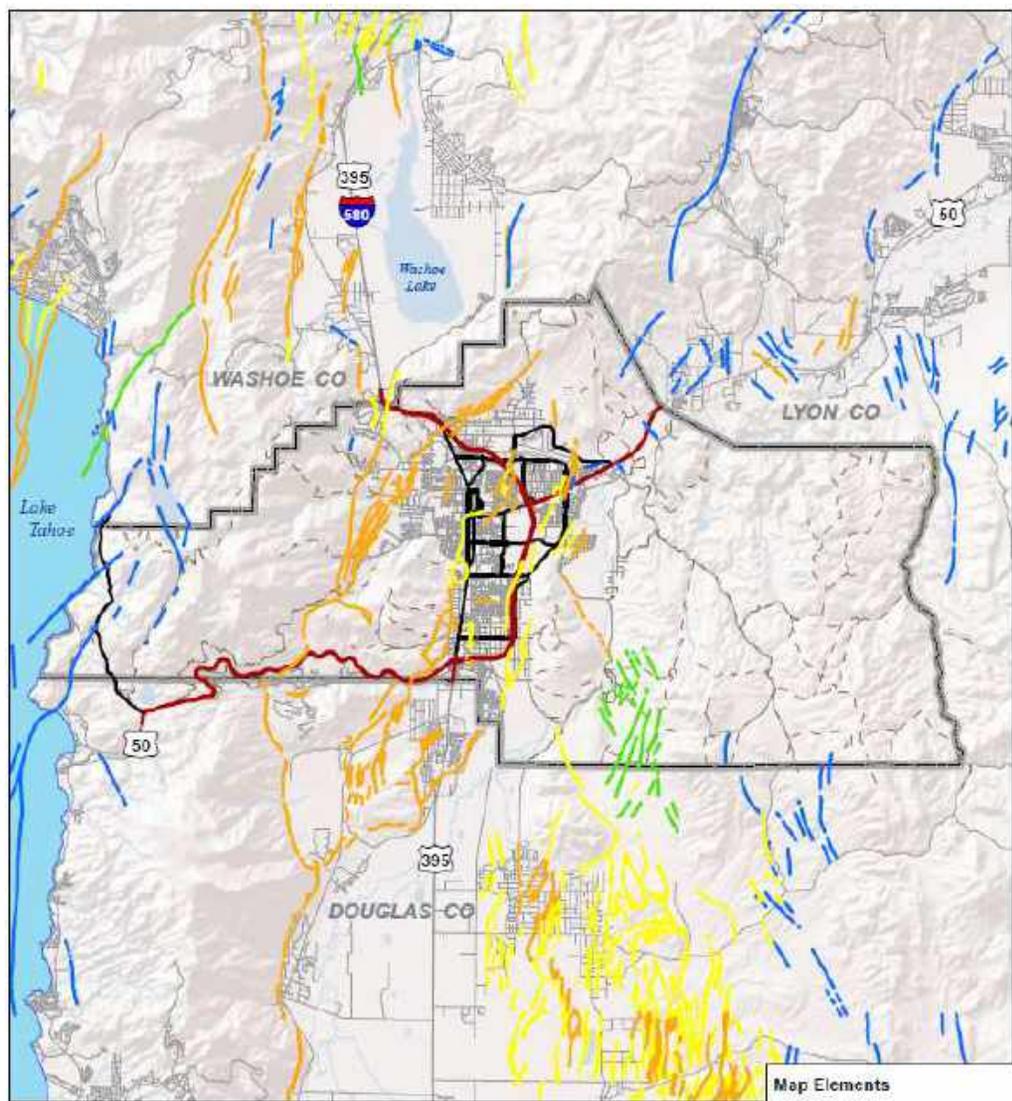
- STATE MUST HAVE HMP**
 - Public Assistance funding to (repair or replace) Categories C-G after a Presidential disaster declaration (A=Debris Removal; B=Emergency Protective Measures)
 - C=Roads & Bridges
 - D=Water Control Facilities
 - F=Buildings & Equipment
 - G=Utilities
- Section 406 Hazard Mitigation Funding
- Hazard Mitigation Grant Program
- Fire Assistance Mitigation Grant

Carson City Assets

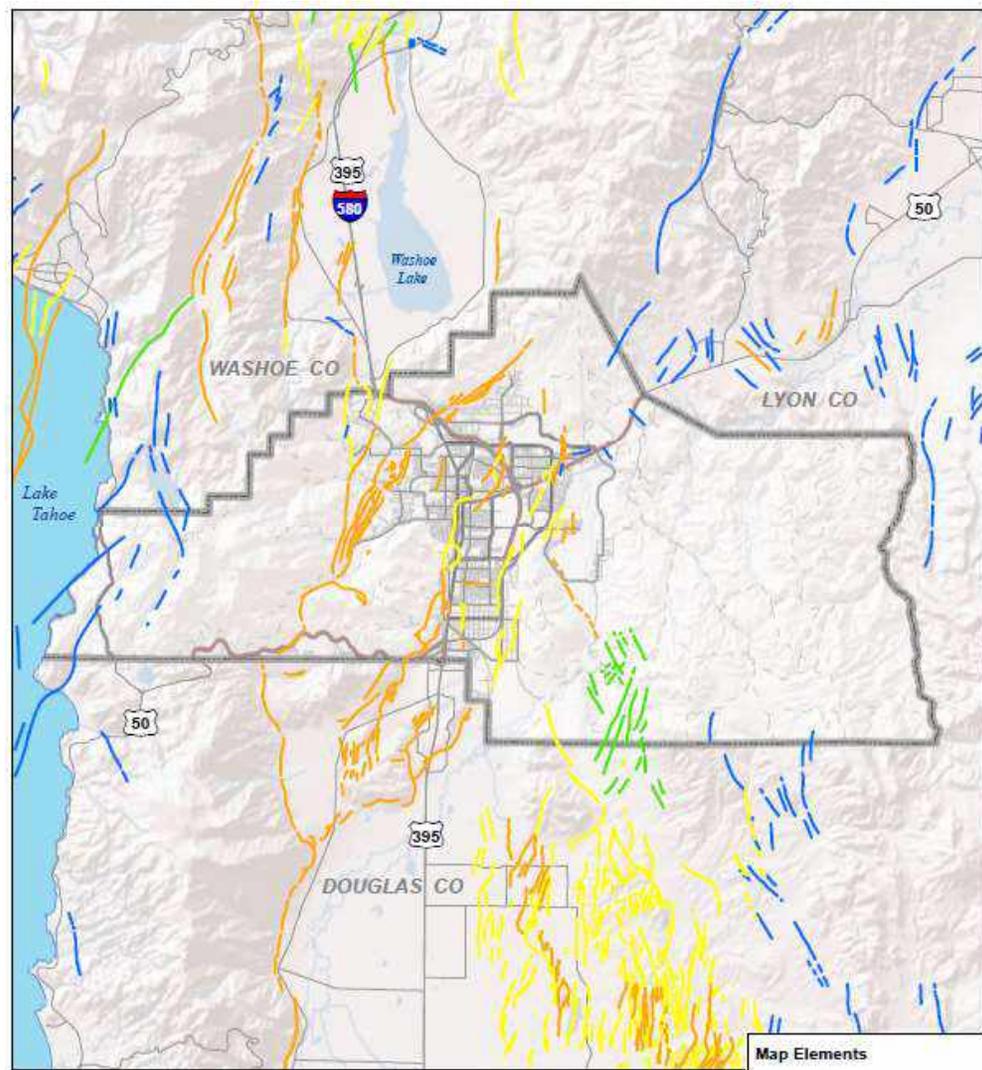
5.0



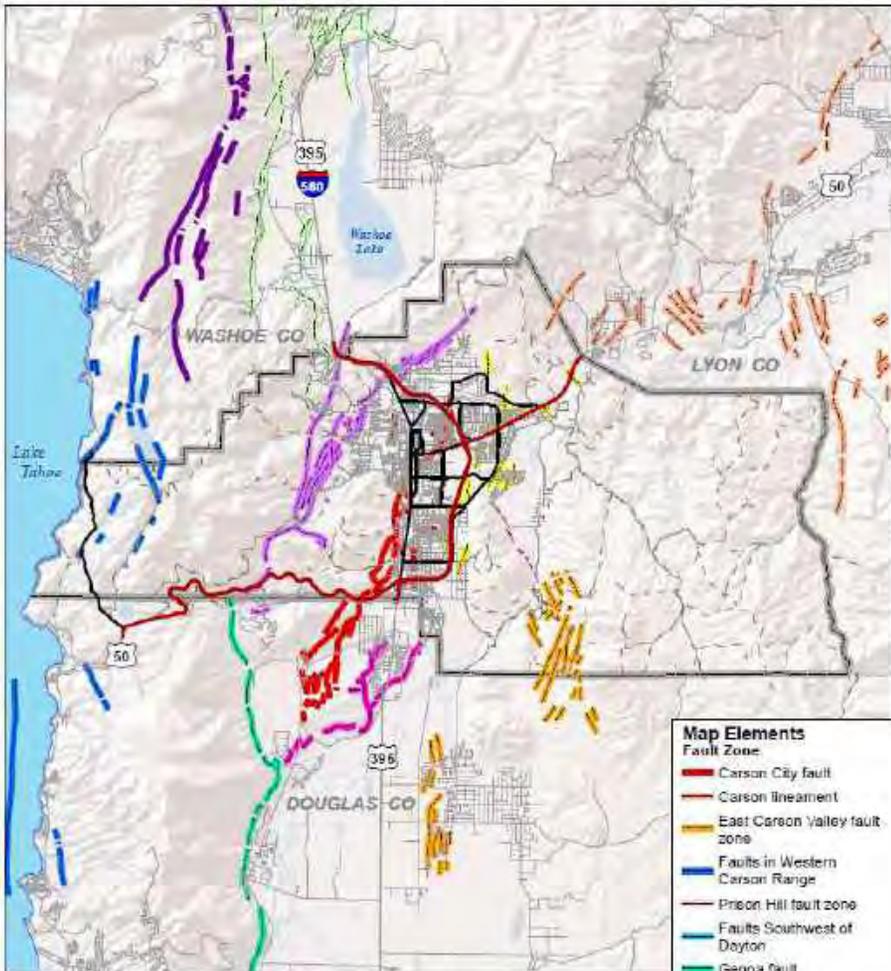




2021



2015

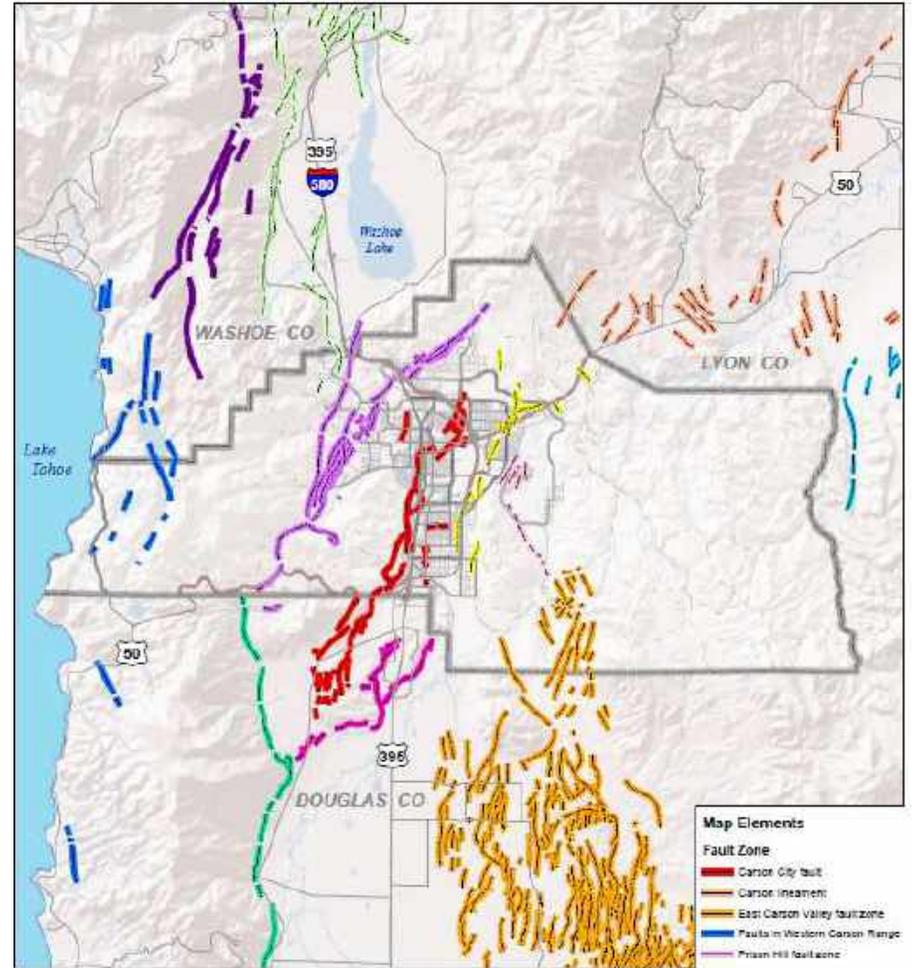


Carson City, NV
Hazard Mitigation Plan
Update: 2021

Earthquake Zones



RO Anderson
Full City Map Scale

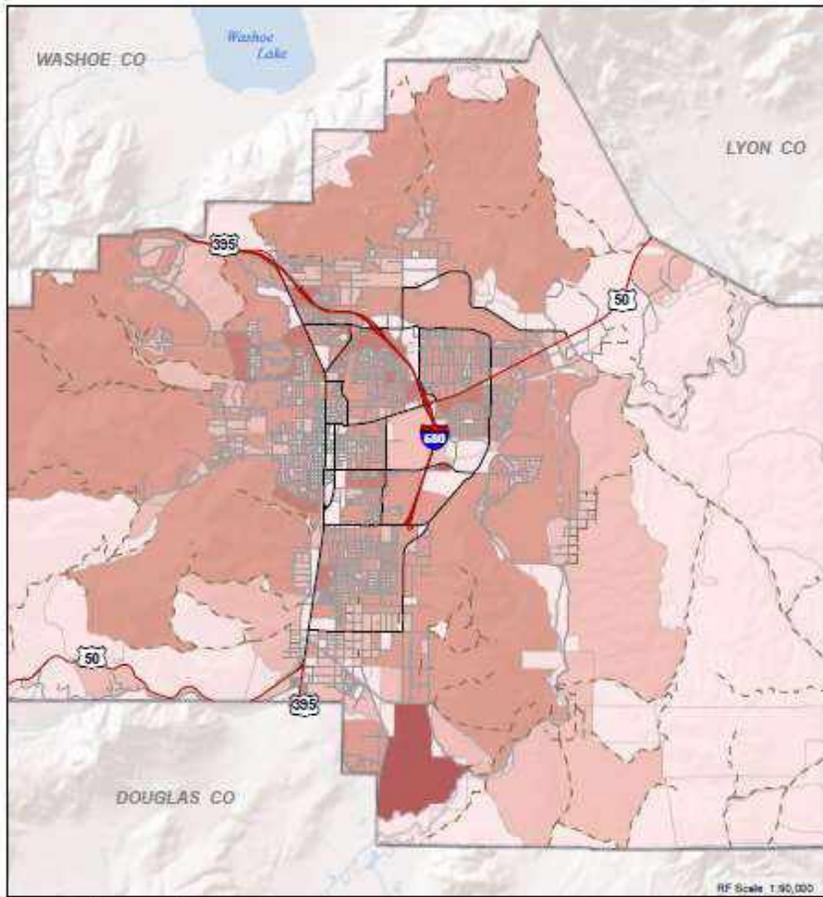


Carson City, NV
Hazard Mitigation Plan
Update: 2015

Earthquake Zones



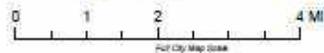
Full City Map Scale



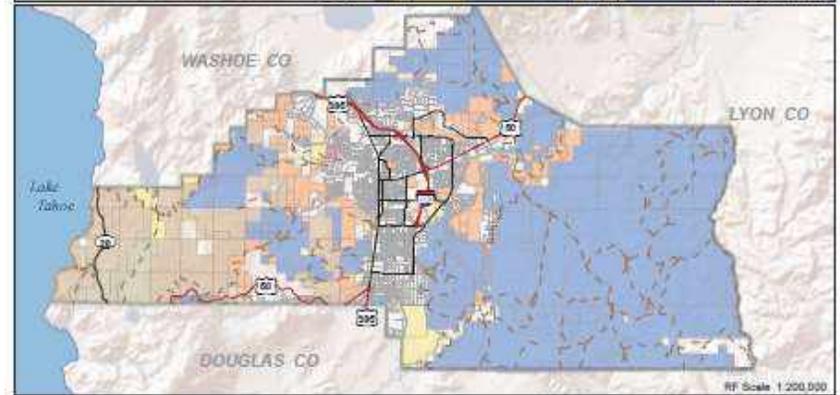
Carson City, NV
Hazard Mitigation Plan
Update: 2015



Population Density



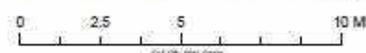
- Map Elements**
- 2010 Census
 - New Population
 - 0
 - 1-50
 - 51-250
 - 251-500
 - 501-1000
 - 1001-1500
- Map Elements**
- Carson City Border
 - Water Bodies
 - Greets**
 - By Function
 - Principal Arterial
 - Arterial Frontage
 - Minor Arterial
 - Minor Road



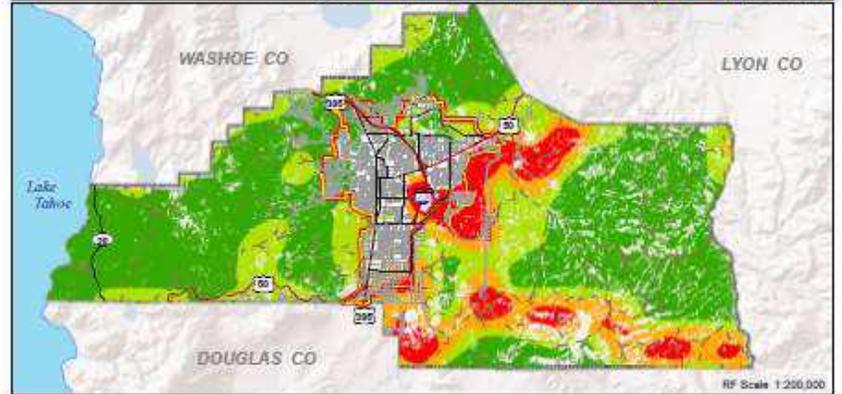
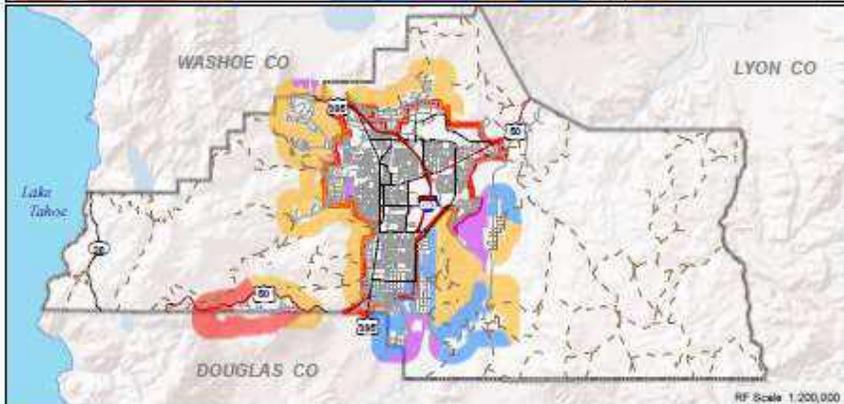
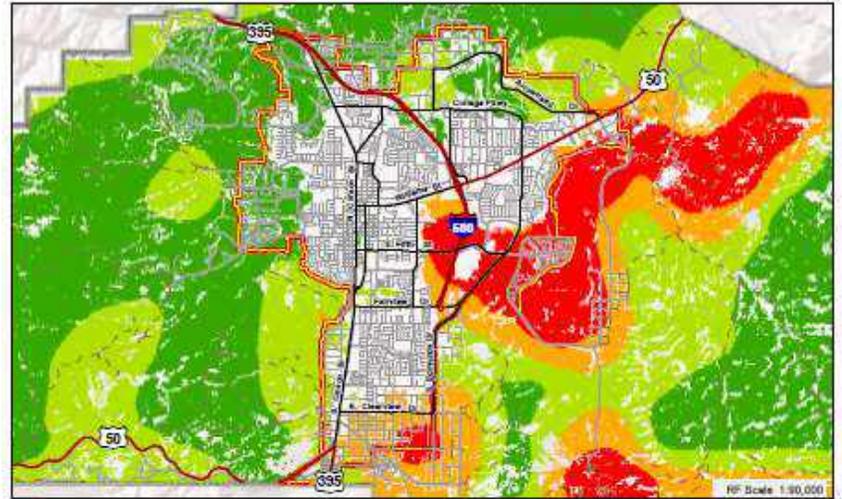
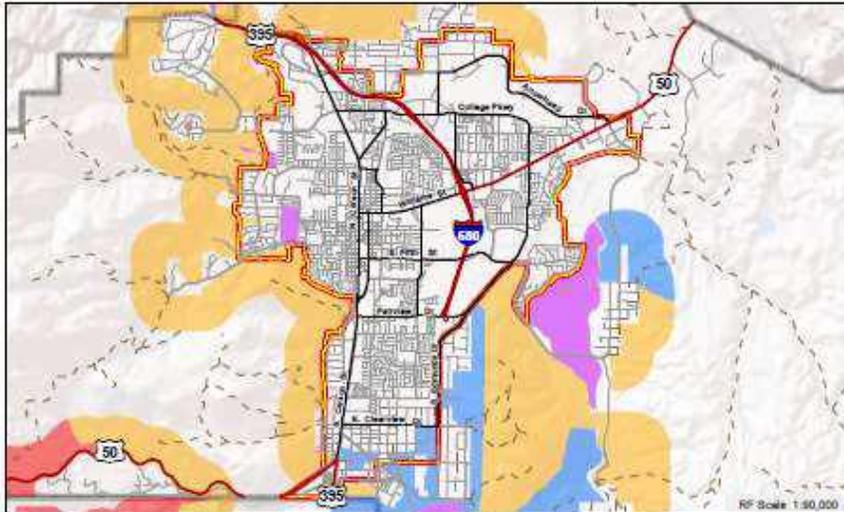
Carson City, NV
Hazard Mitigation Plan
Update: 2015



Public Land Ownership



- Map Elements**
- BLM/BLM
 - Forest
 - BLM/BLM
 - NDOT
 - NV State Property
 - State of Nevada
 - USR
 - LRRP
- Map Elements**
- Carson City Border
 - Water Bodies
 - By Function
 - Principal Arterial
 - Arterial Frontage
 - Minor Arterial
 - Minor Road



Carson City, NV
Hazard Mitigation Plan
Update: 2015

Wildland Fire Fuel Hazards

0 2.5 5 10 M
Full City Map Scale

- Map Elements**
- WUI Boundary
 - Fuel Hazards
 - Low
 - Moderate
 - High
 - Extreme

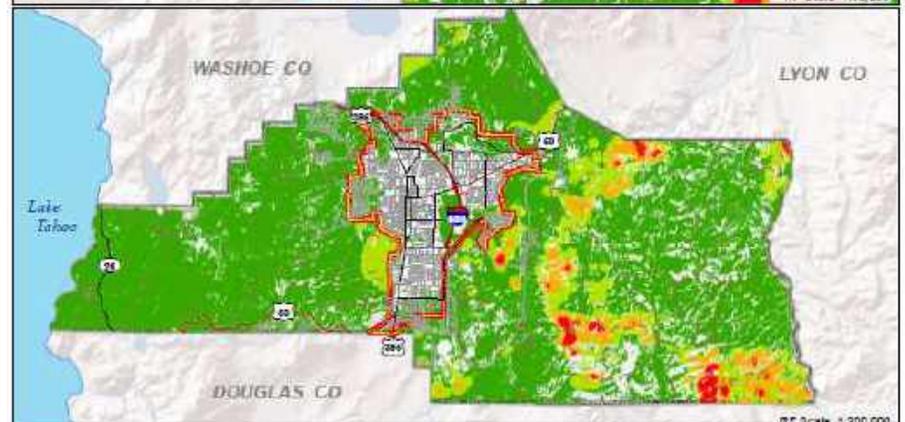
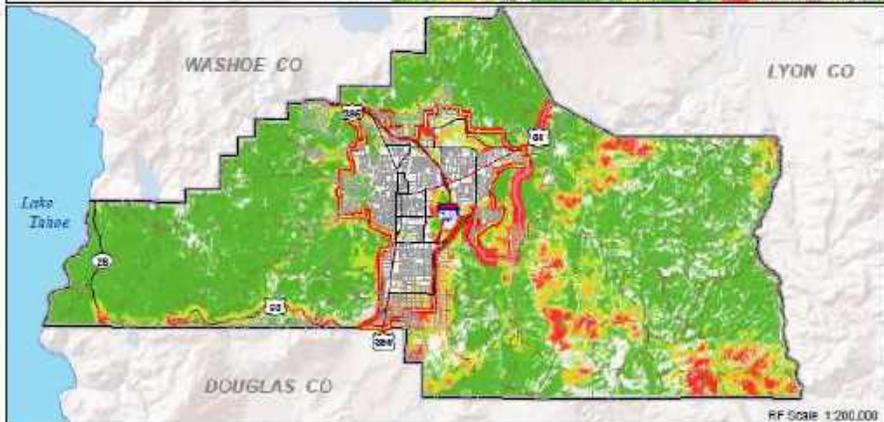
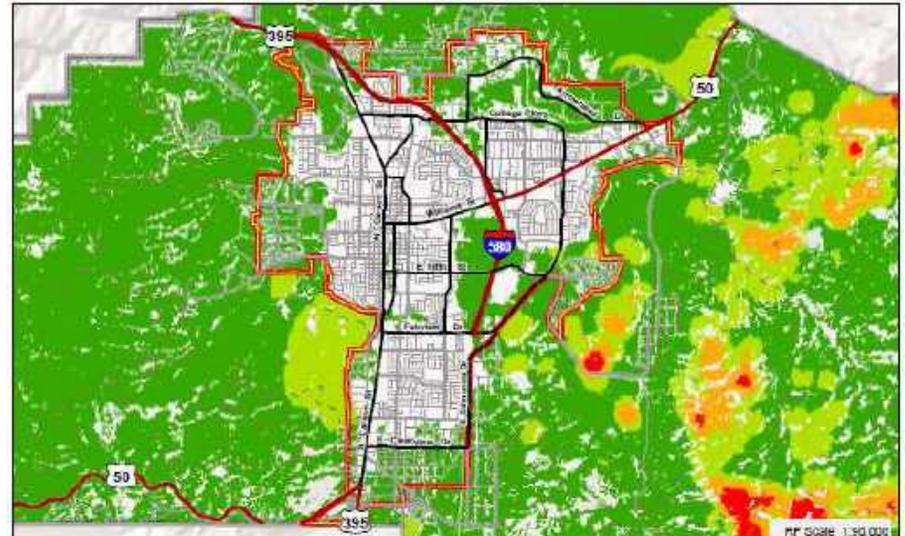
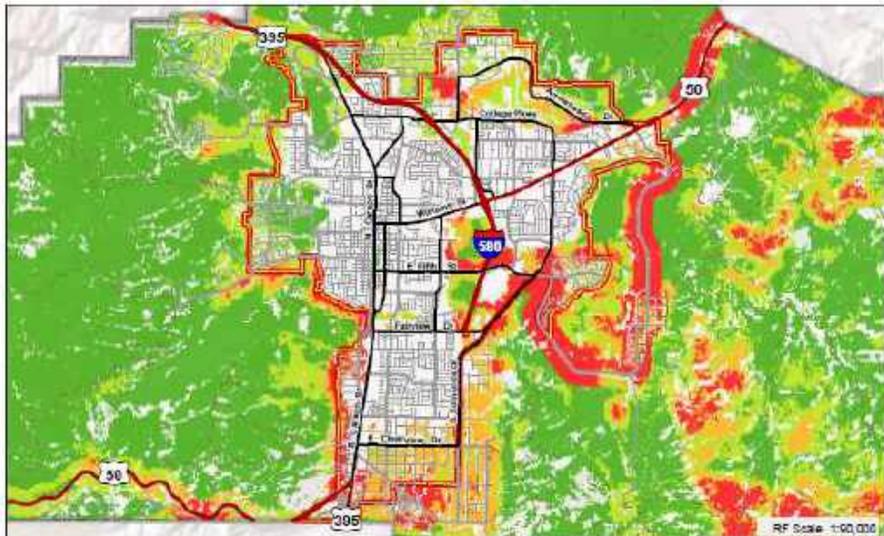


Carson City, NV
Hazard Mitigation Plan
Update: 2015

Wildland Fire Threat - FTI

0 2.5 5 10 M
Full City Map Scale

- Map Elements**
- WUI Boundary
 - Fire Occurrence Area (FOA)
 - Low
 - Moderate
 - High
 - Extreme
- For all based on fuels with the color data and is a continuous rating point grid of fuels the ignition risk calculated in the 1000 weather. Source: NCEM



Carson City, NV
 Hazard Mitigation Plan
 Update: 2015
Wildland Fire Threat - FRI

0 2.5 5 10 MI
 Full City Map Scale

Map Elements
 WUI Boundary
 Fire Risk Index (FRI)
 Low
 Moderate
 High
 Extreme

FTI measures the probability of an area burning with the expected effects if it does occur. This reflects the possibility of suffering loss. (Source: NDFP)



Carson City, NV
 Hazard Mitigation Plan
 Update: 2015
Wildland Fire Threat - FTI

0 2.5 5 10 MI
 Full City Map Scale

Map Elements
 WUI Boundary
 Fire Threat Index (FTI)
 Low
 Moderate
 High
 Extreme

FTI measures the probability of an area burning and the expected loss to the risk collector. The risk collector is a four weather percentile category into a single measure of wildland fire susceptibility. (Source: NDFP)

Vulnerability/Exposure

6.0

Table 6-2 Critical Facilities and Infrastructure

Category	Type	Number	Estimated Total (millions of \$)
Critical Facilities	Sherriff Stations	1	36
	Fire Stations	4	32.5
	EOCs	1	10.5
	Municipal Buildings	12	55.5
	Public Primary and Secondary Schools	12	169
	Hospital w/Emergency Room	1	130
	Urgent Care Facilities	4	41.2
	Ambulance Facilities	4	Included in fire station
	Communication Facilities	15	70.2
	State Owned Critical Buildings	60	447
Critical Infrastructure	State and Federal Highways (miles)	31	192.30
	Airport Facilities	1	39.80
	Bridges	34	3.9
	Utilities (Water, Waste Water, Gas, Electrical)	n/a	106.90

Source: FEMA HAZUS-MH, Carson City Fire Department, NV Division of Emergency Management, Carson-Tahoe Regional Healthcare, CC School District, NV State Dept of Risk Mgmt.

Future Growth Vulnerability/Exposure

7.0

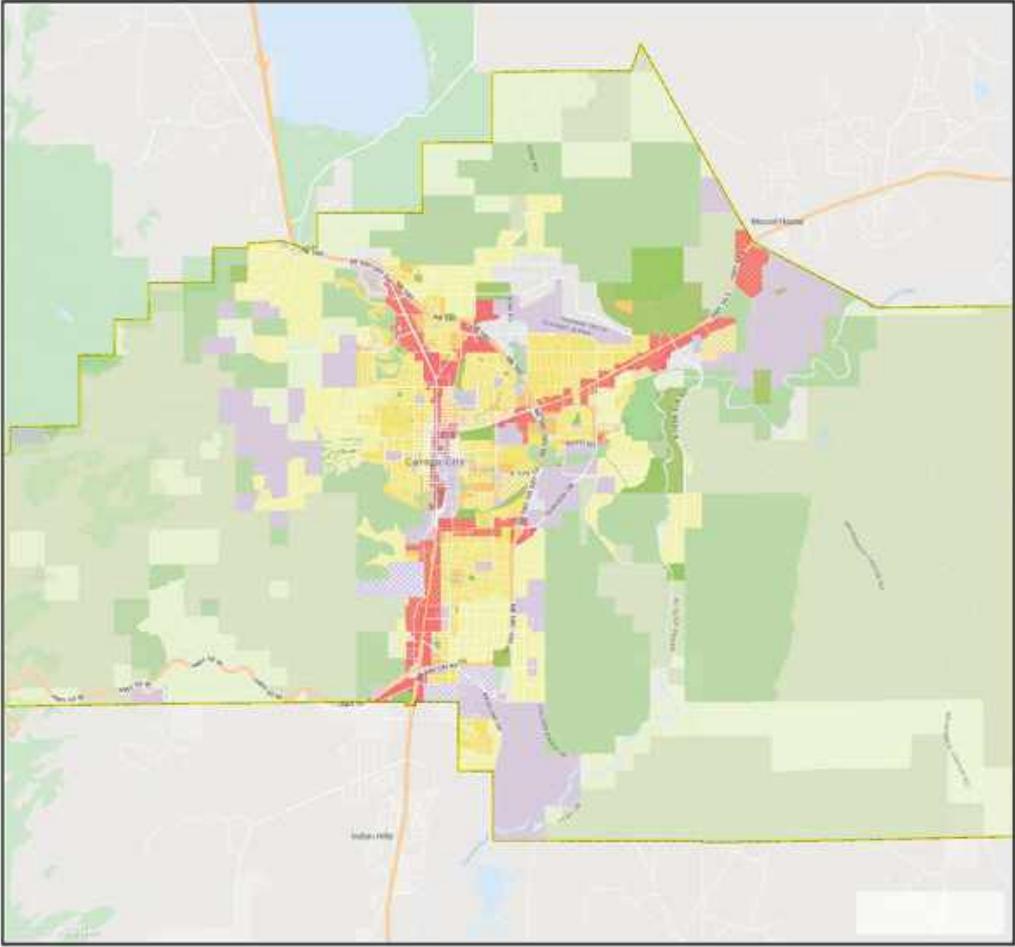


Table 6-3 Potential Hazard Vulnerability Assessment – Population and Buildings

Hazard	Population ⁴	Buildings			
		Residential		Nonresidential	
		Number ³	Value (\$) ¹	Number ³	Value (\$) ¹
Total for Carson City	54,169	22,928	\$842,025,452	3,231	\$588,022,055
Drought	54,169	0	\$0	0	\$0
Earthquake – 100yr Magnitude 6.5 ²	54,169*	N/A*	N/A*	N/A*	N/A*
Flood - 100-Year Flood Zone	53,654	1,944	\$65,583,930	674	\$231,394,909
Hazardous Materials Event – 1-mile radius EHS facilities 10% of 95%	5146	2059.79	\$66,677,423	243.295	\$54,873,132
Hazardous Materials Event – 1-mile radius hazardous facilities 5% of 95%	2,523	1,030	\$27,782,260	122	\$22,863,805
Hazardous Materials Event – 1-mile buffer transport corridors 5% of 95%	2,237	896	\$23,309,509	92	\$18,887,085
Infectious Disease	54,169	0	\$0	0	\$0
Severe Weather – High – 25% of population & 5% buildings	13,542	115	\$4,210,127	16	\$29,401,102
Seiche	0	0	\$0	0	\$0
Utility Loss	54,169	22,928	\$842,025,452	3,231	\$588,022,055
Wildland Fires - Extreme	4,393	675	\$47,407,698	781	\$52,602,598
Volcano/Ash	54,169	22,928	\$2,526,076	3,231	\$1,764,066

¹ Value = buildings only. Data acquired from Carson City Assessor's Office

N/A = Not Applicable

² Data acquired from Nevada Bureau of Mines and Geology Open-file Report 09-8, HAZUS-MH

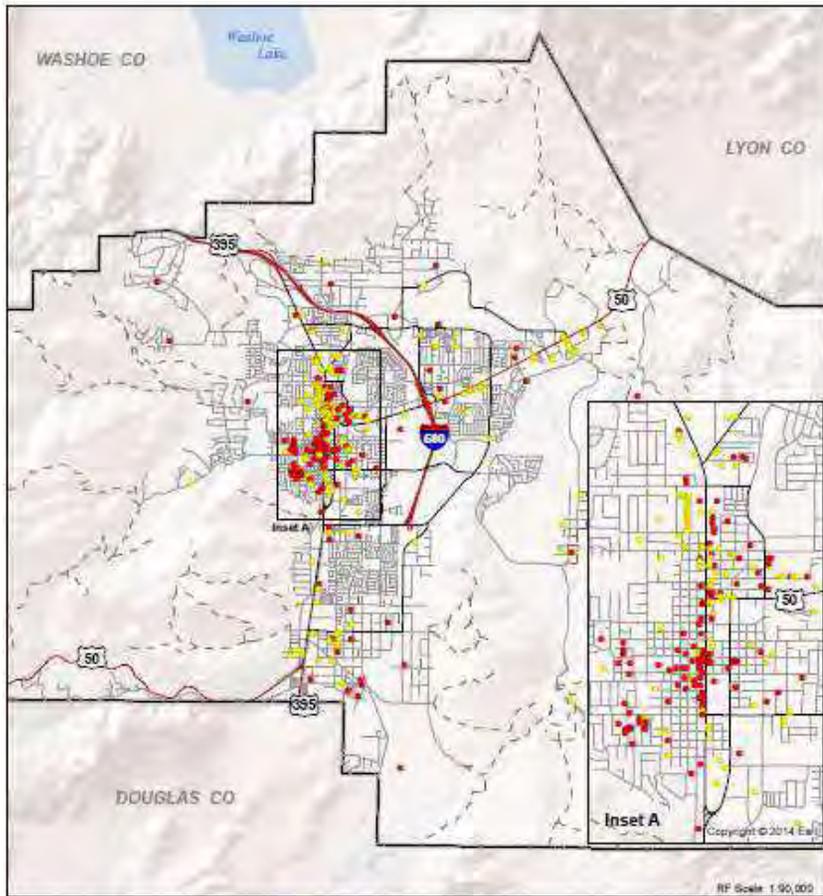
⁴ Data source Nevada State Demographer

³ Data acquired from Carson City Assessor's Office.

*Due to loss of use of buildings and critical infrastructure, it is anticipated that the entire population will be affected by an earthquake with a magnitude of 6.0 or higher. A comprehensive vulnerability assessment was performed by the Nevada Bureau of Mines and Geology using HAZUS. Please see Section 6.4.2 for building loss and values.

Preliminary Mitigation Actions

9.0



Carson City, NV
 Hazard Mitigation Plan
 Update: 2015

Unreinforced Masonry (UMR) Bldgs

Map Elements

UMR Type

- CMU+URM
- URM

*CMU = Concrete Masonry Units
 These are brick buildings
 with CMU blocks and a
 brick foundation.

0 1 2 4 MI

Actual Map Scale

Goals

2016 Plan Goals

Goal Number	Goal
1	Promote increased and ongoing Carson City involvement in hazard-mitigation planning and projects
2	Build and support local capacity to enable the public to prepare for, respond to, and recover from disasters
3	Reduce the possibility of damage and losses due to earthquakes
4	Reduce the possibility of threat to life and losses due to infectious disease
5	Reduce the possibility of damage and losses due to floods
6	Reduce the possibility of damage and losses due to severe weather
7	Reduce the possibility of damage and losses due to acts of violence
8	Reduce the possibility of damage and losses due to wildland fires
9	Reduce the possibility of damage and losses due to drought
10	Reduce the possibility of damage and losses due to landslide
11	Reduce the possibility of damage and losses due to hazardous materials

Updated 2021 Goals

Goal Number	Goal
1	Promote increased and ongoing Carson City involvement in hazard-mitigation planning and projects
2	Build and support local capacity to enable the <u>public community</u> to prepare for, respond to, and recover from disasters.
3	Reduce the possibility of damage and losses due to earthquakes
4	Reduce the possibility of threat to life and losses due to infectious disease
5	Reduce the possibility of damage and losses due to floods
6	Reduce the possibility of damage and losses due to severe weather
7	Reduce the possibility of damage and losses due to acts of violence
8	Reduce the possibility of damage and losses due to wildland fires
9	Reduce the possibility of damage and losses due to drought
10	Reduce the possibility of damage and losses due to landslide
11	Reduce the possibility of damage and losses due to hazardous materials

<p style="text-align: center;">Goal 1</p> <p><i>Promote increased and ongoing Carson City involvement in hazard mitigation planning and projects.</i></p>	1.A LPR	E	Update the Master Plan to be consistent with the hazard areamaps and implementation strategies developed in the HMP every 10 years. Review & <u>and</u> update ordinances <u>and</u> & code every <u>three</u> 3 years.
	1.B E&O	E	Identify and educate Carson City personnel on high hazard areas.
	1.C P&R	E	Coordinate existing Geographic Information Systems (GIS) capabilities to identify hazards through the City.
	1.D P&R	E	Develop the data sets that are necessary to test hazard scenarios and mitigation tools, including HAZUS MH.
	1.E E&O + P&R	E	Utilize the Internet as a communication tool, as well as an education tool.
	1.F LPR	E	Develop city building codes and ordinances that protect people and structures from drought, earthquake, flood, landslide, severe weather, and wildfire.
	1.G LPR	E	Continue to update the Community Wildfire Plan.

<p style="text-align: center;">Goal 2</p> <p><i>Build and support local capacity to enable the public community to prepare for, respond to, and recover from disasters.</i></p>	2.A P&R	E	Develop emergency evacuation programs for neighborhoods in flood prone areas and wildland fire areas.
	2.B LPR	E	Annually review the City's Emergency Operations Plan and identify needed plan updates. <u>update and integrate with local Hazard Mitigation Plan.</u>
	2.C P&R	E	Conduct a minimum of one disaster exercise each year.
	2.D E&O	E	Establish a budget and identify funding sources for mitigation outreach
	2.E E&O	E	Work with school districts to develop a public outreach campaign that teaches children how to avoid danger and behave during an emergency.
	2.F E&O	E	Utilize Business for Innovative Climate Change (BICEP) to increase awareness and knowledge of hazard mitigation and encourage businesses to develop/implement hazard mitigation actions.
	2.G E&O	E	Prepare, develop, and distribute appropriate public information about hazard mitigation programs and projects at Carson City-sponsored events and on the Carson City's/Fire Department's websites.
	2.H E&O + P&R	N	Create a plan for cybersecurity awareness for employees and residents.
	2.I LPR	N	Develop a cybersecurity risk management plan.

<p>Goal 3</p> <p><i>Reduce the possibility of damage and losses due to earthquakes.</i></p>	3.A LPR	E	Continue to enforce the International Building Code (IBC) provisions pertaining to grading and construction relative to seismic hazards. Update Carson City Codes to IBC 2018 when it is released.
	3.B S&I	E	Completed the Unreinforced Masonry (URM) building program that determines the structural safety of critical infrastructure and retrofit buildings, if necessary.
	3.C P&R	E	Identify hazard-prone structures through GIS modeling.
	3.D S&I	E	Acquire and install clean agent systems for the City Hall and Public Safety computer rooms to reduce damage to computer <u>equipment</u> .

<p style="text-align: center;">Goal 4</p> <p><i>Reduce the possibility of threat to life and losses due to <u>Infectious Disease</u>.</i></p>	4.A LPR	E	Update Mass Illness Plan and integrate with local Hazard Mitigation Plan.
	4.B P&R	E	Continuation of training and exercise program relative to epidemics.
	4.C P&R	E	Prepare by acquiring/storing needed medical equipment.
	4.D E&O	E	Maintain a public program for information and education.
	4.E E&O	N	Reduce disparities and inequities in the distribution of infectious disease information during and prior to outbreaks.
	4.F LPR	N	Establish a plan that addresses the development, protection, retention, and resilience of the public health workforce and identifies options for expanding the workforce quickly during a health-related emergency.

<p style="text-align: center;">Goal 5</p> <p>Reduce the possibility of damage and losses due to floods.</p>	5.A LPR	E	Identify flood-prone areas using GIS. Identify those community areas that have recurring losses and conduct detailed analysis of the hydrographic basins for planning, update Provide a consolidated storm water system Master pPlans, including erosion/sediment transport, and develop ment of project proposals to improve stormwater facilities and reduce flooding.
	5.B LPR	E	Continue to update policies that discourage growth in flood-prone areas.
	5.C LPR	E	Review and update flood plans that would include for coordination with adjacent counties, cities, and special districts supporting a regional approach to flood control mitigation.
	5.D LPR	E	Update and expand Sandbagging Plan.
	5.E S&I	E	Install new flood facilities to include, upgrade the and update existing storm drain system, to current standards including culverts and channel improvements.
	5.F NSP	E	Upon completion of land transfers associated with the Lands Bill which includes land trading with Carson City, BLM, US Forestry, and Washoe Tribe; identify/implement projects within transferred lands and other areas within Carson City that need slope stabilization for flood and landslide.
	5.G S&I + NSP	E	Design and install facilities to capture debris/sediment within Eagle Valley.
	5.H S&I + NSP	E	Develop a Flood Management Plan for the New Empire Area and install a new flood control facility for the area.
	5.I NSP & S&I	E	Protect and enhance existing municipal water conveyance structures, storage, and treatment facilities to reduce impact from flood.
	5.J S&I + NSP	E	Install a storm water retention facility at Goni Canyon Creek & Channel D & and construct a new storm drainage system further downstream along at Goni Creek.
	5.K	E	Design and install facilities to capture debris/sediment within Eagle Valley.
	5.L S&I	E	Installation of back-up generators for critical infrastructure and facilities.
	5.L NSP + S&I	E	Land acquisition of buildings with recurring loss or of land which could be used as catch detention basins for flood control projects
5.M LPR	E	Conduct a feasibility study to evaluate options for emergency fuel storage to support critical infrastructure during an extended power outage.	

<p>Goal 6</p> <p><i>Reduce the possibility of damage and losses due to Severe Weather.</i></p>	6.A S&I	E	In areas at risk to severe weather, retrofit public buildings to withstand snow loads and severe winds to prevent roof collapse/damage.
	6.B LPR	E	Continue the storm water management plan for snow melt storage .
<p>Goal 7</p> <p><i>Reduce the possibility of damage and losses due to terrorist events.</i></p>	7.A LPR	E	Develop standards for public buildings and high risk buildings to mitigate impacts from terrorist events.
	7.B LPR	E	Develop planning procedures to cover terrorist events and exercises.
	7.C S&I	E	Retrofit public and high risk buildings to increase safety and reduce the impact of terrorist events.

<p style="text-align: center;">Goal 8</p> <p style="text-align: center;"><i>Reduce the possibility of damage and losses due to wildland fires.</i></p>	8.A LPR	E	Continue to identify areas and update and enforce the most current versions of the Urban-Wildland Interface Code.
	8.B LPR	E	Update the Carson City Fire Code and model weed abatement and fuel modification ordinances.
	8.C NSP	E	Continue to conduct current fuel management programs (i.e. weed abatement programs) and investigate and apply new and emerging fuel management techniques.
	8.D E&O	E	Develop a <u>Continue</u> public outreach campaign on <u>the</u> extreme wildland fire dangers and steps that can be taken to reduce these dangers.
	8.E NSP + E&O	E	Develop <u>Continue to build and maintain current</u> partnerships for a community based vegetation management program including chipping programs.
	8.F E&O	E	<u>Continue to u</u> Utilize GIS and the internet as information tools.
	8.G P&R	E	Establish <u>Maintain the</u> a continuing wildland fire technical working group.
	8.H NSP + S&I	E	<u>Continue to p</u> Protect municipal water recharge zones from wildfires and flooding by stabilizing upper watershed slopes.
	8.I	E	Retrofit buildings (public and private) to reduce the risk of wild fire in Lakeview, Pinyon Hills, Kings Canyon, Voltaire Canyon and Timberlake Canyon. <u>Not implemented/No longer relevant</u>

Goal 9 <i>Reduce the possibility of damage and losses due to drought.</i>	9.A NSP + S&I	E	Watershed stabilization and recharge program to maximize the use of surface sources when available and preserving the groundwater sources for system peaking needs and times of drought.
	9.B E&O + LPR	E	Encourage public participation in drought strategies through public information programs on water conservation and drought resistant landscaping and through building code ordinances.
Goal 10 <i>Reduce the possibility of damage and losses due to landslide.</i>	10.A NSP	E	Evaluate natural slopes to determine if there are slope stabilization treatments that would be appropriate to prevent landslides.
	10.B S&I	E	Conduct slope stabilization projects to prevent landslides.
Goal 11 <i>Reduce the possibility of damage and losses due to hazardous materials.</i>	11.A LPR	E	Review building codes and zoning ordinances to reduce public health risks from hazardous materials releases.

Developing Mitigation Action Items

HAZARD

- Timeline
- Cost
- Cost



BREAK!

10 MINUTES

Capability Assessment & Integration

10.0

Worksheet 4.1

Local Mitigation Worksheet - Administrative and Technical

Capability Assessment Worksheet

Jurisdiction: Carson City

Local mitigation capabilities are existing authorities, policies, programs, and resources that reduce hazard impacts that could be used to implement hazard mitigation activities. Please complete the tables and questions in the worksheet as completely as possible. Complete one worksheet for each jurisdiction.

Administrative and Technical

Identify whether your community has the following administrative and technical capabilities. These include staff and their skills and tools that can be used for mitigation planning and to implement specific mitigation actions. For smaller jurisdictions without local staff resources, if there are public resources at the next higher level government that can provide technical assistance, indicate so in your comments.

Administration	Yes/No	Describe capability. Is coordination effective?
Maintenance programs to reduce risk (e.g. tree trimming, clearing drainage systems)		
Mitigation Planning Committee	Yes	
Mutual aid agreements	Yes	Quad County – Very effective for all hazards identified
Planning Commission		
Regional Transportation Commission	Yes	

Worksheet 4.1

Local Mitigation Worksheet - Administrative and Technical

Staff	Yes/No FT/PT ¹	Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?
Chief Building Official	Yes FT	
Civil Engineer	Yes FT	
Community Planner	Yes FT	
Emergency Manager	Yes FT	
Fiscal Management	Yes FT	
Floodplain Administrator	Yes FT	
GIS Coordinator	Yes FT	
Digital Media Coordinator	Yes FT	
Health Director	Yes FT	
School District Chair		
Sheriff	Yes FT	
Transportation Manager		
Other		

¹ Full-time (FT) or part-time (PT) position

Worksheet 4.1

Capability Assessment Worksheet – Administrative and Technical

Technical	Yes/No	Describe capability Has capability been used to assess/mitigate risk in the past?
Grant writing	Yes	
Hazard data and information		
Hazard analysis	Yes	
Warning systems/services (Reverse 911, outdoor warning signals)		
Other		
How can these capabilities be expanded and improved to reduce risk?		

Worksheet 4.1
 Capability Assessment Worksheet: EVALUATING THEM

Capability Assessment Worksheet

Jurisdiction: Carson City

Local mitigation capabilities are existing authorities, policies, programs, and resources that reduce hazard impacts that could be used to implement hazard mitigation activities. Please complete the tables and questions in the worksheet as completely as possible. Complete one worksheet for each jurisdiction.

Education and Outreach

Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information.

Program/Organization	Yes/No	Describe program/organization and how relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?
Firewise Communities certification		
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Yes	Community Emergency Response Team (CERT)- Yes, outreach/education
Natural disaster or safety related school programs		
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Yes	
Public-private partnership initiatives addressing disaster-related issues		
StormReady certification	Yes	
Public-private partnership initiatives addressing disaster-related issues		
Other		
How can these capabilities be expanded and improved to reduce risk?		

Worksheet 4.1

Capability Assessment Worksheet - 2014/2015

Capability Assessment Worksheet

Jurisdiction: Carson City

Local mitigation capabilities are existing authorities, policies, programs, and resources that reduce hazard impacts or that could be used to implement hazard mitigation activities. Please complete the tables and questions in the worksheet as completely as possible. Complete one worksheet for each jurisdiction.

Financial

Identify whether your jurisdiction has access to or is eligible to use the following funding resources for hazard mitigation.

Funding Resource	Access / Eligibility (Yes/No)	Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions?
Authority to levy taxes for specific purposes	Yes	
Capital Improvement project funding		
Community Development Block Grant	Yes	
Fees for water, sewer, gas, or electric services	Yes	
Impact fees for new development		
Incur debt through general obligation bonds and/or special tax bonds	Yes	
Incur debt through private activities	Yes	
State funding programs	Yes	
Storm water utility fee		
Other federal funding programs	Yes	
Other		
How can these capabilities be expanded and improved to reduce risk?		

Worksheet 4.1

Capability Assessment Worksheet - Planning | 2021 | Hazard Mitigation

Capability Assessment Worksheet

Jurisdiction: Carson City

Local mitigation capabilities are existing authorities, policies, programs, and resources that reduce hazard impacts that could be used to implement hazard mitigation activities. Please complete the tables and questions in the worksheet as completely as possible. Complete one worksheet for each jurisdiction.

Planning and Regulatory

Planning and regulatory capabilities are the plans, policies, codes, and ordinances that prevent and reduce the impacts of hazards. Please indicate which of the following your jurisdiction has in place.

Plans	Yes / No Year	Does the plan address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
Capital Improvements Plan		
Carson City Airport Master Plan 2019 http://carsoncityairportstudy.com/master-plan-documents/	2019	
Carson City Building Code () https://library.municode.com/wv/carson_city/codes/code_of_ordinances	12/2020	
Carson City Community Wildfire Protection Plan https://www.carson.org/home/showDetail?id=94209	(2009)	UPDATE? Other source of information about risk for wildfire?
Carson City Emergency Action Plan (Brunswick Canyon Dam)		
Carson City Emergency Action Plan (Eagle Valley Dam)		
Carson City Emergency Action Plan (Shenandoah Heights Dam)		
Carson City Fire Code https://library.municode.com/wv/carson_city/codes/code_of_ordinances?nodeId=CH1114E	2/2021	
Carson City Hazardous Material Response Plan		
Ash Canyon Sandbag Plan	Yes 2016	
Brunswick Emergency Action Plan	Yes 2019	

4-17

Plans	Yes / No Year	Does the plan address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
Carson City Hazardous Materials Transportation Commodities Study		
Carson City Emergency Operations Plan	Yes 2020	
Carson City Mass Illness Plan		
Comprehensive/Master Plan Carson City Master Plan https://www.carson.org/development/department/community-development/planning-division/master-plan	Yes April 2006	
Carson City Strategic Plan https://www.carson.org/transparency/carson-city-strategy-2020-2025	2021-2025	
Carson City Sandbagging Plan		
Carson City Stormwater Management Plan		
Carson River Geographic Response Plan	Yes 2006	
Carson River Watershed Regional Floodplain Management Plan (Carson Water Subconservancy District) http://www.cwsd.org/wp-content/uploads/2018/11/2018-19-18-REMP-84-Approved-Final.pdf	Yes 2018	
Combs Canyon & Eagle Valley Creek Levees EAP	Yes 2018	
Community Wildfire Protection Plan		
Continuity of Operations Plan		
Economic Development Plan	Yes	

4-18

City of Carson, Nevada

Worksheet 4.1

Capacity Assessment Worksheet - Planning and Resilience

Plans	Yes / No Year	Does the plan address <u>hazards</u> ? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
Goof Canyon Sandbag Plan	Yes 2016	
HazMat Plan	Yes 2020	
H&I-Sandbag Plan	Yes 2016	
Hells Bells Sandbag Plan	Yes 2016	
JAC Transit Development & Coordinated Human Services Plan https://www.carson.org/government/departments-public-works/division/transportation/documents/1	Yes	
King St. Sandbag Plan	Yes 2016	
Local Emergency Operations Plan	Yes	
Pavement Management Plan Fiscal Year 2019-2023 https://www.carson.org/home/showpublisheddocument/174187694	April 2018	Cycle for managing the maintenance of roads managed by the City. Partners with University in pavement engineering. Coordinates with other departments for efficiency and savings. Includes a flexible funding source with matching funds.
Safe routes to School Master Plan https://www.carson.org/government/departments-public-works/division/transportation/documents/1	Yes	
Shenandoah Detention Basin Emergency Action Plan (EAP)	Yes 2017	
Stormwater Management Plan	Yes 2017	
Sustainability in Carson City https://www.carson.org/government/departments-public-works/sustainability		
Threat & Hazard Identification & Risk Assessment	2019	
Transit Asset Management Plan https://www.carson.org/home/showpublisheddocument/183245638747715461870000	October 2018	

A-19

Plans	Yes / No Year	Does the plan address <u>hazards</u> ? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
Transportation Plan		
Voltaire Sandbag Plan	Yes 2016	
Washington Sandbag Plan	Yes 2016	
Wastewater Sandbag Plan	Yes 2016	
Other special plans (e.g., brownfields redevelopment, disaster recovery, coastal zone management, climate change adaptation)		

A-20

Local Resilience Planning Handbook

Worksheet 4.1

Building Code, Permitting, and Inspections	Yes/No	Are codes adequately enforced?
Building Code	Yes	Version/Year:
Building Code Effectiveness Grading Schedule(BCEGS) Score		Score:
Fire department ISO rating		Rating:
Site plan review requirements	Yes	
Land Use Planning and Ordinances	Yes/No	Is the ordinance an effective measure for reducing hazard impacts? Is the ordinance adequately administered and enforced?
Acquisition of land for open space and public recreation uses	Yes	
Floodplain Ordinance	Yes	
Flood insurance rate maps		
Health – Immunization Plan? Other Plan?		
Natural hazard specific ordinance (stormwater, steep slope, wildfire)	Yes	Wildfire
Subdivision ordinance	Yes	
Zoning ordinance	Yes	
How can these capabilities be expanded and improved to reduce risk?		



Q & A

11.0

PUBLIC COMMENTS

12.0



Task Assignments

13.0

Upcoming Meetings

14.0

Meeting 3 & 4

√ **Friday, June 18, 2021, 1:30 to 4:30 p.m.**

- **Fire Station 51**
- 777 South Stewart Street, Carson City
- HMP Planning Team Meeting 3: Rank Mitigation Actions and Strategy and Update Plan Maintenance Process

√ **Thursday, July 22, 2021, 1:30 to 4:30 p.m.**

- **Fire Station 51**
- 777 South Stewart Street, Carson City
- HMP Planning Team Meeting 4: Final review and approval of incorporation of public comment

Thank you, THANK YOU,
Thank you!



Mitigation Goals and Potential Actions

Goals	Action	New or Existing	Description
Goal 1 Promote increased and ongoing Carson City involvement in hazard mitigation planning and projects.	1.A LPR	E	Update the Master Plan to be consistent with the hazard areamaps and implementation strategies developed in the HMP every 10 years. Review & and update ordinances and & code every three 3 years.
	1.B E&O	E	Identify and educate Carson City personnel on high hazard areas.
	1.C P&R	E	Coordinate existing Geographic Information Systems (GIS) capabilities to identify hazards through the City.
	1.D P&R	E	Develop the data sets that are necessary to test hazard scenarios and mitigation tools, including HAZUS MH.
	1.E E&O + P&R	E	Utilize the Internet as a communication tool, as well as an education tool.
	1.F LPR	E	Develop city building codes and ordinances that protect people and structures from drought, earthquake, flood, landslide, severe weather, and wildfire.
	1.G LPR	E	Continue to update the Community Wildfire Plan.
Goal 2 Build and support local capacity to enable the <u>public-community</u> to prepare for, respond to, and recover from disasters.	2.A P&R	E	Develop emergency evacuation programs for neighborhoods inflood prone areas and wildland fire areas.
	2.B LPR	E	Annually review the City's Emergency Operations Plan and identify needed plan updates update and integrate with local Hazard Mitigation Plan.
	2.C P&R	E	Conduct a minimum of one disaster exercise each year.
	2.D E&O	E	Establish a budget and identify funding sources for mitigationoutreach
	2.E E&O	E	Work with school districts to develop a public outreach campaign that teaches children how to avoid danger andbehave during an emergency.
	2.F E&O	E	Utilize Business for Innovative Climate Change (BICEP) to increase awareness and knowledge of hazard mitigation and encourage businesses to develop/implement hazard mitigationactions.
	2.G E&O	E	Prepare, develop, and distribute appropriate public information about hazard mitigation programs and projects at Carson City-sponsored events and on the Carson City's/Fire Department's websites.
	2.H E&O + P&R	N	Create a plan for cybersecurity awareness for employees and residents.
	2.I LPR	N	Develop a cybersecurity risk management plan.
Goal 3	3.A LPR	E	Continue to enforce the International Building Code (IBC) provisions pertaining to grading and construction

Mitigation Goals and Potential Actions

Goals	Action	New or Existing	Description
Reduce the possibility of damage and losses due to earthquakes.	3.B S&I	E	relative to seismic hazards. Update Carson City Codes to IBC 2018 when it is released. Completed the Unreinforced Masonry (URM) building program that determines the structural safety of critical infrastructure and retrofit buildings, if necessary.
	3.C P&R	E	Identify hazard-prone structures through GIS modeling.
	3.D S&I	E	Acquire and install clean agent systems for the City Hall and Public Safety computer rooms to reduce damage to computer <u>equipment</u> .
Goal 4 Reduce the possibility of threat to life and losses due to Infectious Disease.	4.A LPR	E	Update Mass Illness Plan and integrate with local Hazard Mitigation Plan.
	4.B P&R	E	Continuation of training and exercise program relative to epidemics.
	4.C P&R	E	Prepare by acquiring/storing needed medical equipment.
	4.D E&O	E	Maintain a public program for information and education.
	4.E E&O	N	Reduce disparities and inequities in the distribution of infectious disease information during and prior to outbreaks.
	4.F LPR	N	Establish a plan that addresses the development, protection, retention, and resilience of the public health workforce and identifies options for expanding the workforce quickly during a health-related emergency.
Goal 5 Reduce the possibility of damage and losses due to floods.	5.A LPR	E	Identify flood-prone areas using GIS. Identify those community areas that have recurring losses and conduct detailed analysis of the hydrographic basins for planning, update Using GIS, provide a consolidated storm water system Master pPlans, including erosion/sediment transport, and development of project proposals to improve stormwater facilities and reduce flooding.
	5.B LPR	E	Continue to update policies that discourage growth in flood-prone areas.
	5.C LPR	E	Continue to R review and update flood plans that would include for coordination with adjacent counties, cities, and special districts supporting a regional approach to flood control mitigation.
	5.D LPR	E	Update and expand Sandbagging Plan.
	5.E S&I	E	Continue to l install new flood facilities to include improve effectiveness of overall , upgrade the and update existing storm drain systems, to current standards including culverts and channel improvements.

Mitigation Goals and Potential Actions

Goals	Action	New or Existing	Description
	5.F NSP	E	Upon completion of land transfers associated with the Lands Bill which includes land trading with Carson City, BLM, US Forestry, and Washoe Tribe; identify/implement projects within transferred lands and other areas within Carson City that need slope stabilization for flood and landslide mitigation.
	5.G S&I + NSP	E	Design and install facilities to capture debris/sediment within Eagle Valley.
	5.H S&I + NSP	E	Develop a Flood Management Plan for the New Empire Area and install a new flood control facility for the area.
	5.I NSP & S&I	E	Protect and enhance existing municipal water conveyance structures, storage, and treatment facilities to reduce impact from flood.
	5.J S&I + NSP	E	Install a storm water retention detention facility atin Goni Canyon Watershed Creek & Channel-D &and construct a new storm drainage system further downstream alongat Goni Creek.
	5.K	E	Design and install facilities to capture debris/sediment within Eagle Valley.
	5.L S&I	E	Installation of back-up generators for critical infrastructure and facilities.
	5.KM NSP + S&I	E	Land acquisition of buildings with recurring loss or of land which could be used as catch retention basins for flood control projects.
	5.ML LPR	E	Conduct a feasibility study to evaluate options for emergency fuel storage to support critical infrastructure during an extended power outage.
Goal 6 Reduce the possibility of damage and losses due to Severe Weather.	6.A S&I	E	In areas at risk to severe weather, retrofit public buildings to withstand snow loads and severe winds to prevent roof collapse/damage.
	6.B LPR	E	Continue the storm water management plan for snow melt storage.
Goal 7 Reduce the possibility of damage and losses due to terrorist events.	7.A LPR	E	Develop standards for public buildings and high-risk buildings to mitigate impacts from terrorist events.
	7.B LPR	E	Develop planning procedures to cover terrorist events and exercises.
	7.C S&I	E	Retrofit public and high-risk buildings to increase safety and reduce the impact of terrorist events.

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Mitigation Goals and Potential Actions

Goals	Action	New or Existing	Description
Goal 8 <i>Reduce the possibility of damage and losses due to wildland fires.</i>	8.A LPR	E	Continue to identify areas and update and enforce the most current versions of the Urban-Wildland Interface Code.
	8.B LPR	E	Update the Carson City Fire Code and model weed abatement and fuel modification ordinances.
	8.C NSP	E	Continue to conduct current fuel management programs (i.e. weed abatement programs) and investigate and apply new and emerging fuel management techniques.
	8.D E&O	E	Develop a Continue public outreach campaign on the extreme wildland fire dangers and steps that can be taken to reduce these dangers.
	8.E NSP + E&O	E	Continue to build the community-based vegetation management program. Develop partnerships for a community-based vegetation management program including chipping programs.
	8.F NSP & E&O	N	Expand the community-based vegetation management program.
	8.G E&O	E	Continue to u Utilize GIS and the internet as information tools.
	8.H P&R	E	Establish Maintain the continuing wildland fire technical working group.
	8.I NSP + S&I	E	Continue to p Protect municipal water recharge zones from wildfires and flooding by stabilizing upper watershed slopes.
	8.J	E	Retrofit buildings (public and private) to reduce the risk of wild fire in Lakeview, Pinyon Hills, Kings Canyon, Voltaire Canyon and Timberlake Canyon. Not implemented/No longer relevant
Goal 9 <i>Reduce the possibility of damage and losses due to drought.</i>	9.A NSP + S&I	E	Watershed stabilization and recharge program to maximize the use of surface sources when available and preserving the groundwater sources for system peaking needs and times of drought.
	9.B E&O + LPR	E	Encourage public participation in drought strategies through public information programs on water conservation and drought resistant landscaping and through building code ordinances.
Goal 10 <i>Reduce the possibility of damage and losses due to landslide.</i>	10.A NSP	E	Evaluate natural slopes to determine if there are slope stabilization treatments that would be appropriate to prevent landslides.
	10.B S&I	E	Conduct slope stabilization projects to prevent landslides.
Goal 11	11.A LPR	E	Review building codes and zoning ordinances to reduce public health risks from hazardous materials releases.

Preparedness & Response: P&R |
Natural Systems Protection: NSP
Local Plans & Regulations: LPR
Structure & Infrastructure: S&I
Education & Outreach: E&O

Mitigation Goals and Potential Actions

Goals	Action	New or Existing	Description
<i>Reduce the possibility of damage and losses due to hazardous materials.</i>			

Worksheet 4.1

Capability Assessment Worksheet – Administrative and Technical

Capability Assessment Worksheet

Jurisdiction: Carson City

Local mitigation capabilities are existing authorities, policies, programs, and resources that reduce hazard impacts or that could be used to implement hazard mitigation activities. Please complete the tables and questions in the worksheet as completely as possible. Complete one worksheet for each jurisdiction.

Administrative and Technical

Identify whether your community has the following administrative and technical capabilities. These include staff and their skills and tools that can be used for mitigation planning and to implement specific mitigation actions. For smaller jurisdictions without local staff resources, if there are public resources at the next higher level government that can provide technical assistance, indicate so in your comments.

Administration	Yes/No	Describe capability. Is coordination effective?
Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)		
Mitigation Planning Committee	Yes	
Mutual aid agreements	Yes	Quad County – Very effective for all hazards identified
Planning Commission		
Regional Transportation Commission	Yes	

Worksheet 4.1

Capability Assessment Worksheet – Administrative and Technical

Staff	Yes/No FT/PT ¹	Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?
Chief Building Official	Yes FT	
Civil Engineer	Yes FT	
Community Planner	Yes FT	
Emergency Manager	Yes FT	
Fiscal Management	Yes FT	
Floodplain Administrator	Yes FT	
GIS Coordinator	Yes FT	
Digital Media Coordinator	Yes FT	
Health Director	Yes FT	
School District Chair		
Sheriff	Yes FT	
Transportation Manager		
Other		

¹ Full-time (FT) or part-time (PT) position

Technical	Yes/No	Describe capability Has capability been used to assess/mitigate risk in the past?
Grant writing	Yes	
Hazard data and information		
Hazard analysis	Yes	
Warning systems/services (Reverse 911, outdoor warning signals)		
Other		
How can these capabilities be expanded and improved to reduce risk?		

Worksheet 4.1

Capability Assessment Worksheet

Education and Outreach

Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information.

Program/Organization	Yes/No	Describe program/organization and how relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?
Firewise Communities certification		
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Yes	Community Emergency Response Team (CERT)- Yes, outreach/education
Natural disaster or safety related school programs		
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Yes	
Public-private partnership initiatives addressing disaster-related issues		
StormReady certification	Yes	
Public-private partnership initiatives addressing disaster-related issues		
Other		
How can these capabilities be expanded and improved to reduce risk?		

Capability Assessment Worksheet

Jurisdiction: Carson City

Local mitigation capabilities are existing authorities, policies, programs, and resources that reduce hazard impacts or that could be used to implement hazard mitigation activities. Please complete the tables and questions in the worksheet as completely as possible. Complete one worksheet for each jurisdiction.

Education and Outreach

Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information.

Program/Organization	Yes/No	Describe program/organization and how relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?
Firewise Communities certification		
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Yes	Community Emergency Response Team (CERT)- Yes, outreach/education
Natural disaster or safety related school programs		
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Yes	
Public-private partnership initiatives addressing disaster-related issues		
StormReady certification	Yes	
Public-private partnership initiatives addressing disaster-related issues		
Other		

How can these capabilities be expanded and improved to reduce risk?

Capability Assessment Worksheet

Jurisdiction: Carson City

Local mitigation capabilities are existing authorities, policies, programs, and resources that reduce hazard impacts or that could be used to implement hazard mitigation activities. Please complete the tables and questions in the worksheet as completely as possible. Complete one worksheet for each jurisdiction.

Financial

Identify whether your jurisdiction has access to or is eligible to use the following funding resources for hazard mitigation.

Funding Resource	Access / Eligibility (Yes/No)	Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions?
Authority to levy taxes for specific purposes	Yes	
Capital Improvement project funding		
Community Development Block Grant	Yes	
Fees for water, sewer, gas, or electric services	Yes	
Impact fees for new development		
Incur debt through general obligation bonds and/or special tax bonds	Yes	
Incur debt through private activities	Yes	
State funding programs	Yes	
Storm water utility fee		
Other federal funding programs	Yes	
Other		

How can these capabilities be expanded and improved to reduce risk?

Capability Assessment Worksheet

Jurisdiction: Carson City

Local mitigation capabilities are existing authorities, policies, programs, and resources that reduce hazard impacts or that could be used to implement hazard mitigation activities. Please complete the tables and questions in the worksheet as completely as possible. Complete one worksheet for each jurisdiction.

Planning and Regulatory

Planning and regulatory capabilities are the plans, policies, codes, and ordinances that prevent and reduce the impacts of hazards. Please indicate which of the following your jurisdiction has in place.

Plans	Yes / No Year	Does the plan address hazards?
		Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
Capital Improvements Plan		
Carson City Airport Master Plan 2019 http://carsoncity.airportstudy.com/master-plan-documents/	2019	
Carson City Building Code () https://library.municode.com/nv/carson_city/codes/code_of_ordinances	12/2020	
Carson City Community Wildfire Protection Plan https://www.carson.org/home/showpublisheddocument?id=21209	(2009)	UPDATE? Other source of information about risk for wildfire?
Carson City Emergency Action Plan (Brunswick Canyon Dam)		
Carson City Emergency Action Plan (Eagle Valley Dam)		
Carson City Emergency Action Plan (Shenandoah Heights Dam)		
Carson City Fire Code https://library.municode.com/nv/carson_city/codes/code_of_ordinances?nodeId=TIT14F	2/2021	
Carson City Hazardous Material Response Plan		
Ash Canyon Sandbag Plan	Yes 2016	
Brunswick Emergency Action Plan	Yes 2019	

Plans	Yes / No Year	Does the plan address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
Carson City Hazardous Materials Transportation Commodities Study		
Carson City Emergency Operations Plan	Yes 2020	
Carson City Mass Illness Plan		
Comprehensive/Master Plan Carson City Master Plan https://www.carson.org/government/departments-and-community-development/planning-division/master-plan	Yes April 2006	
Carson City Strategic Plan https://www.carson.org/transparency/carson-city-strategic-plan-draft	2021- 2025	
Carson City Sandbagging Plan		
Carson City Stormwater Management Plan		
Carson River Geographic Response Plan	Yes 2006	
Carson River Watershed Regional Floodplain Management Plan (Carson Water Subconservancy District) http://www.cwsd.org/wp-content/uploads/2018/10/2018-10-18-RFMP-Bd-Approved-Final.pdf	Yes 2018	
Combs Canyon & Eagle Valley Creek Levees EAP	Yes 2018	
Community Wildfire Protection Plan		
Continuity of Operations Plan		
Economic Development Plan	Yes	

Plans	Yes / No Year	Does the plan address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
Goni Canyon Sandbag Plan	Yes 2016	
HazMat Plan	Yes 2020	
H&I-Sandbag Plan	Yes 2016	
Hells Bells Sandbag Plan	Yes 2016	
JAC Transit Development & Coordinated Human Services Plan https://www.carson.org/government/departments-g-z/public-works/transportation/documents1	Yes	
King St. Sandbag Plan	Yes 2016	
Local Emergency Operations Plan	Yes	
Pavement Management Plan Fiscal Year 2019-2023 https://www.carson.org/home/showpublisheddocument?id=67694	April 2018	Cycle for managing the maintenance of roads managed by the City. Partners with University in pavement engineering. Coordinates with other departments for efficiency and savings. Includes a flexible funding source with matching funds.
Safe routes to School Master Plan https://www.carson.org/government/departments-g-z/public-works/transportation/documents1	Yes	
Shenandoah Detention Basin Emergency Action Plan (EAP)	Yes 2017	
Stormwater Management Plan	Yes 2017	
Sustainability in Carson City https://www.carson.org/government/departments-g-z/public-works/sustainability		
Threat & Hazard Identification & Risk Assessment	2019	
Transit Asset Management Plan https://www.carson.org/home/showpublisheddocument/63245/636747717461670000	October 2018	

Plans	Yes / No Year	Does the plan address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
Transportation Plan		
Voltaire Sandbag Plan	Yes 2016	
Washington Sandbag Plan	Yes 2016	
Wastewater Sandbag Plan	Yes 2016	
Other special plans (e.g., brownfields redevelopment, disaster recovery, coastal zone management, climate change adaptation)		

Building Code, Permitting, and Inspections	Yes/No	Are codes adequately enforced?
Building Code	Yes	Version/Year:
Building Code Effectiveness Grading Schedule(BCEGS) Score		Score:
Fire department ISO rating		Rating:
Site plan review requirements	Yes	
Land Use Planning and Ordinances	Yes/No	Is the ordinance an effective measure for reducing hazard impacts? Is the ordinance adequately administered and enforced?
Acquisition of land for open space and public recreation uses	Yes	
Floodplain Ordinance	Yes	
Flood insurance rate maps		
Health – Immunization Plan? Other Plan?		
Natural hazard specific ordinance (stormwater, steep slope, wildfire)	Yes	Wildfire
Subdivision ordinance	Yes	
Zoning ordinance	Yes	
How can these capabilities be expanded and improved to reduce risk?		

Appendix A: Meeting Notes and Handouts

- Meeting 3

**May 21 & 22 Meetings 3.0 and 3.5
Planning Team Invitation
Sent June 9, 2021**

naaker@carson.org; elizabeth.breeden@nvenergy.com; acyr@carson.k12.nv.us; jdanen@carson.org; KEcheverria@washoecounty.us; rfellows@carson.org; dfogerson@dps.state.nv.us; jmfreeman@carson.org; kfurlong@carson.org; shicks@carson.org; ahummel@carson.org; tjesse@carson.org; nmerritt@carson.org; taryn.peirce@carsontahoe.org; rrice@carson.org; druben@carson.org; rrummel@carson.org; lschuetter@carson.org; dschulz@carson.org; jocelyn.seemann@redcross.org; sslamon@carson.org; chris.smallcomb@noaa.gov; carsoncitysr1@gmail.com; DStucky@carson.org; HSullivan@carson.org; jtushbant@carson.org; junderwood@carson.org; swartgow@carson.org; jerry@991fmtalk.com; keith.forbes@agri.state.nv.us; alowe@carson.org; pk.oneill@asm.state.nv.us; craig.robinson@wnc.edu; mark.stearns@usw.salvationarmy.org; dyohey@chromalloy.com; rschneider@carson.org; Elizabeth Ashby <eashby@roanderson.com>; Kate Cunningham <kcunningham@roanderson.com>; Eric T. Herron <eherron@roanderson.com>; Marie A. Hulse <mhulse@roanderson.com>; Keith E. Ruben <kruben@roanderson.com>; Kenneth A. Quiner <Kenneth.Quiner@washoetribe.us>

Greetings Planning Team,

The **June 18 Planning Team meeting** has been **cancelled** and **rescheduled** as **TWO** meetings the following week.

New Location: Ormsby Room, Carson City Sheriff's Office, 911 East Musser Street, Carson city

New Time: MONDAY: June 21, 2021—1:30 to 3:30 & TUESDAY: June 22, 2021—1:30 to 3:30

We have 50+ mitigation actions to review and rank—and your participation is essential!

At these meetings, we will gather information needed for the required Benefit vs. Cost review—and rank the mitigation action items. We will also discuss updates to the Plan Maintenance Process. The full agenda and handouts will be distributed on or before June 15.

Please RSVP to kcunningham@roanderson.com. Zoom access is available upon request.

We appreciate your participation and look forward to seeing you then.

Elizabeth, Marie, and Kate



Carson City 2021 Hazard Mitigation Plan Update
 Planning Team Meeting 3: June 21, 2021
 Sign-in-Sheet



Name	Firm/Agency	Phone Number	Email
Kelly Echeverria	WCEM	775-399-4811	KEcheverria@washocounty.gov
JIM WALKER	NDOT	775-888-7837	jlwalker@dot.nv.gov
Nancy Merritt	CCFD	775-721-0142	nmerritt@carson.org
Scott O'Brien	CCFD	775-530-2010	so'Brien@carson.org
Andy Hummel	CCPW	775-283-7357	ahummel@carson.org
Craig Robinson	WN College / NSTATE	775-445-4222	craig.robinson@wnc.edu
DAN STUCKY	CCPW	775-283-7084	dstucky@carson.org
Zachael Schneider	city	775 400 5162	rschneider@carson.org
Robb Fellows	CCPW	775 283 7370	RFellows@carson.org
HOPE SULLIVAN	CITY	283-7922	HSULLIVAN@CARSON.ORG
Lisa Schuette	BOS	671-2413	lschuette@carson.org
JASON DOWEN	CCFD	790-3288	JDowen@coSoling



AGENDA



Carson City 2021 Hazard Mitigation Plan Update

Meeting 3: Public Workshop & HMP Planning Team Meeting

1:30 to 3:30 pm, Monday, June 21, 2021

Ormsby Room, Carson City Sheriff's Office, 911 East Musser Street, Carson City

In-person meeting

- 1.0 Introductions (Discussion). 10 mins.
- 2.0 2021 Hazard Mitigation Plan Update, Section 3: Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson. 15 mins.
- 3.0 2021 Hazard Mitigation Plan Update, Section 4.6: Plan Maintenance Process, Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson. 15 mins.
- 4.0 2021 Hazard Mitigation Plan Update, Section 5: Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson. 15 mins.
- 5.0 Carson City Assets: Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson. 15 mins.
- 6.0 Vulnerability/Exposure: Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson. 15 mins.
- 7.0 Future Growth Vulnerability/Exposure: Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson. 15 mins.
- 8.0 Discussion of Vulnerability Analysis and Review of Current Mitigation Actions. Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson. 15 mins.
- 9.0 Questions and Answers (Q & A) (Discussion Only) – 10 mins.
- 10.0 **Public Comment.** No action may be taken upon a matter raised under this item of the agenda until the matter is specifically included on an agenda as an action item. Public comments may be limited to three minutes per person. Comments will not be restricted based on viewpoint. **10 mins.**



AGENDA



Carson City 2021 Hazard Mitigation Plan Update

11.0 Task Assignments. 10 mins.

12.0 Upcoming Meetings: WORKSHOP SCHEDULE (Discussion Only)

- **Meeting 3.5: Benefit-Cost Analysis & Ranking Mitigation Action Items**

Tuesday, June 22, 2021, 1:30 to 3:30

Ormsby Room

Carson City Sheriff's Office

911 East Musser Street, Carson City

- **Meeting 4: HMP Planning Team Meeting 4: Final Review and Approval of Incorporation of Public Comment**

Thursday, July 22, 2021, 1:30 to 4:30 p.m.

Fire Station 51

777 South Stewart Street, Carson City

This agenda was posted or caused to be posted on June 16, 2021, at the following locations.

- Carson City Online: carson.org/hazardplan
- Physical Locations: Carson City Sheriff's Office (911 East Musser Street, Carson City, NV), Carson City, City Hall (201 N. Carson Street, Carson City, NV) and Fire Station 51 (777 South Stewart Street, Carson City, NV).

We are pleased to make reasonable accommodations for members of the public who have disability or access requirements. Please contact Nancy Merritt, Administrative Support, Carson City Fire Department, 777 S. Stewart St., Carson City, NV. 89701, 775-283-7947, nmerritt@carson.org.



Meeting 3.0 Outcomes

Carson City 2021 Hazard Mitigation Plan Update



Thursday, July 22, 2021, 1:30 to 4:30 p.m.
Fire Station 51
777 South Stewart Street, Carson City



Meeting 3.0 Outcomes

Carson City 2021 Hazard Mitigation Plan Update



Meeting 3: Public Workshop & HMP Planning Team Meeting

1:30 to 3:30 pm, Monday, June 21, 2021

Ormsby Room, Carson City Sheriff's Office, 911 East Musser Street, Carson City
In-person meeting

1.0 Introductions (Discussion). 10 mins

Planning Team members introduced themselves by name, title, and agency.

2.0 2021 Hazard Mitigation Plan Update, Section 3: Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson. 15 mins.

ROA presented changes to Section 3: Community Profile and explained the need to align all data in the plan with the same approach—which relies on Vintage 2019 data for population estimates. The PT members accepted the information without questions—but a vote was not taken.

3.0 2021 Hazard Mitigation Plan Update, Section 4.6: Plan Maintenance Process, Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson. 15 mins.

ROA presented a proposed Mitigation Action Timeline/Schedule for inclusion in the Plan Maintenance discussion under Section 4.6. The attendees did not object to the use of a schedule—and understood that modifications can be made to the proposed dates as well as meeting intervals. A vote for approval was not taken for this item.

4.0 2021 Hazard Mitigation Plan Update, Section 5: Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson. 15 mins.

Section 5: Hazard Profiles had been circulated to the Planning Team for review and comments. To provide additional context for their review, comments from the survey completed in May were presented for their consideration. In addition, the organization of each hazard profile was previewed to note the consistency across all hazards established by consistent categories for discussion and analysis. A vote for approval was not taken at the meeting.

5.0 Carson City Assets: Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson. 15 mins.

Additional asset data gathered since the previous meeting was presented. Discussion focused on identifying missing information and the source/s for obtaining needed information. The Critical Facility Map (not distributed publicly) was presented to the PT members present along with Population data based on 2010 Census Block Data and 2019 Vintage Data. A vote for approval was not taken for this item.

6.0 Vulnerability/Exposure: Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson. 15 mins.

This section identified the need for best available data and the potential sources for the data (as collected to date and/or as needed). Under this section of the agenda, ROA presented six additional mitigation action items to consider including in the 2021 HMP. Discussion went on to discuss the



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Carson City 2021 Hazard Mitigation Plan Update



vulnerability for population and structures for high hazards including earthquake, flood, wildfire, hazardous materials, landslides, and severe weather. Hazards with 100% vulnerability for both population and structures were presented together. Two hazards (avalanche and volcano) were noted as having low planning significance. A vulnerability analysis will not be provided for these low risk hazards. A vote for approval was not taken for this item.

7.0 Future Growth Vulnerability/Exposure: Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson. 15 mins.

In this section of the presentation, ROA presented vulnerability considerations for future development. Properties in the current Master Plan were discussed. Hope Sullivan, Community Development Director, noted that Tyler Jesse, Carson City Assessor, has provided sufficient information to determine the vulnerability of future growth.

8.0 Discussion of Vulnerability Analysis and Review of Current Mitigation Actions. Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson. 15 mins.

Under this item, the ROA Team introduced the ranking criteria for prioritizing mitigation action items. The PT members had questions and ideas about how to streamline the process and adjust the criteria to best fit the Carson City HMP. Feedback from the PT was used to revise the criteria in advance of Meeting 3.5. The PT also reviewed the proposed new mitigation action items. Three of the four items were approved for inclusion in the 2021 HMP.

9.0 Questions and Answers (Q & A) (Discussion Only) – 10 mins.

No additional questions were raised.

10.0 Public Comment. No action may be taken upon a matter raised under this item of the agenda until the matter is specifically included on an agenda as an action item. Public comments may be limited to three minutes per person. Comments will not be restricted based on viewpoint. **10 mins.** *Members of the public were not present at the time of public comment (had left the Zoom meeting).*

11.0 Task Assignments. *None assigned.*

12.0 Upcoming Meetings: WORKSHOP SCHEDULE (Discussion Only)

- **Meeting 3.5: Benefit-Cost Analysis & Ranking Mitigation Action Items**

Tuesday, June 22, 2021, 1:30 to 3:30

Ormsby Room

Carson City Sheriff's Office

911 East Musser Street, Carson City



Meeting 3.0 Outcomes

Carson City 2021 Hazard Mitigation Plan Update



- **Meeting 4: HMP Planning Team Meeting 4: Final Review and Approval of Incorporation of Public Comment**

Thursday, July 22, 2021, 1:30 to 4:30 p.m.
Fire Station 51
777 South Stewart Street, Carson City



Carson City Hazard Mitigation Plan Update

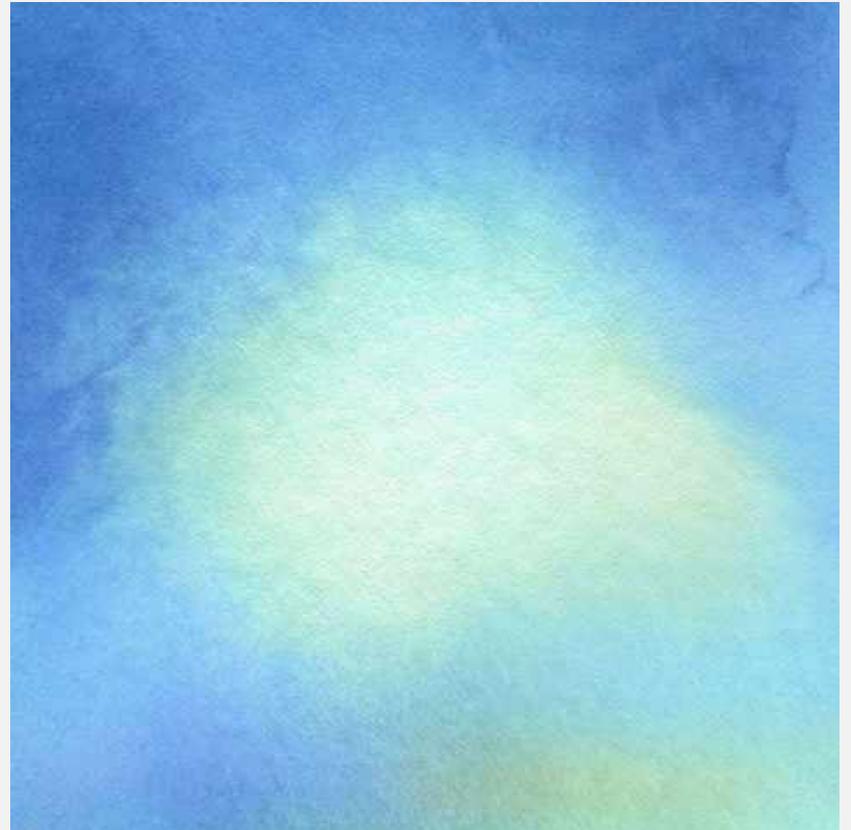
PLANNING TEAM

HOUSEKEEPING

Bathrooms

Emergency Exits

Breaks



Introductions

- Name
- Title
- Organization

Section 3 Community Profile

Review Changes

Final Approval

Changes to Section 3: Community Profile

3.4 Demographics

Information in this section comes from Carson City's Comprehensive Annual Financial Report (CAFR). Sections 3.5 Employment, 3.6 Economics, and 3.7 Housing also rely on information from the CAFR.¹¹ ~~As of~~Based on Vintage 2019 data June 30, 2020, the population of Carson City was 55,916 in 2019 (as of July 1, 2019), an increase of 1.2% since the 2010 Census.¹²~~56,057~~

~~According to the U.S. Census Bureau, the population growth rate in Nevada was one of the highest in the nation, ranking second in 2019. Carson City's population increased 1.1% from July 1, 2019 to July 1, 2020.~~The following data is taken from the U.S. Census Bureau's Quick Facts for Carson City as of July 1, 2019¹³ and reflects estimates based on Vintage 2019 data.¹⁴

~~The majority of the population, 53.4%, falls between the ages of 18 and 65 years, and the majority of the citizens are male, 51%. Over 66% of the population is White followed by 24.8% Hispanic, 2.9% American Indian, and 2.4% Black/African American. The median household income is \$55,718 (2019); the per capita income over the last 12 months (in 2019 dollars) is 12.2%. Over ninety percent of residents 25 years and older have a high school (or higher) level of education. Over eighty-two percent of residents 25 years and older have a bachelor's degree.~~

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Section 4.6: Plan Maintenance

Review, Update, Finalize

Proposed Mitigation Action Timeline/Schedule

Proposed Schedule	Year 1	Year 2	Year 3	Year 4	Year 5
Annual PT Meeting	~	11/2022	11/2023	11/2024	11/2024
Collect Public Input Forms*	~	9/2022	9/2023	9/2024	9/2024
Collect Mitigation Action Updates	~	9/2022	9/2023	9/2024	9/2024
Present Mitigation Action Updates	~	11/2022	11/2023	11/2024	11/2024
Present Mitigation Action Results	~	~	11/2023	11/2024	11/2024
Present Results to BOS	~	01/2022	01/2023	01/2024	01/2025
Annual Report to City Mgr	03/2022	03/2023	03/2024	03/2025	HMP Update
Draft RFP for 2025 Update**	~	~	06/2023	~	~
Circulate RFP**	~	~	10/2023	~	~
Initiate 2025 Update efforts	~	~	~	01/2024	~
*Present comments at annual meeting					
**These items do not apply if the City chooses to complete the update independently.					

Section 5: Hazard Profiles

Format

Comments from the Survey

How have the hazards listed in the table impacted you in the last five years?

“Acts of violence and issues with infectious diseases. . .”

“Drought: Watering restrictions, increased wildfire risk. . .”

“Drought: Higher water prices.”

“Wildland Fire: Poor air quality for much of the summer.”

“[Costly] damage caused to me personally through windstorm damage and cybersecurity breach. . .”

“Severe weather: damage to our home and garden due to intense thunderstorms.”

Hazard Profiles (11 Hazards)

5.2.11 Severe Weather

5.2.11.1 Planning Significance – High

5.2.11.2 Hazard/Problem Description

5.2.11.3 Location and Extent

5.2.11.4 Previous Occurrences

5.2.11.5 Probability of Future Events

5.2.11.6 Future Frequency of Events Due to Climate Change

5.2.11.7 Cascading Hazards

5.2.11.8 Utility Loss

Asset Inventory

Number of Facilities by Type

Assets

Land Use_Group	Parcel Sum	Value	Content Value	Total Value
Vacant Total	1424	\$28,623,687	\$14,311,844	\$42,935,531
Single Family Total	16212	\$2,034,692,450	\$1,017,346,225	\$3,052,038,675
Multi residential Total	870	\$234,061,421	\$117,030,711	\$351,092,132
Commercial Total	1325	\$692,266,164	\$346,133,082	\$1,038,399,246
Industrial Total	205	\$138,645,052	\$69,322,526	\$207,967,578
Rural Total	96	\$4,650,302	\$2,325,151	\$6,975,453
Utilities Total	52	\$269,361	\$134,681	\$404,042
Public Use Total	56	\$68,038,798	\$34,019,399	\$102,058,197
Grand Total	20240	\$3,201,247,235	\$1,600,623,618	\$4,801,870,853

Asset by Type of Facility		
Facility Type	Description	Number
Essential	Hospitals	1
	Urgent Care & Medical Clinics	4
	Police stations	1
	Fire station	4
	Emergency Operations Centers	1
	Schools/Shelters ALL 13?	13
	City Government	8
	State Government	10
Hazardous Material	Hazardous material sites	102
High Potential Loss	Power plants	0
	Dams/levees	2
	Military installations	1
Utility Lifeline	Water facilities	15
	Water Treatment Facilities	1
	Wastewater facilities	2
	Natural gas facilities and pipelines	
	Oil facilities and pipelines	
	Communication facilities	?
Transportation	Highways/Roads - in process	
	Bridges 34	
	Tunnels	
	Railroads and facilities	
	Bus facilities	
	Airports	1
	Museums	3
Cultural	Historical	1
	Cemeteries (1=Pet Cemetery)	5
Recreational	Parks	22
	Trails	15
	Sports Complex	3
	Open Space Areas	18
Residential		17802
Commercial		1325
		19360

Critical Facility Map

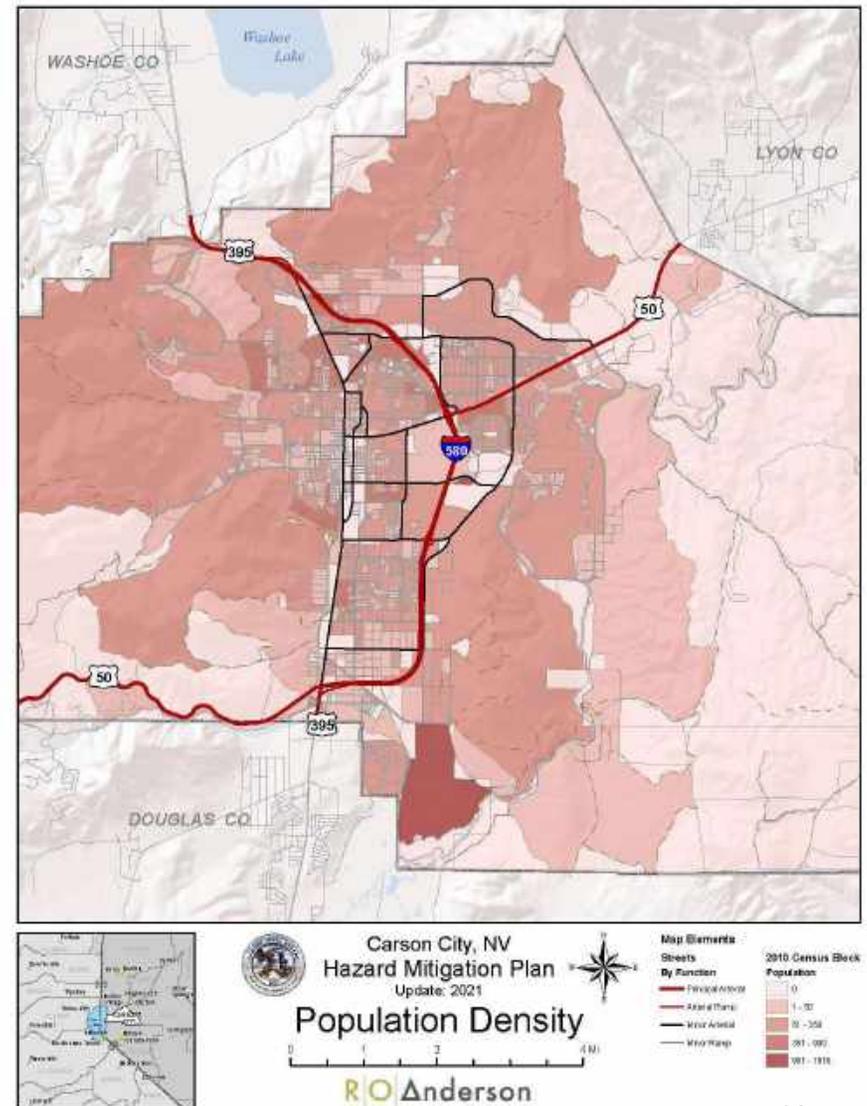
- Not included in plan for safety reasons

MAP REMOVED FROM THIS DOCUMENT

Population

2010 Census Block Data + 2019 Vintage Data

Vintage Data calculated by US Census Bureau by: Adding births, deducting deaths, including projected immigration



Vulnerability

Data, data, data

1. Best available data
 - a) Assessor's data for building replacement value (BRV)
 - b) 50% of BRV = Content Values
 - c) Critical facilities
 - d) Infrastructure
2. Hazard risk data
 - a) Wildfire USFS
 - b) Earthquake USGS
 - c) Flood FEMA
 - d) Hazardous Materials Carson City

1. Other Hazards
 - a) Severe Weather
 - b) Drought
 - c) Etc.
2. Gaps in data
 - ✓ Landslide Risk





Consider new mitigation actions

- Incorporate the HMP Update process to the City's Strategic Plan.
- Establish a process to determine losses avoided
- Add the HMP update duties to job descriptions for the PT members with responsibility to implement strategy
- Gathering data related to City's critical assets to determine specific actions for reduction of impact from natural hazards
- Train GIS staff in the FEMA HAZUS Software (Travel)
- Develop a Recovery Plan

Earthquake Vulnerability

1. Earthquake Risk (HAZUS) • MAP GOES HERE
2. Overlay assets (HAZUS)
3. Determine exposure
 - Structures # & Value (structure & content)
 - Population
 - Economic?

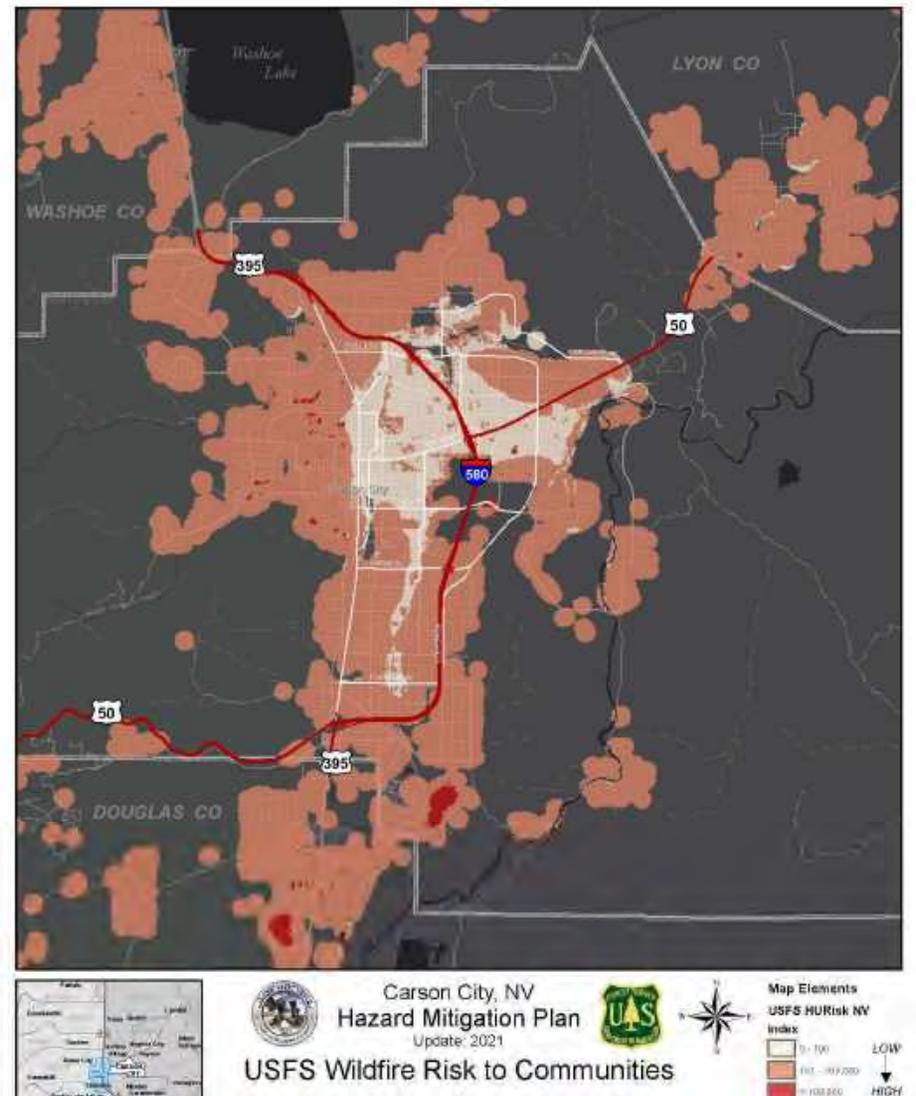
Flood Vulnerability

- Flood Risk (HAZUS)
- Overlay assets (HAZUS)
- Determine exposure
 - Population #
 - Economic?
 - Structure # & Value (structure & content)



Wildfire Risk

USFS HURisk index integrating likelihood, intensity, susceptibility, and exposure on structure unit density



Wildfire Vulnerability Population

(Hazard Risk = High, Med, Low)

1. Overlay assets
 - Population
2. Determine exposure
 - #

Population Exposure

Using Mean # of pixels of the hazard per census block to determine the Low, Medium, High risk

MEAN Category	Pop10
LOW Total	14000
MEDIUM Total	39974
HIGH Total	1293
Grand Total	55267

Wildfire Vulnerability Structures

(Hazard Risk = High, Med, Low)

1. Overlay assets
 - Structures (Assessor data)
2. Determine exposure
 - # & Value (structure)
 - Content will be calculated @ 50% of structure value (FEMA default)

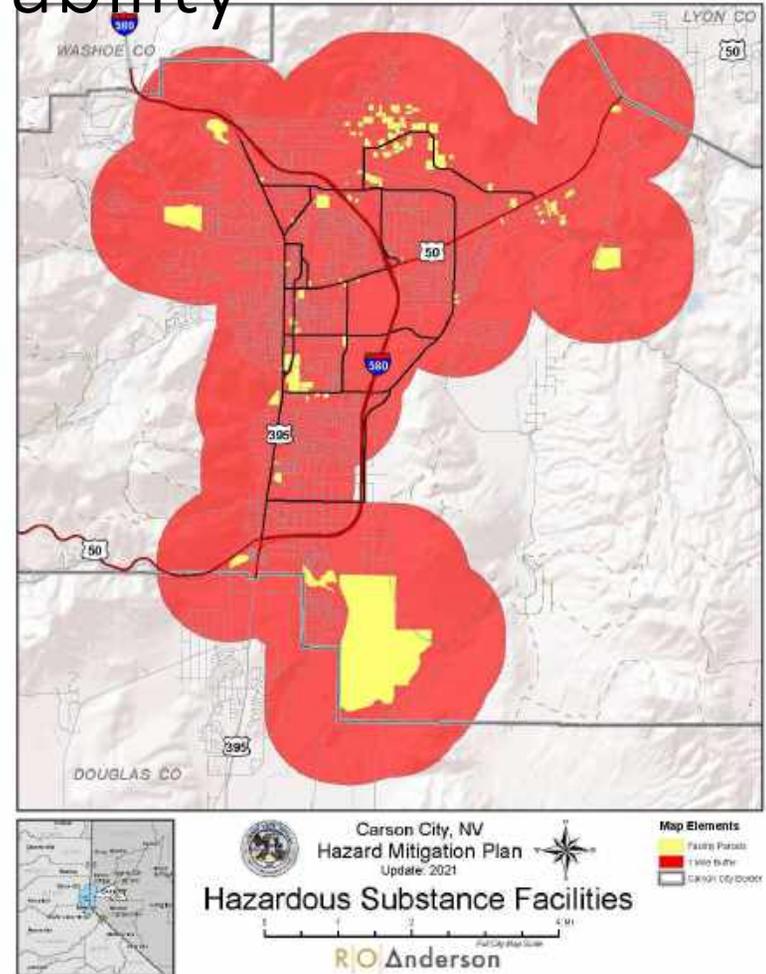
Structure Exposure

Using Mean # of pixels of the hazard per parcel to determine the Low, Medium, High risk

MEAN Category	Building_Value	S
LOW Total	\$595,505,959	
MEDIUM Total	\$2,019,857,238	
HIGH Total	\$5,922,584	
Grand Total	\$2,621,285,781	

Hazardous Materials Vulnerability

1. 1 Mile radius
2. Overlay assets
 - Population
 - Structures (Assessor data)
3. Determine exposure
 - # & Value (structure & content)



Landslide Vulnerability



Severe Weather Vulnerability

- Severe Weather
 - Thunderstorms
 - Hailstorms
 - Tornadoes
 - Downburst Winds
 - Downslope winds
 - Winter Storms
- Structures 100%
- Population 100%

Other Hazards Vulnerability

- Acts of Violence
- Infectious Disease
- Drought
- Climate Change
- Structures 100%
- Population 100%
- Avalanche & Volcano  Low planning significance

Future Growth Vulnerability

Future Growth Earthquake Vulnerability

Overlay only areas designated
as future development

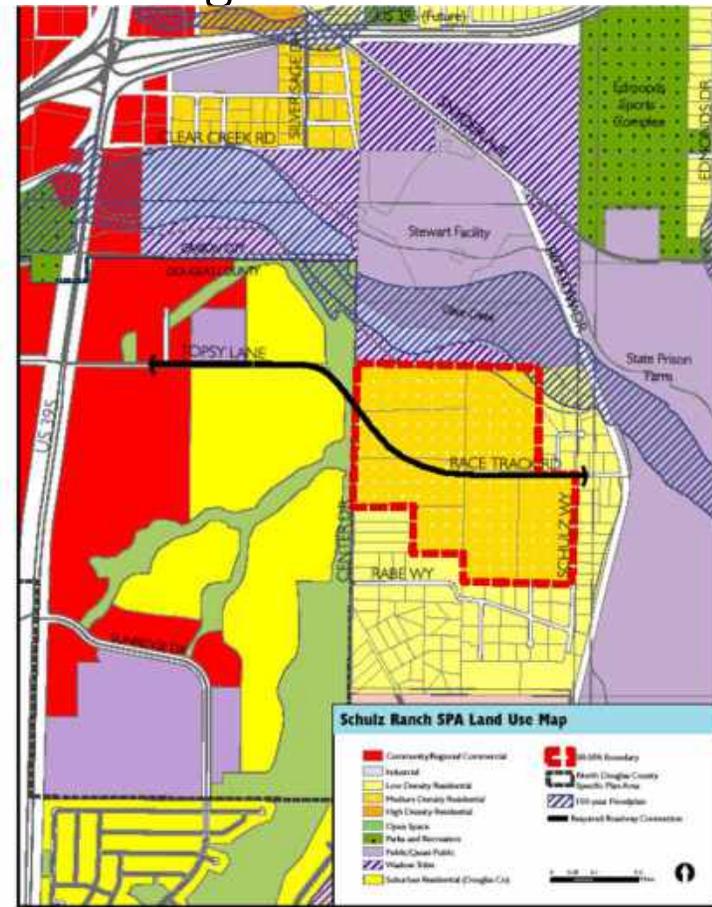
Value of assets?

Population?

Schultz Ranch – Specific Planning Area



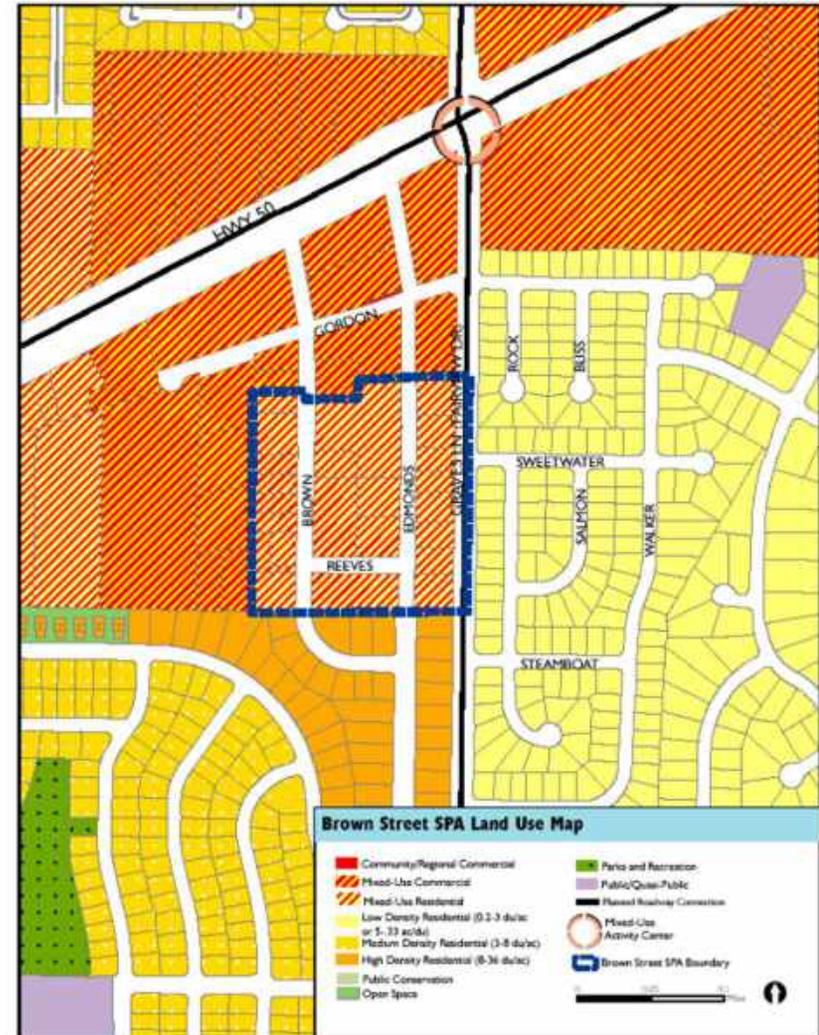
The SR-SPA is located south of the City's existing urbanized area between Bigelow Drive and Center Street, as identified on the map on the map above.



Brown St.



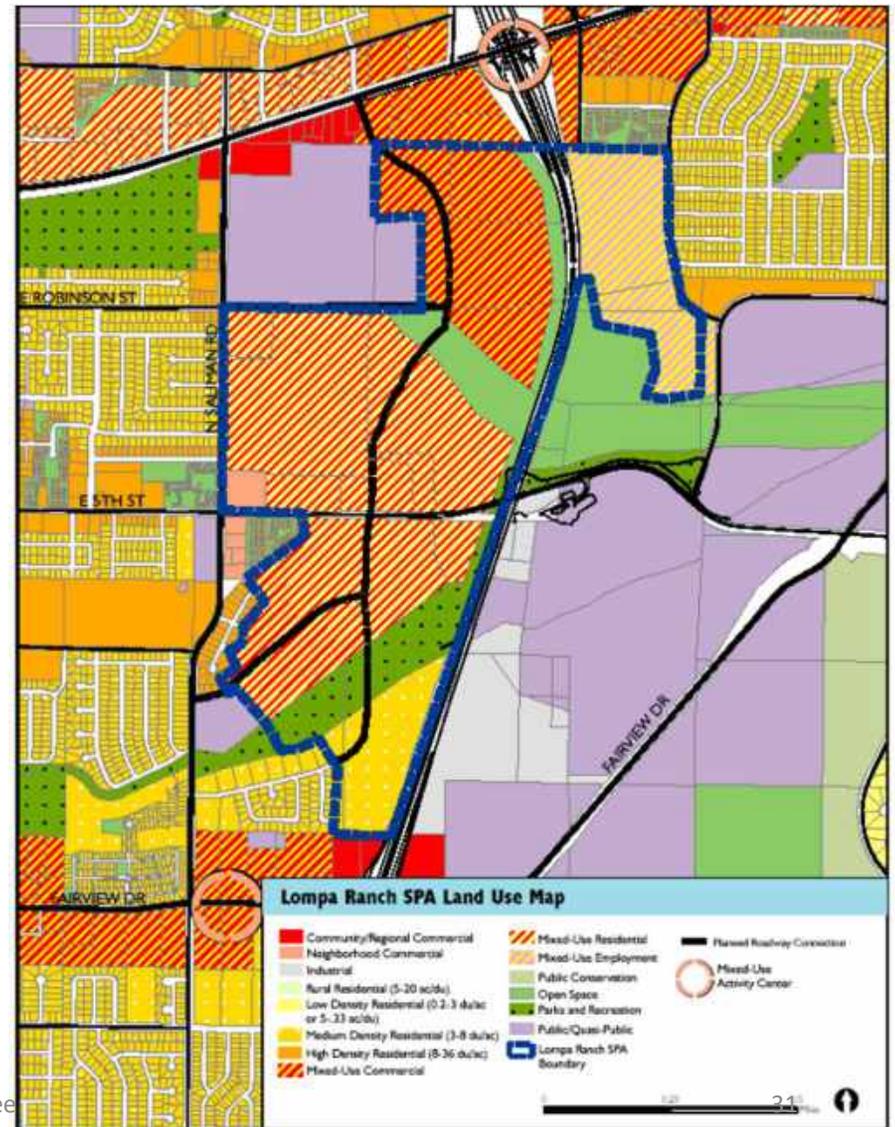
The Brown Street Specific Plan Area is located southwest of the Highway 50 East/Graves Lane (Fairview) intersection, as defined on



Lompa Ranch



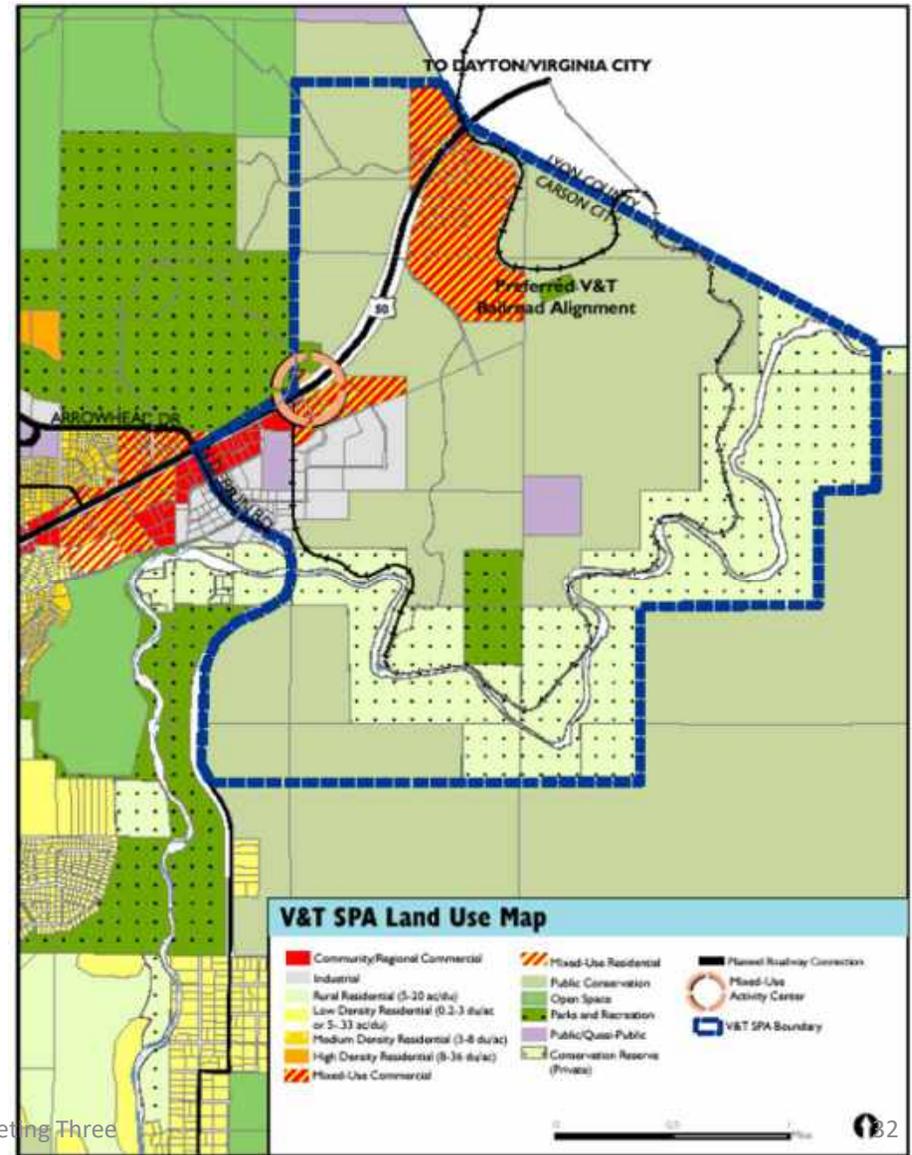
The Lompa Ranch Specific Plan Area is located south of Highway 50 and north of Fairview Drive, as defined on the map above. The



Eastern Portal



The Eastern Portal—Virginia & Truckee Railroad Gateway Specific Plan Area is located along Highway 50 east at the Lyon County line, as



Add Mitigation Actions by goal

- Will review tomorrow!

Capability Assessment & Integration

Virtual voting to follow

Integration stuff

- Several mitigation actions are integrated into existing plans and policies with current support from the community and government leaders.
 1. the open space action (#XXXX)
 2. the NFIP participation with CRS rating (#XXXX)
 3. Enforcement of current building codes (#XXXX)
 4. Master Plan has the following integration with other plans, policies, regulations.
 - a. Arts & Culture Master Plan
 - b. Parks & Recreation Master Plan
 - c. United Pathways Master Plan
 - d. Wastewater Collection Master Plan
 - e. Water Master Plan
 - f. Stormwater Master Plan
 - g. Carson Area Transportation Plan
 - h. Airport Master Plan
 - i. Open Space Plan
 - j. Carson River Master Plan
 - k. Carson City Historical/Archeological Properties Preservation Plan
 - l. Tahoe Regional Planning Agency
 - m. NV Energy Electric Master Plan
-
- Additional integration is clear in the adoption and enforcement of building codes in pre-disaster planning and post-disaster recovery activities. Recovery activities implemented after the 2017 Severe Winter Storm declaration include the current IBC standards
 - Carson City Municipal Code (2020) Title 14 - Fire Code: Incorporates mitigation actions.
 - Carson City Municipal Code (2020) Title 15 – Building Code: Incorporates mitigation actions.
 - Carson City Municipal Code (2020) Title 17 – Division of Land, Subdivision of Land: Incorporates mitigation actions.
 - Carson City Municipal Code (2020) Title 18 – Zoning, Development Standards: Incorporates mitigation actions.
 - State of Nevada Enhanced Hazard Mitigation Plan (2018): This plan, prepared by NDEM, utilizes the City's HMP for hazard profile and historical data to include in State's Plan.
 - Development Standards. The development standards document is a comprehensive resource for the design-oriented standards required by the city for the safeguarding and maintenance of community character, safety, and environment



Q & A

11.0

PUBLIC COMMENTS

12.0



Task Assignments

13.0

Upcoming Meetings

14.0

Meeting 3.5

√ **Tuesday, June 22, 2021, 1:30 to 3:30 p.m.**

Ormsby Room

Carson City Sheriff's Office

911 East Musser Street, Carson City

Highlights

Benefit-Cost Analysis

Mitigation Action Item Rankings

Meeting 4

√ **Thursday, July 22, 2021, 1:30 to 4:30 p.m.**

- **Fire Station 51**
- 777 South Stewart Street, Carson City
- HMP Planning Team Meeting 4: Final review and approval of incorporation of public comment

Thank you, THANK YOU,
Thank you!



Carson City Hazard Mitigation Plan Update – 2021

Benefit Vs Cost Review of Mitigation Actions

The associated costs and benefits of identified mitigation actions can change significantly over the timeline for implementation, for this reason the rubric for reviewing the cost vs benefit of each action item contains subjective criteria. The purpose of the rubric is to support ranking of the action items while keeping in mind these two important factors of implementation.

The application of the rubric (assigning points) to each of the identified action items supports the maximization of benefits.

Cost	Benefit	Points
Low	High	9
	Medium	8
	Low	7
Medium	High	6
	Medium	5
	Low	4
High	High	3
	Medium	2
	Low	1

COST Criteria Consider the estimated costs to implement the action, including the time and staff needed to complete the action.		BENEFITS Criteria Consider the effectiveness of action in protecting life and preventing injuries and/or in eliminating or reducing damage to structures and infrastructure (Life Safety and Property Protection).
High	<ul style="list-style-type: none"> Existing funding will not cover the cost of implementing the action. New, additional, or alternative source(s) of funding is required (i.e., grants, bonds, increase in fees). The action requires more than 2 years for implementation. Completing the action requires adding staff with technical expertise and increasing administrative staff. 	<ul style="list-style-type: none"> Action will provide immediate (short-term 1 year or less) reduction of risk to life and property
Medium	<ul style="list-style-type: none"> The action may be implemented with current funding/budget but requires either a budget change, or an appropriation over several budget cycles. It requires less than 2 years for implementation. The action can be funded from the existing budget. Completing this action requires increasing administrative staff. 	<ul style="list-style-type: none"> Action will provide a long-term (2 to 5 years) reduction of risk to life and property.
Low	<ul style="list-style-type: none"> The action is part or can be included as part of an existing and ongoing program. It can be implemented in less than 1 year, OR it is an ongoing action. The City has the technical expertise and administrative staff to complete the action. 	<ul style="list-style-type: none"> Currently the action’s risk reduction to life and property are difficult to quantify.

Use the criteria defined below to evaluate each mitigation action being considered. For each action, assess the potential benefits and/or likelihood of successful implementation and assign each criterion a value of 3, 2, or 1 where:

3 = Highly effective or feasible 2 = Neutral 1 = Ineffective or not feasible

Administrative

Does the community have the personnel and administrative capabilities to maintain the project, or will outside help be necessary?

Environmental

What are the potential environmental impacts of the action? Will it comply with environmental regulations?

Legal

Does Carson City have the authority to implement the action?

Local Champion

Is there a strong advocate for the action or project among local department and agencies that will support the action's implementation?

Other Community Objectives

Does the action advance other community objectives, such as capital improvements, economic development, environmental quality, or open space preservation? Does it support the policies of the comprehensive (Master) plan?

Political

Is there overall public support for the mitigation action? Is there the political will to support it?

Social

Will the action adversely affect one segment of the population? Will the action disrupt established neighborhoods, break up voting districts, or cause the relocation of lower income people?

Technical

Is the mitigation action technically feasible? Is it a long-term solution? Eliminate actions that, from a technical standpoint, will not meet the goals.

Prioritization Tool: June 22, 2021

Carson City Hazard Mitigation Plan Update

		<i>Please note your scores and this sheet and submit to ROA for documentation.</i>			Vote Range = 9 to 1	3 = Highly effective or feasible 2 = Neutral 1 = Ineffective or not feasible					
Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Estimated Cost (\$)	Cost-Benefit Analysis	Administrative (Maintenance Capability)	Legal	Local Champion	Other Community Objectives	Political	Social	Technical
Goal 1: Promote increased and ongoing Carson City involvement in hazard mitigation planning and projects.											
1.A - e LPR	ALL	Review and update the Master Plan to be consistent with the hazard area maps and implementation strategies developed in the HMP in 2022 and 2023. Review and update ordinances and code every three years.	Staff Time \$5,000								
1.B - e E&O	ALL	Identify & educate Carson City personnel on high hazard areas.	Staff Time \$16,000								
1.C - e P&R	ALL	Coordinate existing Geographic Information Systems (GIS) capabilities to identify hazards through the City.	Staff Time \$5,000								
1.D - e P&R	ALL	Develop the data sets that are necessary to test hazard scenarios and mitigation tools, including HAZUS MH.	Staff Time \$29,000								
1.E - e E&O + P&R	ALL	Continue to utilize the Internet as a communication tool, as well as an education tool.	Staff time for Six weeks/ \$24,000 Yr								
1.F - e P&R	Drought, Earthquake, Flood, Landslide, Severe Weather, & Wildfire	Continue to adopt and implement city building codes and ordinances that protect people and structures from drought, earthquake, flood, landslide, severe weather, and wildfire.	Staff Time \$5,000								
1.G - e LPR	Wildfire	Collaborate and support the continued update of the Community Wildfire Plan.	Staff time/ \$20,000 Yr								
1.H - n LPR	Earthquake, Flood, Severe Weather, Wildfire	Design and construct a City-owned fuel facility, including emergency fuel storage to support critical infrastructure during an extended power outage.	\$900,000								
1.I - n P&R	Severe Weather	Reduce the risk of power outages by collaborating with NV Energy to determine areas where disruption is most likely and the feasibility of underground power lines.	Staff Time (2 People for 3 mos & Travel)/ \$129,500								
1.J - n LPR	ALL	Include the task of updating the hazard mitigation plan to the job descriptions of positions responsible for implementing actions and the Emergency Management staff.	Staff Time \$50,000								
Goal 2: Build and support local capacity to enable the community to prepare for, respond to, and recover from disasters.											
2.A - e P&R	Flood and Wildfire	Maintain and update emergency evacuation programs for neighborhoods in flood prone and wildland areas.	Staff Time \$5,000								
2.B - e LPR	ALL	Annually review the City's Emergency Operations Plan and update and integrate w/local Hazard Mitigation Plan.	Staff time \$18,000 Yr								

Prioritization Tool: June 22, 2021

Carson City Hazard Mitigation Plan Update

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2.C – e P&R	ALL	Conduct a minimum of one disaster exercise per year.	Staff time \$18,000 Yr								
2.D – e E&O	ALL	Establish a budget and identify funding sources for mitigation outreach.	Staff time \$12,000 Yr								
2.E – e E&O	ALL	Continue to work with school district to promote education on the Standard Response Plan, a public outreach campaign that teaches children, staff, and families how to avoid danger and behave during an emergency.	Materials available @ no cost \$25,000 Staff Time Yr								
2.F – e E&O	ALL	Continue to prepare, develop, and distribute appropriate public information about hazard mitigation programs and projects at Carson City-sponsored events and on the Carson City and Fire Department websites.	Staff time \$6,000								
2.G – n S&I	All	Plan and construct an Emergency Operations Center (EOC), including a fire station and backup emergency dispatch center	\$12.5M								
Goal 3: Reduce the possibility of damage and losses due to earthquakes.											
3.A – e LPR	Earthquake	Continue to develop, adopt, and enforce policies and regulations pertaining to grading and related construction relative to seismic hazards.	Staff Time \$5,0000								
3.B – n S&I	Earthquake	Evaluate unreinforced masonry structure inventory; using benefit-cost analysis, identify priorities for retrofitting buildings; and complete the necessary upgrades.	Staff Time Tasks 1 & 2 Only \$178,000								
3.C – e P&R	Earthquake, Wildfire, Flood, Severe Weather, Landslides	Maintain a structure database using GIS.	Staff Time \$5,000								
3.D – e S&I	Fire	Acquire and install clean-agent systems for the City Hall and Public Safety computer rooms to reduce damage to computer equipment due to fire.	One time cost \$50,000								
Goal 4: Reduce the possibility of threat to life and losses due to Infectious Disease.											
4.A – e LPR	Infectious Disease	Update Mass Illness Plan and integrate with local Hazard Mitigation Plan.	One time cost \$3,500								
4.B – e P&R	Infectious Disease	Continuation of training and exercise program relative to infectious disease.	Yearly \$42,000								

Prioritization Tool: June 22, 2021
Carson City Hazard Mitigation Plan Update

Please note your scores and this sheet and submit to ROA for documentation.				Vote Range = 9 to 1	3 = Highly effective or feasible 2 = Neutral 1 = Ineffective or not feasible						
Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Estimated Cost (\$)	Cost-Benefit Analysis	Administrative (Maintenance Capability)	Legal	Local Champion	Other Community Objectives	Political	Social	Technical
4.C – e P&R	Infectious Disease	Prepare by acquiring and storing needed medical PPE to help support medical response due to infectious disease and managing the rotation of stock.	Yearly \$25,000								
4.D – e E&O & P&R	Infectious Disease	Maintain a public program for information and education.	Yearly \$12,000								
4.E – n E&O & P&R	Infectious Disease	Reduce disparities and inequities in the distribution of infectious disease information during and prior to outbreaks.	\$50,000 for implementation Yearly Personnel & Operating Bdgt. \$116,000								
4.F – n LPR P&R	Infectious Disease	Establish a plan that addresses the development, protection, retention, and resilience of the public health workforce and identifies options for expanding the workforce quickly for a health-related emergency that extends beyond 30 days.	Consultant Estimate \$65,000								
Goal 5: Reduce the possibility of damage and losses due to floods.											
5.A – e revised LPR	Severe Weather, Flood	Provide a consolidated storm water system Master Plan including development of project proposals to improve storm water facilities.	\$75,000								
5.B – e LPR	Severe Weather, Flood	Continue to update policies that discourage growth in flood-prone areas.	Staff Time \$5,000								
5.C – e LPR	Severe Weather, Flood	Continue to review and update flood plans for coordination w/adjacent counties, cities, and special districts supporting a regional approach to flood mitigation.	Staff Time \$5,000								
5.D – e LPR	Severe Weather, Flood	Update and expand Sandbagging Plan.	Staff Time \$5,000								
5.E – e S&I	Severe Weather, Flood	Continue to install new flood facilities through the City's CIP program to improve the overall effectiveness of the storm drain system.	\$950,000								
5.F – e NSP	Flood, Landslide	Upon completion of land transfers associated with the Lands Bill which includes land trading with Carson City, BLM, US Forestry, and Washoe Tribe; identify/implement projects within transferred lands and other areas within Carson City that need slope stabilization for flood and landslide mitigation.	Staff Time \$5,000								
5.G – e NSP	Flood, Landslide	Design and install facilities to capture debris and sediment within Eagle Valley.	120000								

Prioritization Tool: June 22, 2021
Carson City Hazard Mitigation Plan Update

Please note your scores and this sheet and submit to ROA for documentation.				Vote Range = 9 to 1	3 = Highly effective or feasible 2 = Neutral 1 = Ineffective or not feasible						
Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Estimated Cost (\$)	Cost-Benefit Analysis	Administrative (Maintenance Capability)	Legal	Local Champion	Other Community Objectives	Political	Social	Technical
5.H – e S&I + NSP	Flood	Develop a Flood Management Plan for the New Empire Area and install a new flood control facility for the area.	\$5.8M								
5.I – e NSP + S&I	ALL	Protect and enhance existing municipal water conveyance structures, storage and treatment facilities.	\$50,000								
5.J – e S&I + NSP	Severe Weather, Flood	Install a storm water retention / detention facility in Goni Canyon Watershed and storm drain system at Goni Creek.	\$8.6M								
5.K – e NSP + LPR	Flood, Severe Weather	Continue land acquisition of buildings with recurring loss or of land which could be used as retention and detention basins for flood control projects.	\$1M								
5.L – n LPR	Flood, Severe Weather	Install a storm water retention / detention facility in Ash and Kings Canyon Watersheds	\$2M								
Goal 6: Reduce the possibility of damage and losses due to Severe Weather.											
6.A – e S&I	Severe Weather	In areas at risk to severe weather, retrofit public buildings to withstand snow loads and severe winds to prevent roof collapse/damage.	\$1M								
6.B – e LPR	Severe Weather	Continue the Storm Water Management Plan for snow melt and debris storage.	Training & Staff Time \$10,000								
Goal 7: Reduce the possibility of damage and losses due to terrorist events.											
7.A – e LPR	Acts of Violence	Develop mitigation standards for public and high-risk buildings and associated grounds.	Staff Time \$148,000								
7.B – e LPR	Acts of Violence	Continue following planning procedures to mitigate acts of violence.	Staff Time \$500								
7.C – e S&I	Acts of Violence	Retrofit public and high-risk buildings to increase safety and reduce risk associated with acts of violence.	\$500k								
Goal 8: Reduce the possibility of damage and losses due to wildland fires.											
8.A – e LPR	Wildfire	Continue to adopt and enforce new versions of the Wildland Urban-Interface code and International Fire Code.	Staff time, outreach meetings, books \$8,000 (Due 2024) Every Six Yrs								
8.B – e NSP	Wildfire	Continue to conduct current fuel management programs and investigate and apply new and emerging fuel management techniques.	\$325,000								

Prioritization Tool: June 22, 2021
Carson City Hazard Mitigation Plan Update

Please note your scores and this sheet and submit to ROA for documentation.				Vote Range = 9 to 1	3 = Highly effective or feasible 2 = Neutral 1 = Ineffective or not feasible						
Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Estimated Cost (\$)	Cost-Benefit Analysis	Administrative (Maintenance Capability)	Legal	Local Champion	Other Community Objectives	Political	Social	Technical
8.C – e E&O	Wildfire	Continue public outreach campaign on extreme wildland fire dangers and steps that can be taken to reduce these dangers.	\$2,500								
8.D – e NSP + E&O	Wildfire	Expand the community-based vegetation management program.	\$5,000								
8.E – e E&O	Wildfire	Continue to utilize GIS and the internet as information tools.	\$2,500								
8.F – e P&R	Wildfire	Maintain the continuing wildland fire technical working group.	\$1,000								
8.G – e NSP + S&I	Flood, Wildfire	Continue to protect municipal water recharge zones from wildfires and flooding.	\$25,000								
Goal 9: Reduce the possibility of damage and losses due to drought.											
9.A – e NSP + S&I	Drought	Maintain water supply stabilization and recharge programs to maximize the use of surface sources when available and preserve the groundwater sources for system peaking needs and times of drought	\$2M								
9.B – e E&O + LPR	Drought	Continue to encourage public participation in drought strategies through public information programs on water conservation and drought resistant landscaping and through building code ordinances.	Staff Time \$5,000								
9.C – n NSP	Drought	Rehabilitate and upgrade the Quill Water Treatment Plant to maximize the use of available surface water resources and increase water supply.	\$15M								
Goal 10: Reduce the possibility of damage and losses due to landslide.											
10.A – e NSP	Landslide	Evaluate natural slopes to determine whether there are slope stabilization treatments that would be appropriate to prevent landslides.	\$50k								
10.B – e S&I	Landslide	Conduct slope stabilization projects to prevent landslides.	\$500k								
Goal 11: Reduce the possibility of damage and losses due to hazardous materials.											
11.A – e LPR	Hazardous Materials	Consider and as appropriate, adopt building codes and zoning ordinances to reduce public health risks from hazardous materials releases.	Staff Time \$75,000								

Appendix A: Meeting Notes and Handouts

- Meeting 3.5

**May 21 & 22 Meetings 3.0 and 3.5
Planning Team Invitation
Sent June 9, 2021**

naaker@carson.org; elizabeth.breeden@nvenergy.com; acyr@carson.k12.nv.us; jdanen@carson.org; KEcheverria@washoecounty.us; rfellows@carson.org; dfogerson@dps.state.nv.us; jmfreeman@carson.org; kfurlong@carson.org; shicks@carson.org; ahummel@carson.org; tjesse@carson.org; nmerritt@carson.org; taryn.peirce@carsontahoe.org; rrice@carson.org; druben@carson.org; rrummel@carson.org; lschuetter@carson.org; dschulz@carson.org; jocelyn.seemann@redcross.org; sslamon@carson.org; chris.smallcomb@noaa.gov; carsoncitysr1@gmail.com; DStucky@carson.org; HSullivan@carson.org; jtushbant@carson.org; junderwood@carson.org; swartgow@carson.org; jerry@991fmtalk.com; keith.forbes@agri.state.nv.us; alowe@carson.org; pk.oneill@asm.state.nv.us; craig.robinson@wnc.edu; mark.stearns@usw.salvationarmy.org; dyohey@chromalloy.com; rschneider@carson.org; Elizabeth Ashby <eashby@roanderson.com>; Kate Cunningham <kcunningham@roanderson.com>; Eric T. Herron <eherron@roanderson.com>; Marie A. Hulse <mhulse@roanderson.com>; Keith E. Ruben <kruben@roanderson.com>; Kenneth A. Quiner <Kenneth.Quiner@washoetribe.us>

Greetings Planning Team,

The **June 18 Planning Team meeting** has been **cancelled** and **rescheduled** as **TWO** meetings the following week.

New Location: Ormsby Room, Carson City Sheriff's Office, 911 East Musser Street, Carson city

New Time: MONDAY: June 21, 2021—1:30 to 3:30 & TUESDAY: June 22, 2021—1:30 to 3:30

We have 50+ mitigation actions to review and rank—and your participation is essential!

At these meetings, we will gather information needed for the required Benefit vs. Cost review—and rank the mitigation action items. We will also discuss updates to the Plan Maintenance Process. The full agenda and handouts will be distributed on or before June 15.

Please RSVP to kcunningham@roanderson.com. Zoom access is available upon request.

We appreciate your participation and look forward to seeing you then.

Elizabeth, Marie, and Kate



Carson City 2021 Hazard Mitigation Plan Update
 Planning Team Meeting 3.5: June 22, 2021
 Sign-in-Sheet



Name	Firm/Agency	Phone Number	Email
Jason Doren	CCFD		
Taryn Peirce	Carson Tahoe Hospital	775-445-7303	taryn.peirce@carson-tahoe.org
Robb Fellows	CCPW	775-283-7370	RFellows@carson.org
Alex Cyr	CCSD	775-342-3234	acyr@carson.kia.nv.us
Nancy Merritt	CCFD	283-7947	nmerritt@carson.org
Andy Hummel	CCPW	283-7357	ahummel@carson.org
Rachael Schneider	City Manager	775 400 5162	rschneider@Carson.org
Jim Walker	NDOT	775-888-7837	jwalker@dot.nv.gov
Craig Robinson	WNCINSHE	775-445-4222	craig.robinson@wnc.edu
DAN STUCKY	CCPW	775-287-2717	dstucky@carson.org
HOTSULLIVAN	LITM	283 7922	HSULLIVAN@carson.org
Lisa Schutte	BOS	671-2413	lschutte@carson.org



AGENDA



Carson City 2021 Hazard Mitigation Plan Update

Meeting 3.5: Public Workshop & HMP Planning Team Meeting

1:30 to 3:30 pm, Tuesday, June 22, 2021

Ormsby Room, Carson City Sheriff's Office, 911 East Musser Street, Carson City
In-person meeting

- 1.0 Introductions (Discussion). 10 mins.
- 2.0 Discussion of Vulnerability Analysis and Review of Current Mitigation Actions. Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson. 15 mins.
- 3.0 Mitigation Actions Review of Benefits vs Costs. (Discussion and Possible Action) – Planning Team & RO Anderson. Approx. 30 mins.
- 4.0 Mitigation Action Prioritization: Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson. Approx. 30 mins.
- 5.0 Questions and Answers (Q & A) (Discussion Only) – 10 mins.
- 6.0 **Public Comment.** No action may be taken upon a matter raised under this item of the agenda until the matter is specifically included on an agenda as an action item. Public comments may be limited to three minutes per person. Comments will not be restricted based on viewpoint. **10 mins.**
- 7.0 Task Assignments. 10 mins.
- 8.0 Upcoming Meetings: **WORKSHOP SCHEDULE** (Discussion Only)
 - **Meeting 4: HMP Planning Team Meeting 4: Final Review and Approval of Incorporation of Public Comment**

Thursday, July 22, 2021, 1:30 to 4:30 p.m.
Fire Station 51
777 South Stewart Street, Carson City



AGENDA



Carson City 2021 Hazard Mitigation Plan Update

This agenda was posted or caused to be posted on June 16, 2021, at the following locations.

- Carson City Online: carson.org/hazardplan
- Physical Locations: Carson City Sheriff's Office (911 East Musser Street, Carson City, NV), Carson City, City Hall (201 N. Carson Street, Carson City, NV) and Fire Station 51 (777 South Stewart Street, Carson City, NV).

We are pleased to make reasonable accommodations for members of the public who have disability or access requirements. Please contact Nancy Merritt, Administrative Support, Carson City Fire Department, 777 S. Stewart St., Carson City, NV. 89701, 775-283-7947, nmerritt@carson.org.



Meeting 3.5 Outcomes

Carson City 2021 Hazard Mitigation Plan Update



Meeting 3.5: Public Workshop & HMP Planning Team Meeting
1:30 to 3:30 pm, Tuesday, June 22, 2021
Ormsby Room, Carson City Sheriff's Office, 911 East Musser Street, Carson City
In-person meeting

1.0 Introductions (Discussion). 10 mins.

The Planning Team members in attendance introduced themselves by name, title, and organization.

2.0 Discussion of Vulnerability Analysis and Review of Current Mitigation Actions. Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson. 15 mins.

A review of the vulnerability of population and assets for the City's hazards was provided prior to initiating the prioritization exercise.

3.0 Mitigation Actions Review of Benefits vs Costs. (Discussion and Possible Action) – Planning Team & RO Anderson. Approx. 30 mins.

Although the majority of attendees previewed the prioritization process under the last action item in the previous day's meeting, all members were introduced to the revised criteria for prioritizing mitigation action items. The ranking range was reduced to 3, 2, or 1 for all categories. Some criteria were combined with another category to streamline ranking. Financial feasibility and anticipated benefits were redefined.

4.0 Mitigation Action Prioritization: Review, Discussion, and Possible Approval by the Planning Team Members. (Discussion and Possible Action) – Planning Team & RO Anderson. Approx. 30 mins.

The prioritization process began as a group exercise—relying on hand raising to tally votes under each category—and quickly shifted to an individual one. In this format, spontaneous discussion took place amongst neighbors. Most PT members completed the form on site. One took the form home to complete. Another was asked to complete the form remotely after it was found to be incomplete. Note that the tally sheet distributed at the meeting did not capture the column for Cost-Benefit Analysis. This information was written in after the last column by the PT members as part of the ranking. In addition, four new mitigation action items were ranked by the group collectively and integrated into the final prioritization results.

5.0 Questions and Answers (Q & A) (Discussion Only) – 10 mins.

Questions about the process were addressed throughout the meeting as they arose.

6.0 Public Comment. No action may be taken upon a matter raised under this item of the agenda until the matter is specifically included on an agenda as an action item. Public comments may be limited to three minutes per person. Comments will not be restricted based on viewpoint. **10 mins.** *One member of the public participating via Zoom raised a question about fire risk near Prison Hill. The Deputy Emergency Manager conversed with this participant and responded to her questions.*



Meeting 3.5 Outcomes

Carson City 2021 Hazard Mitigation Plan Update



Additional information on how to engage these questions in other arenas was provided. This public comment was accepted at the time that the prioritization became an individual exercise.

7.0 Task Assignments. 10 mins.

None assigned.

8.0 Upcoming Meetings: WORKSHOP SCHEDULE (Discussion Only)

Not discussed.

- **Meeting 4: HMP Planning Team Meeting 4: Final Review and Approval of Incorporation of Public Comment**

Thursday, July 22, 2021, 1:30 to 4:30 p.m.

Fire Station 51

777 South Stewart Street, Carson City



Carson City Hazard Mitigation Plan Update

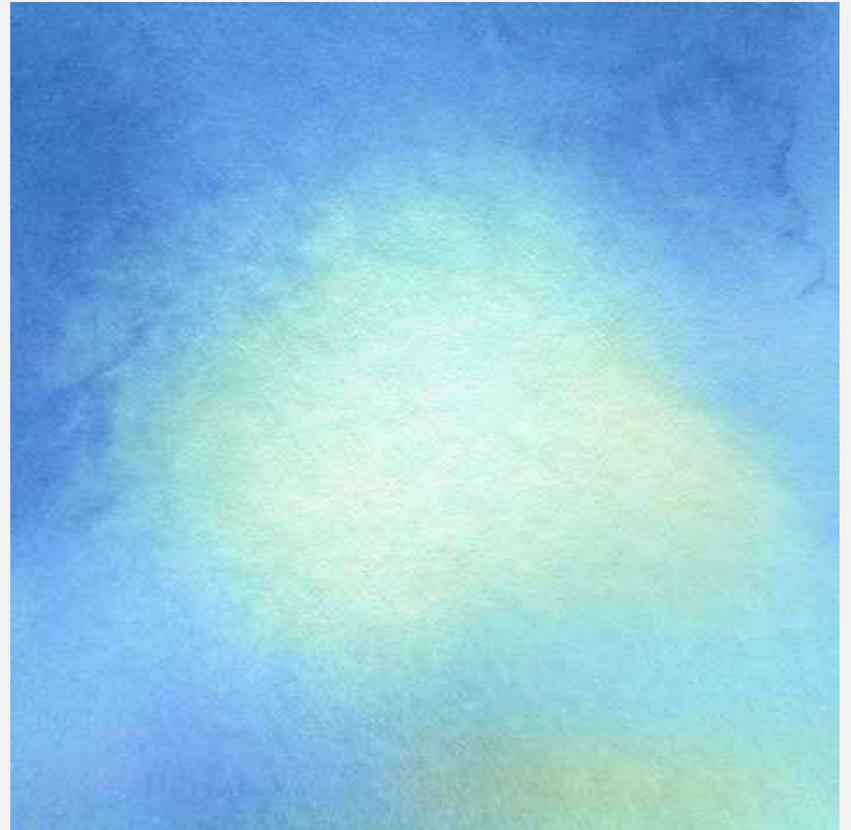
PLANNING TEAM

HOUSEKEEPING

Bathrooms

Emergency Exits

Breaks



Introductions

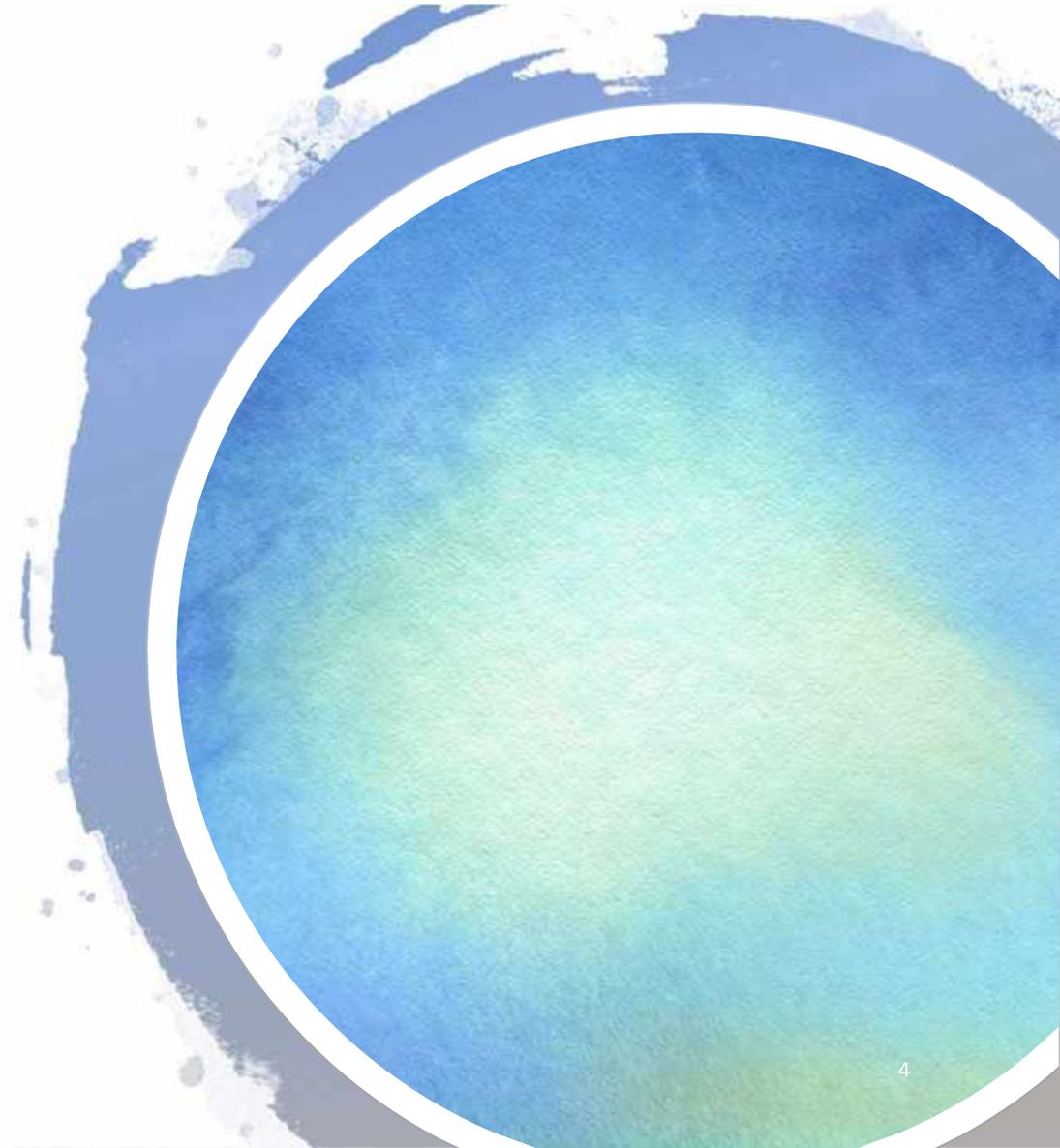
- Name
- Title
- Organization

Review of Vulnerability

Hazards

Assets

Values



Identified Hazards

High

Earthquake
Wildfire
Flood
Severe Weather
Acts of Violence

Moderate

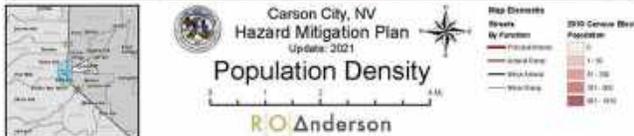
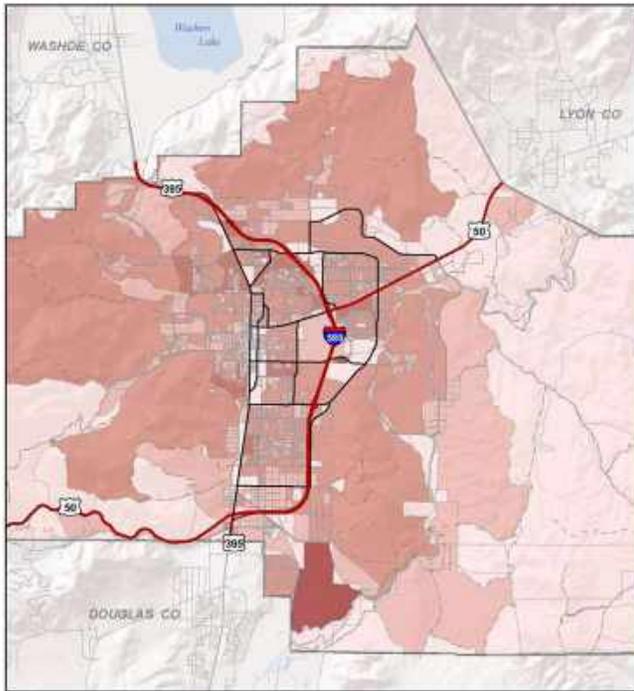
Infectious Disease
Drought
Hazardous Materials
Climate Change
Landslides

Low

Avalanche
Volcano

Population: 55,916

Assets



Land Use_Group	Parcel Sum	Value	Content Value	Total Value
Vacant Total	1424	\$28,623,687	\$14,311,844	\$42,935,531
Single Family Total	16212	\$2,034,692,450	\$1,017,346,225	\$3,052,038,675
Multi residential Total	870	\$234,061,421	\$117,030,711	\$351,092,132
Commercial Total	1325	\$692,266,164	\$346,133,082	\$1,038,399,246
Industrial Total	205	\$138,645,052	\$69,322,526	\$207,967,578
Rural Total	96	\$4,650,302	\$2,325,151	\$6,975,453
Utilities Total	52	\$269,361	\$134,681	\$404,042
Public Use Total	56	\$68,038,798	\$34,019,399	\$102,058,197
Grand Total	20240	\$3,201,247,235	\$1,600,623,618	\$4,801,870,853

Earthquake

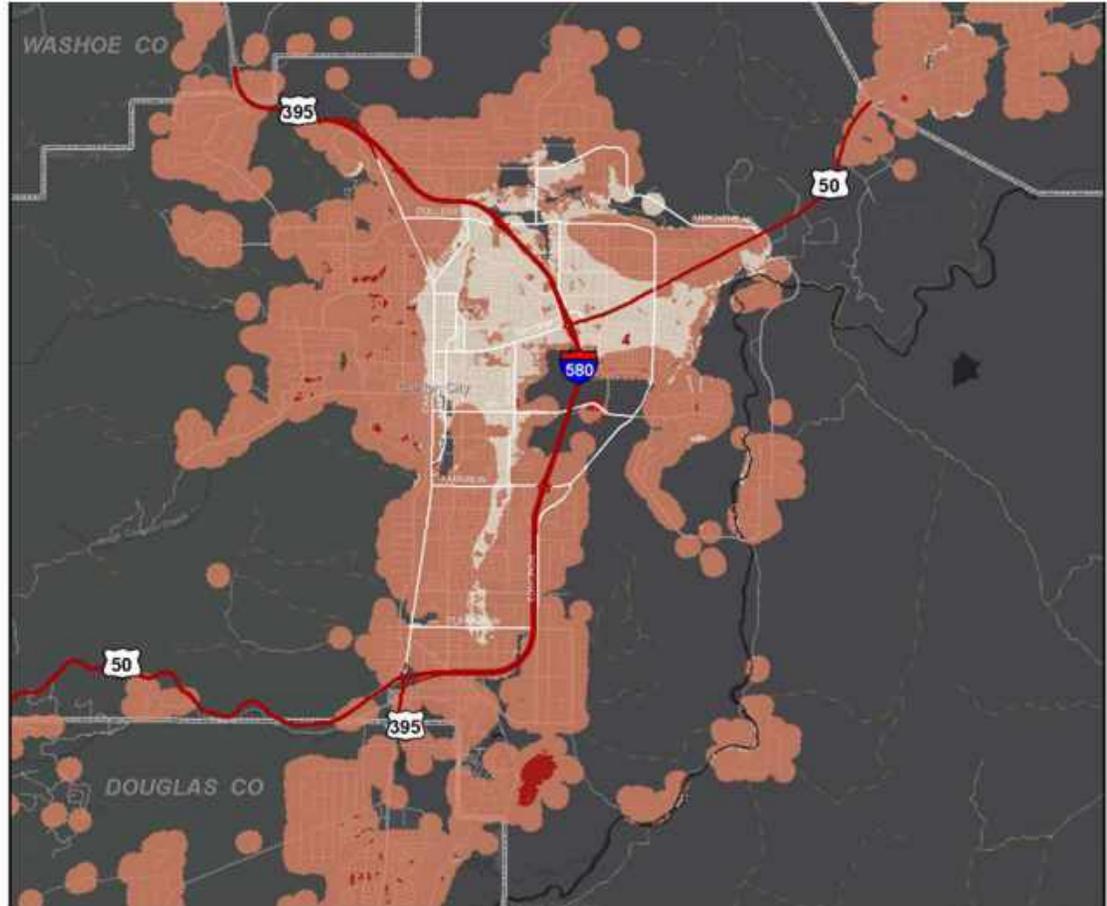
Population Exposure for 6.5 Earthquake = 54,269

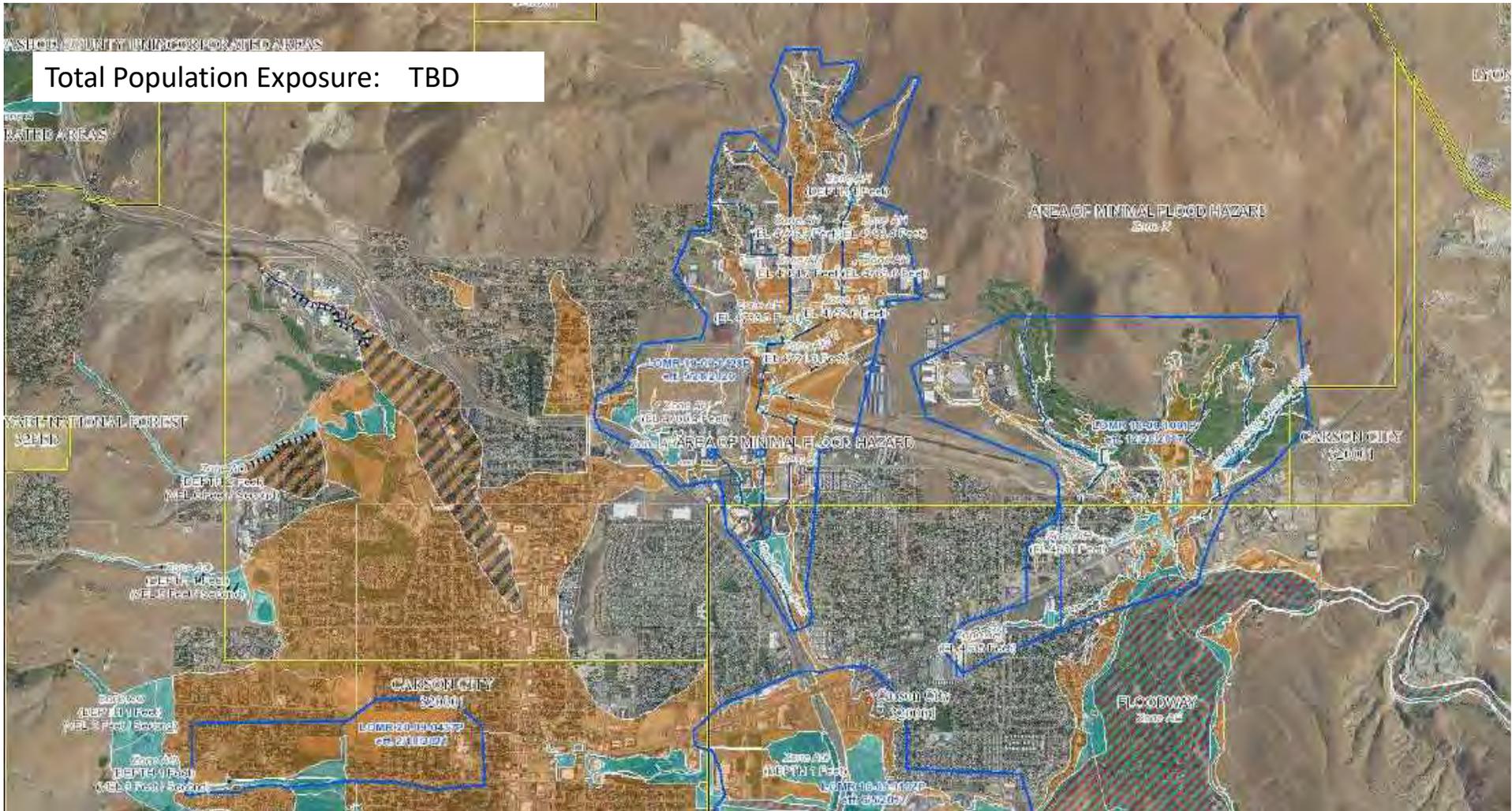
Table 6-5 Cost Estimates for a Capitol Suite of Scenario Earthquakes for Nevada Counties				
Earthquake Magnitude	Building Damage (\$M)	Transportation Damage (\$M)	Utility Damage (\$M)	Total Cost (\$M)
5.0	1.3	1.5	5.4	8.2
5.5	38.9	3.2	7.6	50
6.0	214.3	6.1	17.3	237
6.5	649.9	11.1	27.1	688
7.0	1,246	16.9	49.6	1,310

Wildfire

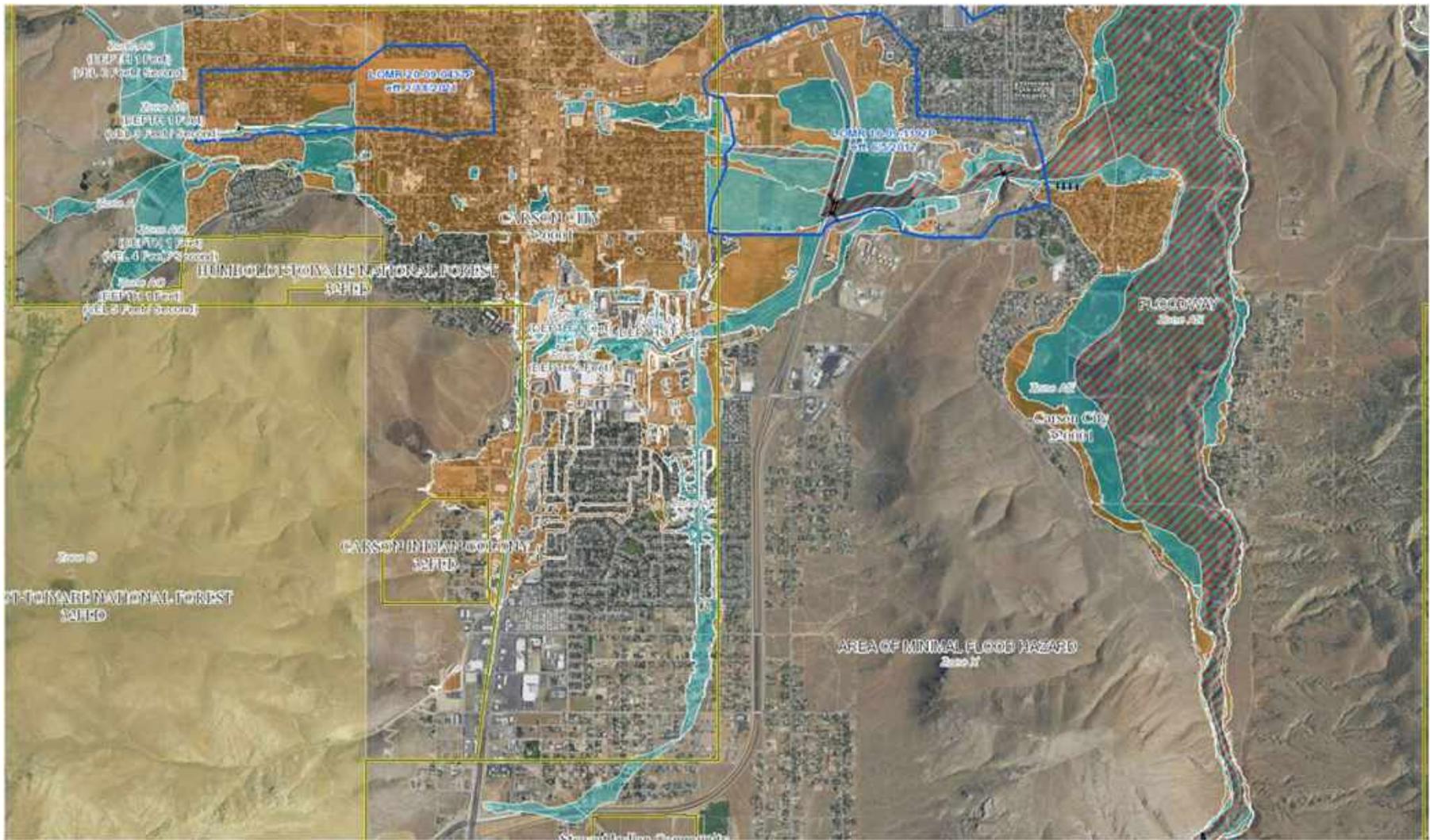
MEAN Category	Pop10
LOW Total	14000
MEDIUM Total	39974
HIGH Total	1293
Grand Total	55267

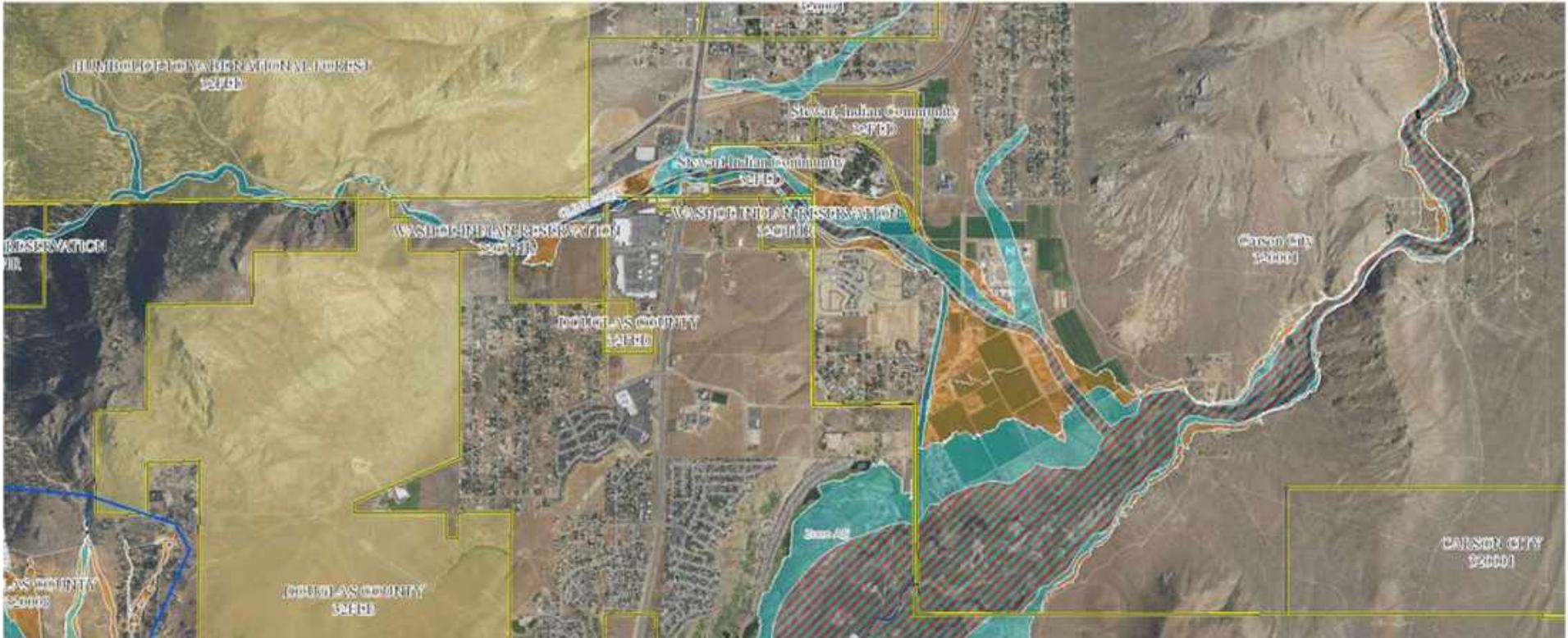
MEAN Category	Building_Value
LOW Total	\$595,505,959
MEDIUM Total	\$2,019,857,238
HIGH Total	\$5,922,584
Grand Total	\$2,621,285,781





Total Population Exposure: TBD





Severe Weather

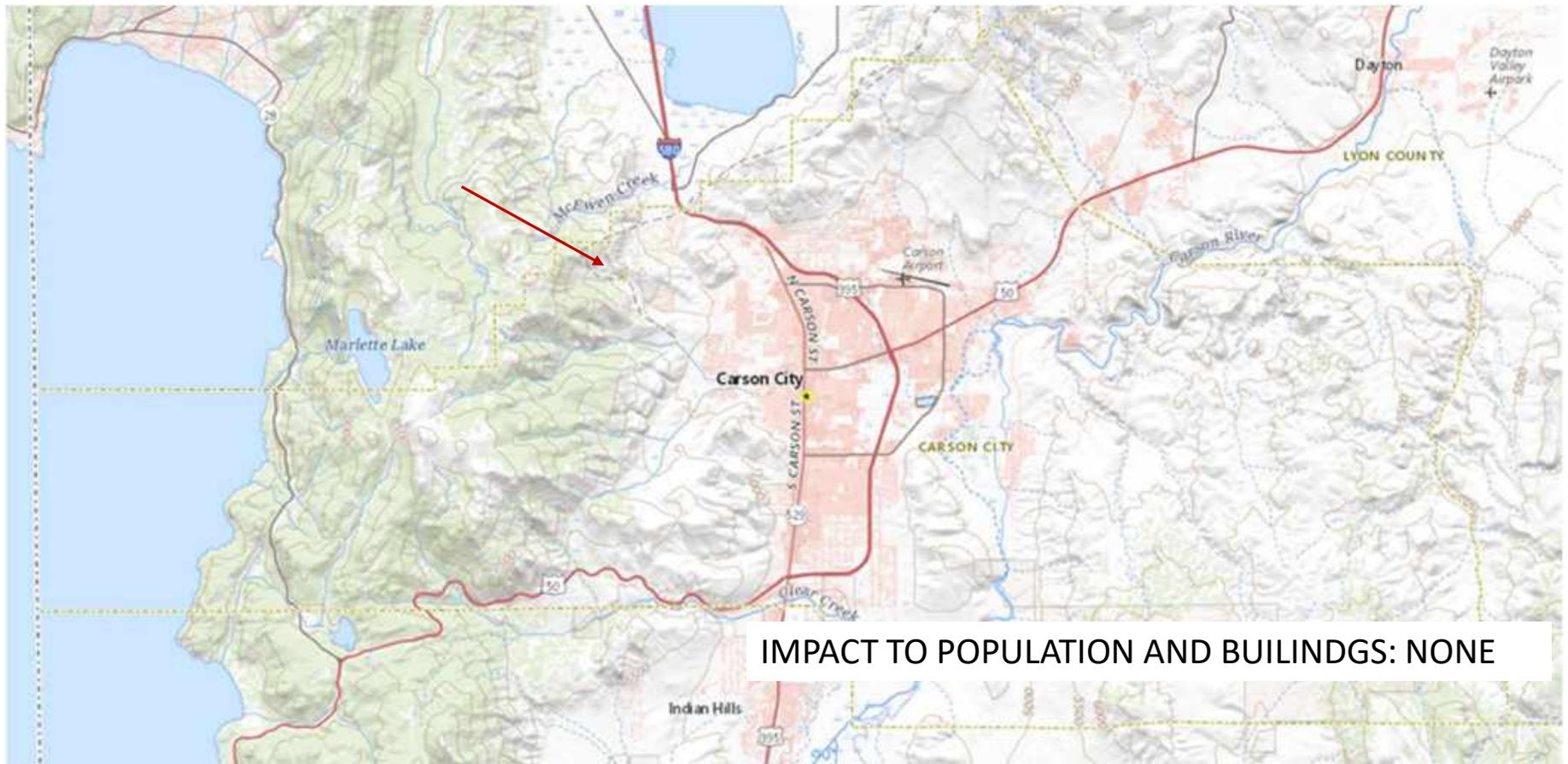
POPULATION

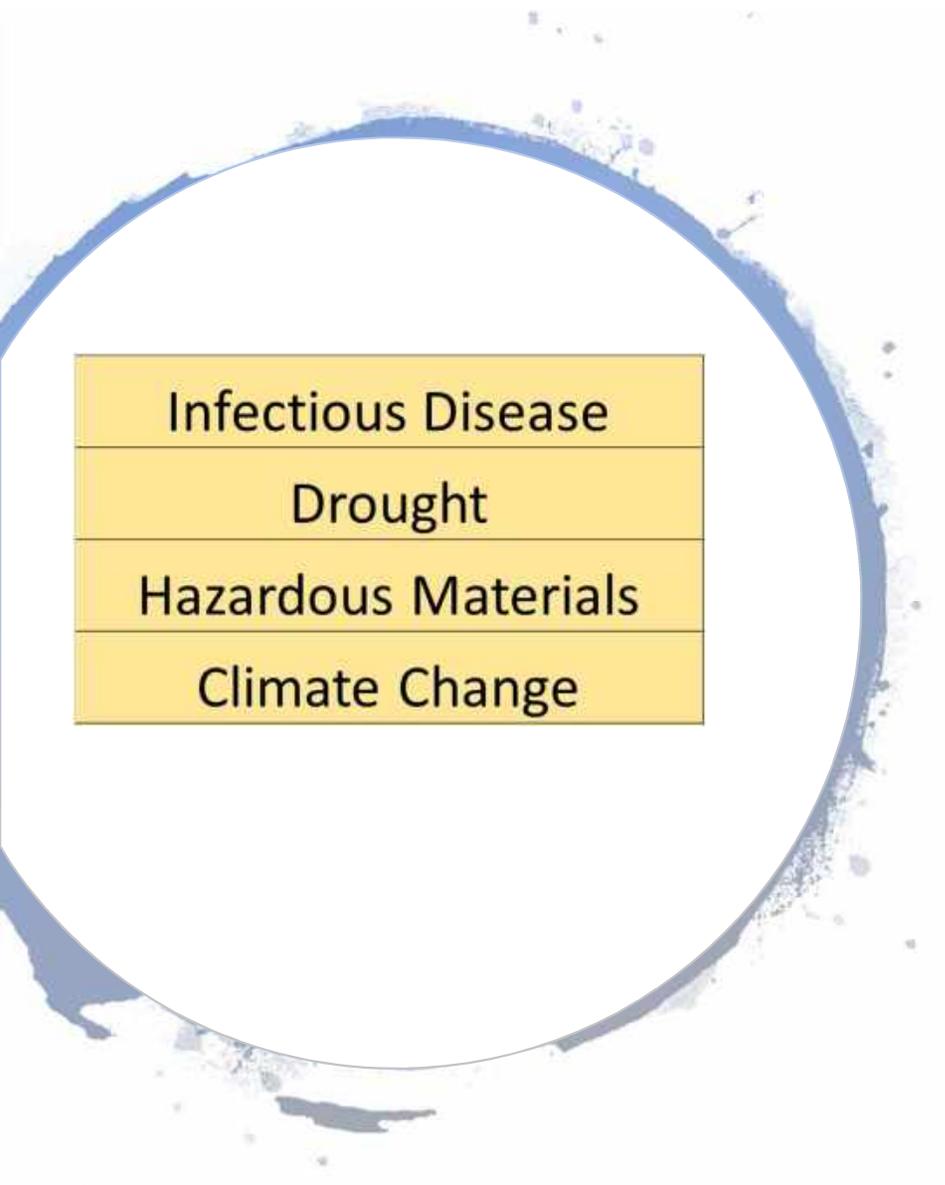
- 55,916

BUILT ENVIRONMENT

Land Use_Group	Parcel Sum	Value	Content Value	Total Value
Vacant Total	1424	\$28,623,687	\$14,311,844	\$42,935,531
Single Family Total	16212	\$2,034,692,450	\$1,017,346,225	\$3,052,038,675
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Utilities Total	52	\$269,361	\$134,681	\$404,042
Public Use Total	56	\$68,038,798	\$34,019,399	\$102,058,197
Grand Total	20240	\$3,201,247,235	\$1,600,623,618	\$4,801,870,853

Landslide Vulnerability





Acts of Violence and

....

- EXPOSURE/RISK TO:
 - All population
 - All buildings and infrastructure

LOW: Avalanche & Volcano Low planning significance

Section 6: Mitigation Strategy

Benefit vs Cost
Prioritization



Prioritization of Mitigation Actions

Review Benefit VS Cost Criteria

Carson City HMP Update 2021

Mitigation Action Ranking Criteria

Use the criteria defined below to evaluate each mitigation action being considered. For each action, assess the potential benefits and/or likelihood of successful implementation and assign each criterion a value of 3, 2, or 1 where:

3 = Highly effective and/or feasible 2 = Effective and/or feasible 1 = Ineffective and/or not feasible	
Administrative & Legal	Does the community have the personnel and administrative capabilities to <i>implement and maintain</i> the project, or will outside help be necessary? Does Carson City have the authority to implement the action?
Environmental	Does the mitigation action benefit the environment? Does it support the protection of natural systems? Will it comply with environmental regulations?
Local Champion & Political	Is there a strong advocate for the action or project among local department and agencies that will support the action's implementation? Is there overall public support for the mitigation action? Is there the political will to support it?
Other Community Objectives	Does the action advance other community objectives, such as capital improvements, economic development, environmental quality, or open space preservation? Does it support the policies of the comprehensive (Master) plan?
Social	Will the action adversely affect one segment of the population? Will the action disrupt established neighborhoods, break up voting districts, or cause the relocation of lower income people?
Technical	Is the mitigation action technically feasible? Is it a long-term solution? Eliminate actions that, from a technical standpoint, will not meet the goals.
3 = Highly feasible 2 = Feasible 1 = Major Challenges	
Financial Feasibility	Consider the cost of the life of the project, from design through construction and maintenance. Can the project be funded and maintained? To what extent would these costs burden the City? Can the action be implemented over time in stages? Are alternative funding sources available—for construction? Maintenance?
3 = High 2 = Moderate 1 = Limited	
Anticipated Benefits	Will the action protect lives and/or prevent injuries? Will the action protect structures and infrastructure? Will the action enhance <i>quality of life</i> and the natural and beneficial function of ecosystems (water sources, wetlands, etc.)?
3 = Benefit trumps cost 2 = Neutral 1 = Cost over benefit	
Cost vs. Benefit	Using the results of Financial Feasibility and Anticipated Benefits scoring above, assign a Cost vs. Benefit score to each task.



Discussion of Potential Mitigation Actions

- Review suggested mitigation actions
 - Determine to add as agreed

Potential New Mitigation Actions

POTENTIAL ADDITIONAL TASKS

1.J – n LPR	ALL	Integrate tasks related to updating the hazard mitigation plan into job descriptions for positions responsible for implementing action items and Emergency Management staff.	Staff Time \$50,000
1.K – n LPR	ALL	Incorporate the HMP Update process to the City's Strategic Plan.	
2.H – n P&R	ALL	Establish and implement a process to determine losses avoided on a scheduled basis.	
2.I – n P&R	ALL	Gather and track data related to City's critical assets to support the evaluation of specific actions needed to reduce the impact of natural hazards.	
2.J – n P&R	ALL	Train GIS staff in the FEMA HAZUS Software (Travel)	
2.K – n P&R	ALL	Develop a Recovery Plan	



Q & A

11.0

PUBLIC COMMENTS

12.0



Task Assignments

13.0

Progress Update

1. Section_1_CC_2021_OfficialRecordofAdoption
2. Section_2_CC_2021_Background
3. Section_3_CC_2021_CommunityProfile
4. Section_4_CC_2021_Planning Process
5. Section_5_CC_2021_HazardAnalysis
6. Section_6_CC_2021_Vulnerability
7. Section_7_Capability Assessment
8. Section_8_ID_Mitigation_Actions

Timeline Update

Mtg 3 HMP Planning Team: Rank Mitigation Actions and Strategy, and Update Plan Maintenance Process	1 day	Fri 6/18/21	Fri 6/18/21
4.0 Prepare Draft Update for Hazard Mitigation Plan	29 days	Mon 6/21/21	Thu 7/29/21
Distribute administrative draft to HMP Planning Team	1 day	Mon 6/28/21	Mon 6/28/21
Deadline for Planning Team Input	1 day	Tue 7/6/21	Tue 7/6/21
Distribute draft for public input	1 day	Tue 7/6/21	Tue 7/6/21
Submit to NDEM--pending incorp of public comment	1 day	Fri 7/9/21	Fri 7/9/21

Upcoming Meetings

14.0

Meeting 4

√ **Thursday, July 22, 2021, 1:30 to 4:30 p.m.**

- **Fire Station 51**
- 777 South Stewart Street, Carson City
- HMP Planning Team Meeting 4: Final review and approval of incorporation of public comment

Thank you, THANK YOU,
Thank you!



Appendix A: Meeting Notes and Handouts

- Meeting 4
 - Additional Meeting 4 documentation will be provided in an amendment to be completed within four months of FEMA's approval of the Plan. The invitation, agenda, and presentation are included below.

Kate Cunningham

From: Kate Cunningham
Sent: Monday, July 12, 2021 2:04 PM
To: Jason Danen
Cc: Rebecca.Bodnar@ndep.nv.gov; tcarlini@eastforkfire.org; jcurtis@storeycounty.org; eq_dude@sbcglobal.net; charjo@dps.state.nv.us; lmaloney@carson.org; Stefanie.McCaffrey@nvenergy.com; hannah@pcccarson.org; npaulson@carson.org; Katie.Nannini@nvenergy.com; jpage@lyon-county.org; serrell.smokey@washoetribe.us; bwacker@admin.nv.gov; jlwalker@dot.nv.gov; ewarnock@water.nv.gov; jwoodward@dps.state.nv.us; tomraw58@gmail.com; xing.liu@fema.dhs.gov; naaker@carson.org; dbooth@carson.org; elizabeth.breeden@nvenergy.com; acyr@carson.k12.nv.us; jdanen@carson.org; KEcheverria@washoecounty.us; rfellows@carson.org; dfogerson@dps.state.nv.us; jmfreeman@carson.org; kfurlong@carson.org; shicks@carson.org; ahummel@carson.org; tjesse@carson.org; nmerritt@carson.org; taryn.peirce@carsontahoe.org; rrice@carson.org; druben@carson.org; rrummel@carson.org; lschuetter@carson.org; dschulz@carson.org; jocelyn.seemann@redcross.org; sslamon@carson.org; chris.smallcomb@noaa.gov; carsoncitysr1@gmail.com; DStucky@carson.org; HSullivan@carson.org; jtushbant@carson.org; swartgow@carson.org; jerry@991fmtalk.com; keith.forbes@agri.state.nv.us; alowe@carson.org; pk.oneill@asm.state.nv.us; craig.robinson@wnc.edu; mark.stearns@usw.salvationarmy.org; dyohey@chromalloy.com; rschneider@carson.org; Elizabeth Ashby; Kate Cunningham; 'Eric T. Herron'; Marie A. Hulse; Keith E. Ruben; kenneth.quiner@washoetribe.us
Subject: SAVE THE DATE! July 22, 1:30 to 4:30--Public Workshop and HMP Planning Team Meeting
Attachments: Meeting_4_Agenda_July-22-2021.pdf; Meeting_4_Presentation_07-22-2021.pdf

Please join us to review and discuss the Draft Carson City 2021 Hazard Mitigation Plan.

Meeting 4: Public Workshop & HMP Planning Team Meeting July 22, 2021

1:30 to 4:30 pm
Carson City Sheriff's Office, Ormsby Room
911 East Musser Street, Carson City, NV

The Agenda and Draft Presentation are attached.

Please register in advance to attend the meeting virtually:

https://roanderson.zoom.us/webinar/register/WN_WkG6cY3fQ_aUXn873JF0Pw.

After registering, you will receive a confirmation email containing information about joining the webinar.

Spread the word! Let us know you are coming via RSVP to kcunningham@roanderson.com.

We hope to see you then!

Elizabeth, Kate, and Marie



AGENDA

Carson City 2021 Hazard Mitigation Plan Update

Meeting 4: Public Workshop & HMP Planning Team Meeting July 22, 2021

1:30 to 4:30 pm

Carson City Sheriff's Office Ormsby Room
911 East Musser Street, Carson City, NV

- 1.0 The Importance of Public Participation
- 2.0 Why Update the Hazard Mitigation Plan?
- 3.0 Overview of the Hazard Mitigation Plan Update Process
- 4.0 What Changed?
- 5.0 Plan Update Outcomes
- 6.0 Q&A
- 7.0 Public Comment 1

If you have not yet done so, please RSVP to kcunningham@roanderson.com.

This is a public meeting. In conformance with the Nevada Public Meeting Law, this agenda was posted or caused to be posted on or before 9:00 am on July 19, 2021, at the following locations.

- Carson City Online: carson.org/hazardplan
- Physical Locations: Carson City Sheriff's Office (911 East Musser Street, Carson City, NV), Carson City, City Hall (201 N. Carson Street, Carson City, NV) and Fire Station 51 (777 South Stewart Street, Carson City, NV).

We are pleased to make reasonable accommodations for members of the public who have disability or access requirements. Please contact Nancy Merritt, Administrative Support, Carson City Fire Department, 777 S. Stewart St., Carson City, NV. 89701, 775-283-7947, nmerritt@carson.org

Continued -> -> -> If you have not yet done so, please RSVP to kcunningham@roanderson.com.

Carson City Hazard Mitigation Plan Update

**PUBLIC WORKSHOP &
HMP PLANNING TEAM MEETING**

July 22, 2021

Carson City Sheriff's Office, Ormsby Room
911 East Musser Street

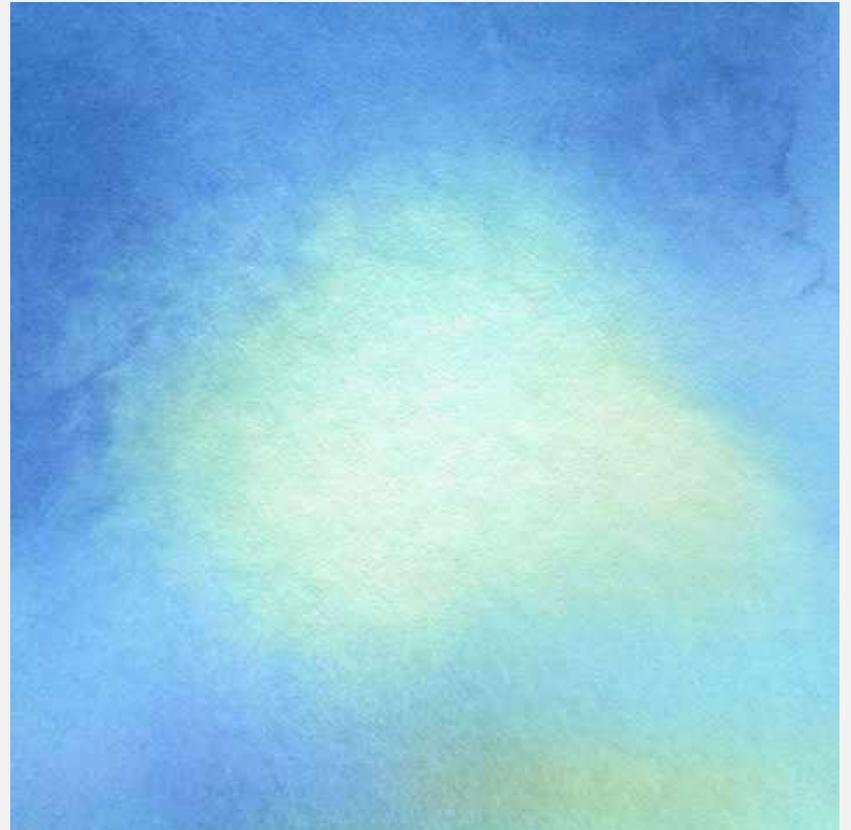
Welcome! Please sign in.

Welcome!

Bathrooms

Emergency Exits

Breaks



Meet your neighbors

- *What's your name?*
- *What brings you here today?*

July 22, 2021 Meeting Agenda

- 1. The Importance of Public Participation**
- 2. Why Update the Hazard Mitigation Plan?**
- 3. Overview of the Hazard Mitigation Plan Update Process**
- 4. What Changed?**
- 5. Plan Update Outcomes**
- 6. Q&A**
- 7. Public Comment 1**

The Importance of Public Participation

- **Perspectives:** More Vantage Points
- **Expertise:** Knowledge & Experience
- **Investment:** Everyone is a Stakeholder
- **Cooperation:** Required for Success
- **Involvement:** Builds Awareness
- **FEMA:** Requires Public Involvement



Broad public participation enables the development of mitigation actions that are supported by a variety of stakeholders and reflect the needs of the community.



Why Update the Hazard Mitigation Plan?

- Qualify for BRIC Funding (FEMA)
- Identify Trends in Hazards & Impacts
- Compare Past Priorities to Current Ones
- Identify Mitigation Actions
- Continuing Education
- *“Identify technical assistance needs”* (2021 CC HMP, p. 2-1)
- *“Prioritize project funding”* (2021 CC HMP, p. 2-1)



Carson City Hazard Mitigation Plan

August 4, 2016



Prepared by:
R O Anderson
P.O. Box 2225
Minden, NV 89423
www.ROAnderson.com

- Minden, Nevada
- Reno, Nevada
- South Lake Tahoe, California

How did we get from here ↑ to here ↓?



Carson City Hazard Mitigation Plan

2021



Prepared by:
R O Anderson
P.O. Box 2225
Minden, NV 89423
www.ROAnderson.com

- Minden, Nevada
- Reno, Nevada

Overview of the Hazard Mitigation Plan Update Process

- **Get Organized:** Collect Documents, Team Members, and Stakeholders
- **Assess Risk:** Review and Rank Hazards & ID Vulnerability
- **Assess Capability:** Review current admin, tech, legal/regulatory, and fiscal
- **Review & Update Mitigation Strategies**
- **Monitor Progress**

We invited the Public as well as the Planning Team & Stakeholders.



1. Get Organized

We looked at existing state and local hazards.

Rankings for State of Nevada 2018 & 2013

2018 Risk Categories Assigned to State of Nevada Hazards		
High Risk	Medium/Significant Risk	Low Risk
Earthquake	Extreme heat	Tsunami/seiche
Wildfire	Hazardous materials	Hail and thunderstorm
Flood	Drought	Avalanche
	Severe storms, extreme snowfall, windstorms	Epidemic
		Landslide
		Tornado
		Infestation
		Land subsidence and ground failure
		Volcano
		Expansive soil

STATE OF NEVADA

2013 Risk Categories Assigned to State of Nevada Hazards		
High Risk	Medium/Significant Risk	Low Risk
Earthquake	Terrorism/WMD	Tsunami/seiche
Flood	Hazardous materials	Hail and thunderstorm
Wildfire	Drought	Avalanche
	Severe winter storm and extreme snowfall	Epidemic
		Windstorm
		Landslide
		Heat, extreme
		Tornado
		Infestation
		Land subsidence
		Volcano
		Expansive soil

STATE OF NEVADA

Rankings for Carson City 2016 & 2010

2016 Carson City Hazard Ranking		
	Identified Hazards	Score/Ranking
HIGH	1 Earthquakes (+Seiche)	212
	2 Wildland Fire	184
	3 Floods	165
	4 Severe Weather	152
	5 Landslides	146
	6 Acts of Violence	146
	7 Hazardous Materials	134
	8 Utility Loss	129
LOW	9 Drought	126
	10 Seiche	120
	11 Infectious Disease	117
	12 Avalanche	111
	13 Volcanic Activity	97

2010 Carson City Hazard Ranking		
	Identified Hazards	Score/Ranking
HIGH	1 Wildland Fire	253
	2 Earthquake	251
	3 Epidemic	228
	4 Terrorism/WMD	229
	5 Flood	216
	6 Severe Weather	200
	7 Hazmat	192
	8 Drought	186
LOW	9 Utility Loss	172
	10 Volcano	140
	11 Landslide	116
	12 Seiche	98
	13 Avalanche	90

2. Assess Risk

We heard from subject matter experts.

Carson City

Hazard Mitigation Plan 2021

APPENDIX A

Appendix A: Meeting Notes and Handouts

- Meeting 1
- Meeting 2
- Meeting 3
- Meeting 3.5
- Mitigation Action Review Documents
- Presentations by Subject Matter Experts
 - Acts of Violence
 - Earthquake
 - Flooding in Carson City
 - Infectious Disease
 - Overview of Residential Development
 - Severe Weather
 - Wildland Fire

We reviewed the ranking criteria and the ranking form.

Criteria	Value	Category	Description
Probability / Frequency	1	Very Low	Occurs less than once in 1000 years.
	2	Low	Occurs less than once in 100 to once in 1000 years.
	3	Medium	Occurs less than once in 10 to once in 100 years.
	4	High	Occurs less than once in 5 to once in 100 years.
	5	Very High	Occurs more frequently than once in 5 years.
Magnitude/ Severity • Economic Impact • Area Affected • Vulnerability	1	Very Low	<ul style="list-style-type: none"> Negligible property damages (less than 5% of all buildings and infrastructure). No deaths and injuries/illnesses treatable with first aid and do not require hospitalization. Negligible loss of quality of life. Economic and geographic effects are localized.
	2	Low	<ul style="list-style-type: none"> Slight property damages (5% to 15%) of all buildings and infrastructure). No deaths and few injuries/illnesses require hospitalization. Slight loss of quality of life. Economic and geographic effects felt at the city or community.
	3	Medium	<ul style="list-style-type: none"> Moderate property damages (15% to 30% of all buildings and infrastructure). Fewer than 5 deaths and multiple injuries/illnesses require hospitalization. Some loss of quality of life. Economic and geographic effects felt countywide.
	4	High	<ul style="list-style-type: none"> Moderate property damages (30% to 50% of all buildings and infrastructure). More than 5 deaths and considerable injuries/illnesses require hospitalization in multiple facilities with some resulting in permanent disability. Moderate loss of quality of life. Economic and geographic effects felt statewide.
	5	Very High	<ul style="list-style-type: none"> Moderate property damages (30% to 50% of all buildings and infrastructure). Significant number of deaths and injuries/illnesses requiring hospitalization in multiple facilities with some resulting in permanent disability. Significant loss of quality of life. Economic and geographic effects felt at the Region IX level.
Warning Time	1	Very Low	Greater than 30 days of warning
	2	Low	5-30 days of warning
	3	Medium	1-5 days of warning
	4	High	1 to 10 hours of warning
	5	Very High	No warning
Duration of Loss of Critical Facilities and Services	1	Very Low	1 to 3 days
	2	Low	4 to 7 days
	3	Medium	8 to 14 days
	4	High	15 to 20 days
	5	Very High	More than 20 days
Frequency in the Future	1	Very Low	Highly unlikely to increase probability of this hazard
	2	Low	Unlikely to increase probability of this hazard
	3	Medium	Could increase probability of this hazard
	4	High	Likely to increase probability of this hazard
	5	Very High	Highly likely to increase probability of this hazard

Hazard Ranking Tool

Hazard Type*	Probability / Frequency	Magnitude / Severity	Warning Time	Duration of loss of critical facilities & services	Risk Update >, <, =	Total
Acts of Violence						
Avalanche						
Climate Change						
Drought						
Earthquake						
Floods						
Hazardous materials event						
Infectious Disease						
Landslide						
Severe Weather; Storms, dry lightning, extreme heat, high wind						
Wildland Fire						
Volcano						
Other						

* Cascading effects such as utility loss, seiche, and other impacts will be discussed under primary hazards as appropriate.

2. Assess Risk

We identified and categorized hazards by risk and then. . .

High

Earthquake
Wildfire
Flood
Severe Weather
Acts of Violence

Moderate

Infectious Disease
Drought
Hazardous Materials
Climate Change
Landslides

Low

Avalanche
Volcano

We profiled and mapped them. . .

5.2.13 Wildland Fire

- 5.2.13.1 Planning Significance – High
- 5.2.13.2 Hazard/Problem Description
- 5.2.13.3 Location and Extent
- 5.2.13.4 Previous Occurrences
- 5.2.13.5 Probability of Future Events
- 5.2.13.6 Future Frequency of Events Due to...
- 5.2.13.7 Cascading Hazards
- 5.2.13.8 Utility Loss

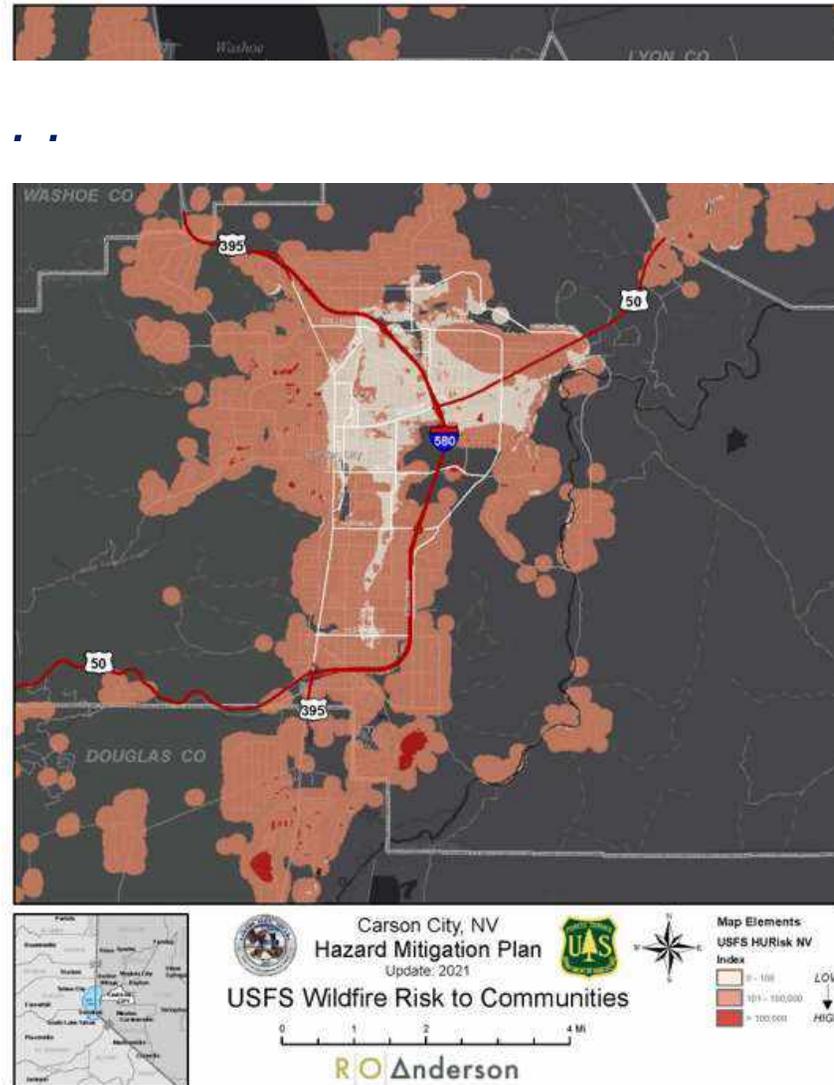
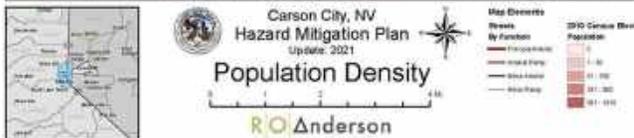
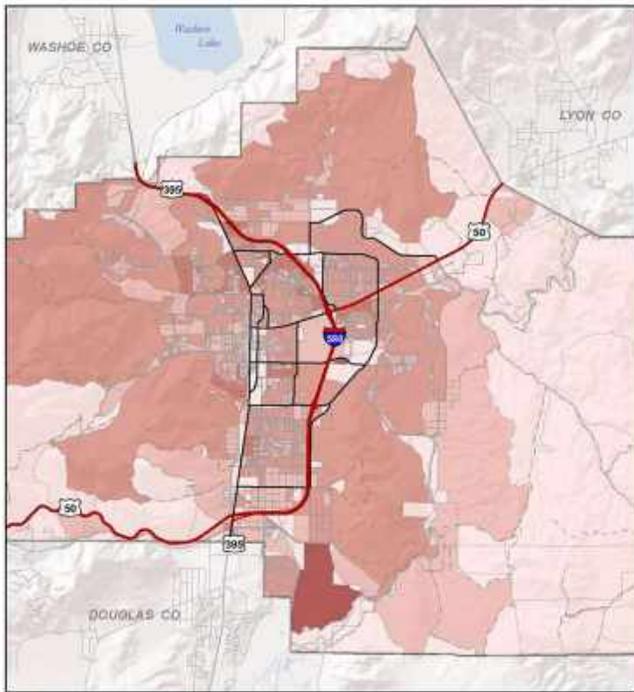


FIGURE 6-6: MAP OF CARSON CITY'S WILDFIRE RISK

2. Assess Risk

We identified assets . . .

Population: 55,916



Land Use_Group	Parcel Sum	Value	Content Value	Total Value
Vacant Total	1424	\$28,623,687	\$14,311,844	\$42,935,531
Single Family Total	16212	\$2,034,692,450	\$1,017,346,225	\$3,052,038,675
Multi residential Total	870	\$234,061,421	\$117,030,711	\$351,092,132
Commercial Total	1325	\$692,266,164	\$346,133,082	\$1,038,399,246
Industrial Total	205	\$138,645,052	\$69,322,526	\$207,967,578
Rural Total	96	\$4,650,302	\$2,325,151	\$6,975,453
Utilities Total	52	\$269,361	\$134,681	\$404,042
Public Use Total	56	\$68,038,798	\$34,019,399	\$102,058,197
Grand Total	20240	\$3,201,247,235	\$1,600,623,618	\$4,801,870,853

2. Assess Risk

. . . and vulnerabilities.

Hazard Loss Estimate

Due to the limited data available showing no recent significant volcanic in striking distance of the planning area, this qualitative analysis identifies 5% of the population and 5% of the total value for structures/contents to estimate damages (see table below) and the number people (2,796) impacted by a volcanic event.

Carson City

Hazard Mitigation Plan 2021

SECTION SIX

Structure Type by Land Use Code	# of Assets	5% of # of Assets	Building Replacement Value	Content Value	Total Value of Exposure	5% of Total Value of Exposure
Vacant Total	1424	71	\$28,623,887	\$14,311,844	\$42,935,531	\$2,146,776.53
Single Family Total	16212	811	\$2,034,692,450	\$1,017,346,225	\$3,052,038,675	\$152,601,933.75
Multi-Residential	870	44	\$234,061,421	\$117,030,711	\$351,092,132	\$17,554,606.58
Commercial Total	1325	66	\$692,266,164	\$346,133,082	\$1,038,399,246	\$51,919,962.30
Industrial Total	205	10	\$138,645,052	\$69,322,526	\$207,967,578	\$10,398,378.90
Rural Total	96	5	\$4,650,302	\$2,325,151	\$6,975,453	\$348,772.65
Utilities Total	52	3	\$269,361	\$134,681	\$404,042	\$20,202.08
Public Use Total	56	3	\$68,038,798	\$34,019,399	\$102,058,197	\$5,102,909.85
Grand Total	20240	1012	\$3,201,247,235	\$1,600,623,618	\$4,801,870,853	\$240,093,542.63

FIGURE 6-9: 5% EXPOSURE OF STRUCTURE AND CONTENTS - VOLCANO

2. Assess Risk

We reviewed & updated capabilities.

7 Capability Assessment & National Flood Insurance Program (NFIP) Participation

7.1 What Changed?

7.2 Capability Assessment.

7.2.1 Administrative & Technical Capabilities

7.2.2 Education & Outreach Capabilities

7.2.3 Financial Capabilities

7.2.3.1 Additional Potential Funding Resources for Hazard Mitigation

7.2.4 Planning & Regulatory Capabilities

7.3 National Flood Insurance Program (NFIP) Participation

City's Department	Program Name & Description	Acronym	Funding Organization	Potential Connections to 2021 Mitigation Action Items
Fire Department/ Emergency Management	<p>State General Fund United We Stand (license plate)</p> <p>Provides financial assistance to local governments to support preparedness to combat terrorism, including, without limitation, planning, training, and purchasing supplies and equipment, or for any other purpose authorized by the Legislature.</p>	SGF	State of Nevada	Potential

3. Assess Capability

We reviewed & updated mitigation goals

TABLE 8-1: UPDATED MITIGATION GOALS

Goal #	Goal Description
1	<i>Promote increased and ongoing Carson City involvement in hazard mitigation planning and projects.</i>
2	<i>Build and support local capacity to enable the community to prepare for, respond to, and recover from disasters.</i>
3	<i>Reduce the possibility of damage and losses due to earthquakes.</i>
4	<i>Reduce the possibility of threat to life and losses due to infectious disease.</i>
5	<i>Reduce the possibility of damage and losses due to floods.</i>
6	<i>Reduce the possibility of damage and losses due to severe weather.</i>
7	<i>Reduce the possibility of damage and losses due to terrorist events.</i>
8	<i>Reduce the possibility of damage and losses due to wildland fires.</i>
9	<i>Reduce the possibility of damage and losses due to drought.</i>
10	<i>Reduce the possibility of damage and losses due to landslide.</i>
11	<i>Reduce the possibility of damage and losses due to hazardous materials.</i>

“Mitigation is any sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event.”

2021 Carson City Hazard Mitigation Plan

- *Review & Update Mitigation Strategies*

We reviewed & updated mitigation actions.

TABLE 8-3: MITIGATION STRATEGY

Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Lead Dept. or Division - Timeline	Estimated Cost (\$)	Potential Funding Source	Primary Reviewer for the City	Status Not Started, Continuing, Completed, No longer relevant	2021 Priority
Goal 1: Promote increased and ongoing Carson City involvement in hazard mitigation planning and projects.								
1.A - e LPR	ALL	Review and update the Master Plan to be consistent with the hazard area maps and implementation strategies developed in the HMP in 2022 and 2023. Review & update ordinances & code every three years.	Planning — 2 Years	Staff Time \$5,000	Local Gen. Fund	Hope Sullivan	Continuing	Medium
1.B - e E&O	ALL	Identify & educate Carson City personnel on high hazard areas.	LEPC Planning Committee / Emergency Mgmt. — Annually	Staff time \$16,000	Local Gen. Fund, BRIC	Jason Danen & Rachael Schneider	Continuing	Medium
1.C - e P&R	ALL	Coordinate existing Geographic Information Systems (GIS) capabilities to identify hazards through the City.	Public Works — Ongoing	Staff Time \$5,000	Local Gen. Fund	Dan Stucky	Continuing	Medium

- Review & Update Mitigation Strategies

We prioritized mitigation actions.

Carson City HMP Update 2021

Mitigation Action Ranking Criteria

Use the criteria defined below to evaluate each mitigation action being considered. For each action, assess the potential benefits and/or likelihood of successful implementation and assign each criterion a value of 3, 2, or 1 where:

3 = Highly effective and/or feasible 2 = Effective and/or feasible 1 = Ineffective and/or not feasible	
Administrative & Legal	Does the community have the personnel and administrative capabilities to <i>implement and maintain</i> the project, or will outside help be necessary? Does Carson City have the authority to implement the action?
Environmental	Does the mitigation action benefit the environment? Does it support the protection of natural systems? Will it comply with environmental regulations?
Local Champion & Political	Is there a strong advocate for the action or project among local department and agencies that will support the action's implementation? Is there overall public support for the mitigation action? Is there the political will to support it?
Other Community Objectives	Does the action advance other community objectives, such as capital improvements, economic development, environmental quality, or open space preservation? Does it support the policies of the comprehensive (Master) plan?
Social	Will the action adversely affect one segment of the population? Will the action disrupt established neighborhoods, break up voting districts, or cause the relocation of lower income people?
Technical	Is the mitigation action technically feasible? Is it a long-term solution? Eliminate actions that, from a technical standpoint, will not meet the goals.
3 = Highly feasible 2 = Feasible 1 = Major Challenges	
Financial Feasibility	Consider the cost of the life of the project, from design through construction and maintenance. Can the project be funded and maintained? To what extent would these costs burden the City? Can the action be implemented over time in stages? Are alternative funding sources available—for construction? Maintenance?
3 = High 2 = Moderate 1 = Limited	
Anticipated Benefits	Will the action protect lives and/or prevent injuries? Will the action protect structures and infrastructure? Will the action enhance <i>quality of life</i> and the natural and beneficial function of ecosystems (water sources, wetlands, etc.)?
3 = Benefit trumps cost 2 = Neutral 1 = Cost over benefit	
Cost vs. Benefit	Using the results of Financial Feasibility and Anticipated Benefits scoring above, assign a Cost vs. Benefit score to each task.

- Review & Update Mitigation Strategies

We identified and collected maintenance and monitoring strategies. . .

A proposed timeline for managing plan maintenance over the next five years is outlined below.

Proposed Schedule	Year 1	Year 2	Year 3	Year 4	Year 5
Annual PT Meeting	~	11/2022	11/2023	11/2024	11/2024
Collect Public Input Forms*	~	9/2022	9/2023	9/2024	9/2024
Collect Mitigation Action Updates	~	9/2022	9/2023	9/2024	9/2024
Present Mitigation Action Updates	~	11/2022	11/2023	11/2024	11/2024
Present Mitigation Action Results	~	~	11/2023	11/2024	11/2024
Present Status/Results to BOS	~	01/2022	01/2023	01/2024	01/2025
Annual Report to City Manager	03/2022	03/2023	03/2024	03/2025	HMP Update
Draft RFP for 2025 Update**	~	~	06/2023	~	~
Circulate RFP**	~	~	10/2023	~	~
Initiate 2025 Update efforts	~	~	~	01/2024	~
*Present comments at annual meeting					
**These items do not apply if the City chooses to complete the update independently.					

- *Monitor Progress*

... and tools to support this effort.

Carson City Hazard Mitigation Plan – 2021 Update
Mitigation Action Progress Report Tracking Sheet

Goal #, Action Letter Existing = e or New = n	Hazard Description	Action Description	Lead Dept. Division Timeline	or — Estimated Cost (\$)	Potential Funding Source	Primary Reviewer for the City	Status Not Started, Continuing, Completed, No longer relevant	Progress Report Sent DATE	Progress Report Received DATE
<i>Goal 1: Promote increased and ongoing Carson City involvement in hazard mitigation planning and projects.</i>									
I.A – e LPR	ALL	Review and update the Master Plan to be consistent with the hazard area maps and implementation strategies developed in the HMP in 2022 and 2023. Review & update ordinances & code every three years.	Planning — 2 Years	Staff Time \$5,000	Local Gen. Fund	Hope Sullivan			
I.B – e E&O	ALL	Identify & educate Carson City personnel on high hazard areas.	LEPC Planning Committee / Emergency MgmtL — Annually	Staff time \$16,000	Local Gen. Fund, BRVC	Jason Danen & Rachael Schneider	Continuing		
I.C – e P&R	ALL	Coordinate existing Geographic Information Systems (GIS) capabilities to identify hazards through the City.	Public Works — Ongoing	Staff Time \$5,000	Local Gen. Fund	Dan Stucky	Continuing		

- Monitor Progress

What Changed?

- Section 1: Overview & Official Record of Adoption
- Section 2: Purpose of the Plan +
- Section 3: Community Description
- Section 4: Planning Process & Plan Maintenance
- Section 5: Hazard Analysis
- Section 6: Vulnerability Analysis
- Section 7: Capability Assessment
- Section 8: Mitigation Strategy

Section 1: Overview & Official Record of Adoption

- Expedited process
- Record of Adoption and FEMA Approval will be integrated into this Section (rather than located in an Appendix).
- Amendment to the FEMA-Approved, Carson City Adopted Plan
 - Updates to Section 6: Vulnerability Assessment
 - Hazus Level 2 analysis for flood and earthquake
 - Integrating data provided by Carson City (vs. default data available via Hazus)
 - To be completed at no additional cost to the City within four months of FEMA's approval of the Plan Update.

- *What Changed?*

Section 2: Purpose of the Plan

- Changes in FEMA funding opportunities
 - New Programs
 - BRIC: Building Resilient Infrastructure and Communities
 - Rehabilitations of High Hazard Dams
 - Discontinued Programs
 - Pre-Disaster Mitigation
 - Severe Repetitive Loss
- Tables outlining FEMA Funding Programs

FEMA Assistance Program	Current HMP Required for a State/Tribal Applicant?	Current HMP Required for a Tribal/Local Sub-Applicant?
<u>Individual Assistance (IA)</u> The community must meet requirements and be approved in the Presidential Declaration.	No	No
<u>Public Assistance (PA)</u> Categories A and B (e.g., debris removal, emergency protective measures) Approved by Presidential Declaration	No	No
<u>Public Assistance (PA)</u> Categories C through G (e.g., repairs to damaged infrastructure, publicly owned buildings) Approved by Presidential Declaration	Yes	No

- *What Changed?*

Section 3: Community Description

- Integration of Additional Maps, Tables, and Exhibits
- Expansion of Community Features
 - History
 - Geography
 - Climate
 - Demographics
 - Employment
 - Economics
 - Housing
 - Transportation
 - Infrastructure
 - Natural and Cultural Resources
 - Government
 - Land Use
 - Population
 - Quad County Partnership

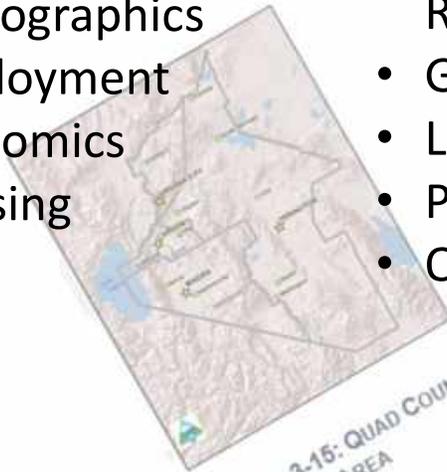
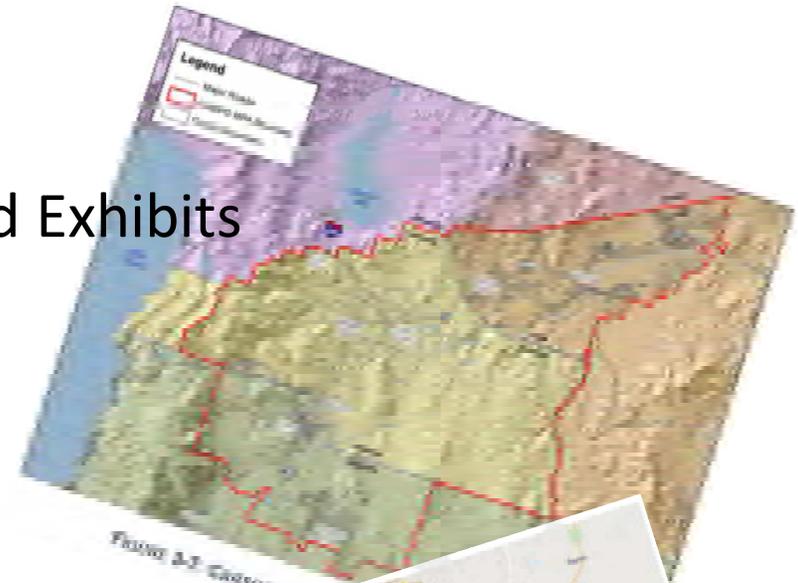


FIGURE 3-15: QUAD COUNTY AREA



- *What Changed?*

Section 4: Planning Process and Plan Maintenance

- The process itself was streamlined to accommodate the City’s deadline—and was submitted with best available data to date.
- “What Changed” is a new subcategory under each Section.
- Plan Maintenance folded into Section 4: Planning Process eliminating Section 9, the former location for plan maintenance.
- FEMA Requirements updated to current language and integrated in each section to facilitate the plan review.

ELEMENT	REQUIREMENTS
<p>A5. Is there discussion on how the community(ies) will continue public participation in the plan maintenance process? 44 CFR 201.6(c)(4)(iii)</p> <p><i>Intent:</i> To identify how the public will continue to have an <u>opportunity to participate in the plan's maintenance and implementation over time.</u></p>	<p>a. The plan must describe how the jurisdiction(s) will continue to seek public participation after the plan has been approved and during the plan's implementation, monitoring and evaluation.</p> <p><i>Participation</i> means engaged and given the chance to provide feedback. Examples include, but are not limited to, periodic presentations on the plan's progress to elected officials, schools or other community groups, annual questionnaires or surveys, public meetings, postings on social media and interactive websites.</p>

- What Changed?

Section 5: Hazard Analysis

- Each hazard profile addresses the following categories to align with current requirements and streamline the review.
 - **Planning Significance**
 - **Hazard Problem/Description**
 - **Location and Extent**
 - **Previous Occurrences**
 - **Future Frequency of Events due to Climate Change**
 - **Cascading Hazards**
 - **Utility Loss**
- Term “human-caused” was replaced by “manmade.”
- Climate Change was added to the hazard list. Each hazard was also evaluated for “Future Frequency of Events Due to Climate Change.”
- “Utility Loss,” previously a stand-alone hazard, was addressed in a separate category under “Cascading Hazards.”

- *What Changed?*

Section 6: Vulnerability Assessment

- Population data is based on Vintage 2019 data as the 2020 Census results was not available during the planning process.
- The vulnerability of population for each hazard and its sub-hazards are described in the narrative (population) and in tables (building and content values) as applicable for each hazard.
- Note that a 5% average exposure is used for hazards evaluated using available qualitative data.
- The vulnerability analysis intends to present a more detailed, Hazus Level-2, evaluation of the impacts of flood and earthquake. An Amendment to address the currently insufficient analysis is planned to commence upon FEMA's approval of the existing plan.

- *What Changed?*

Section 7: Capability Assessment

- Expedited process
- Record of Adoption and FEMA Approval will be integrated into this Section (rather than located in an Appendix).
- Amendment to the FEMA-Approved, Carson City Adopted Plan
 - Updates to Section 6: Vulnerability Assessment
 - Hazus Level 2 analysis for flood and earthquake
 - Integrating data provided by Carson City (vs. default data available via Hazus)
 - To be completed at no additional cost to the City within four months of FEMA's approval of the Plan Update.

- *What Changed?*

Section 8: Mitigation Strategy

- Updates to goals and mitigation actions
- Addition of new mitigation actions.
- Address additional FEMA Requirements
 - Integration of Mitigation Plan into Local Planning Mechanisms
 - Changes in Development
 - Progress in Mitigation Efforts and Changes in Priorities

The table below outlines the requirement that plan updates address the progress made in implementing mitigation actions as well as any changes in priorities for the community

ELEMENT	REQUIREMENTS
<p>D2. Was the plan revised to reflect progress in local mitigation efforts? 44 CFR 201.6(d)(3)</p> <p><i>Intent:</i> To evaluate and demonstrate progress made in the past five years in achieving goals and implementing actions outlined in their mitigation strategy.</p>	<p>a. The plan must describe the status of hazard mitigation actions in the previous plan by identifying those that have been completed or not completed. For actions that have not been completed, the plan must either describe whether the action is no longer relevant or be included as part of the updated action plan.</p>
<p>D3. Was the plan revised to reflect changes in priorities? 44 CFR 201.6(i)(3)</p> <p><i>Intent:</i> To ensure the plan reflects current conditions, including financial, legal, and political realities as well as post-disaster conditions.</p>	<p>a. The plan must describe if and how any priorities changed since the plan was previously approved.</p> <p>If no changes in priorities are necessary, plan updates may validate the information in the previously approved plan.</p>

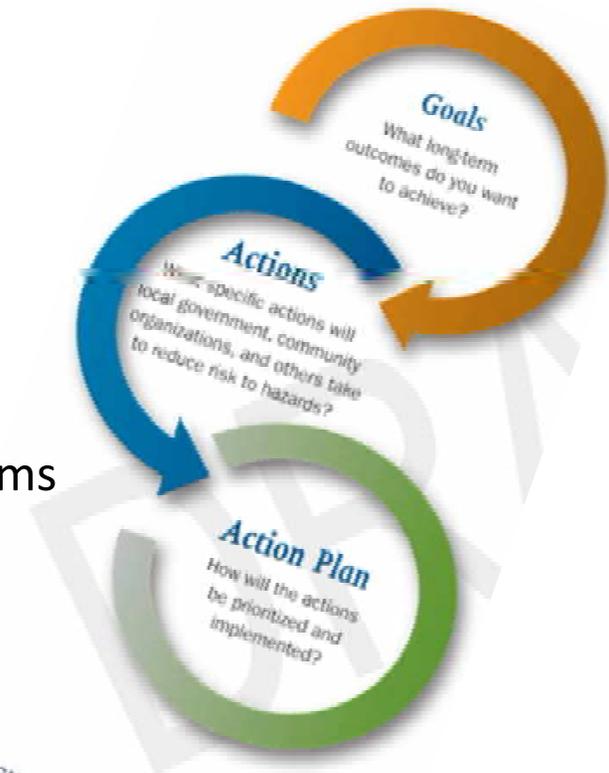


FIGURE 8-1: MITIGATION STRATEGY COMPONENTS

- What Changed?

Plan Update Outcomes

- Addresses current FEMA requirements.
- Identifies post-2015 previous occurrences.
- Includes hazard profile for Climate Change.
- ***Presents new mitigation actions.***
- Planned Amendment
- Approval and Adoption

New Mitigation Actions and Priorities

- 1.H.** Design and construct a City-owned fuel facility, including emergency fuel storage. . .

- 1.I.** Reduce the risk of power outages by collaborating with NV Energy to determine where disruption is most likely and the feasibility of underground power lines.

- 1.J.** Incorporate the HMP Update process into the City's Strategic Plan

- 2.G.** Plan and construct an Emergency Operations Center. . .

- 2.H.** After a hazard event, ask FEMA to conduct a losses-avoided analysis for specific projects as appropriate.

- 2.I.** Train GIS staff in the FEMA Hazus software

- *Outcomes*

New Mitigation Actions and Priorities

2.J. Initiate development of a Recovery Plan

3.B. Evaluate unreinforced masonry structure inventory, using benefit-cost analysis, identified priorities for retrofitting buildings. . .

4.E. Reduce disparities and inequities in the distribution of infectious disease information during and prior to outbreaks.

4.F. Establish a plan that addressed the development, protection, retention, and resilience of the public health workforce and identifies options for expanding the workforce. . .

5.L. Install a storm water retention/detention facility in Ash and Kings Canyon Watersheds.

9.C. Rehabilitate and upgrade the Quill Water Treatment Plant to maximize the use of available surface water resources and increase water supply.

• *Outcomes*

Approval, Adoption, Amendment

Upon receipt of **Public Comment**, due July 22nd, the comments will be incorporated, and the updated Plan will be sent to the **State of Nevada Division of Emergency Management** (NDEM) on July 23, 2021.

Upon their review and approval, the Plan will be sent to **FEMA** for review and approval.

Upon receipt of FEMA's approval, the **Carson City Board of Supervisors** may adopt the plan.

Adoption must be completed within one year of FEMA's approval.

Upon receipt of FEMA's approval, an amendment will be completed for approval by the Planning Team as early as the November PT meeting.

- *Outcomes*

Planned Amendment (excerpted from Executive Summary)

The *Carson City, Nevada, Hazard Mitigation Plan* has been updated in compliance with Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act or the Act), 42 U.S.C. 5165, enacted under Sec. 104 the Disaster Mitigation Act of 2000 (DMA 2000). The 2016 HMP update will expire in early August. The 2021 plan update was authorized in mid-April, and the administrative draft was circulated on July 2, 2021.

The Planning Process was streamlined to accommodate the approximate twelve-week window for preparing, circulating, and editing this update so that the City can remain eligible for funding for FEMA's 2020 grant cycle awards expected in September.

Due to challenges posed by this goal, the plan was submitted with the best available data to date. A more detailed vulnerability assessment, including HAZUS Level 2 Analysis, will be incorporated via an amendment within four months from receipt of FEMA's approval of the 2021 HMP Update.

- *Outcomes*



Q & A

PUBLIC COMMENTS

Appendix A: Meeting Notes and Handouts

- Mitigation Action Review Documents

Carson City HMP Update 2021

Mitigation Action Ranking Criteria

Use the criteria defined below to evaluate each mitigation action being considered. For each action, assess the potential benefits and/or likelihood of successful implementation and assign each criterion a value of 3, 2, or 1 where:

3 = Highly effective and/or feasible 2 = Effective and/or feasible 1 = Ineffective and/or not feasible	
Administrative & Legal	Does the community have the personnel and administrative capabilities to <i>implement and maintain</i> the project, or will outside help be necessary? Does Carson City have the authority to implement the action?
Environmental	Does the mitigation action benefit the environment? Does it support the protection of natural systems? Will it comply with environmental regulations?
Local Champion & Political	Is there a strong advocate for the action or project among local department and agencies that will support the action's implementation? Is there overall public support for the mitigation action? Is there the political will to support it?
Other Community Objectives	Does the action advance other community objectives, such as capital improvements, economic development, environmental quality, or open space preservation? Does it support the policies of the comprehensive (Master) plan?
Social	Will the action adversely affect one segment of the population? Will the action disrupt established neighborhoods, break up voting districts, or cause the relocation of lower income people?
Technical	Is the mitigation action technically feasible? Is it a long-term solution? Eliminate actions that, from a technical standpoint, will not meet the goals.
3 = Highly feasible 2 = Feasible 1 = Major Challenges	
Financial Feasibility	Consider the cost of the life of the project, from design through construction and maintenance. Can the project be funded and maintained? To what extent would these costs burden the City? Can the action be implemented over time in stages? Are alternative funding sources available—for construction? Maintenance?
3 = High 2 = Moderate 1 = Limited	
Anticipated Benefits	Will the action protect lives and/or prevent injuries? Will the action protect structures and infrastructure? Will the action enhance <i>quality of life</i> and the natural and beneficial function of ecosystems (water sources, wetlands, etc.)?
3 = Benefit trumps cost 2 = Neutral 1 = Cost over benefit	
Cost vs. Benefit	Using the results of Financial Feasibility and Anticipated Benefits scoring above, assign a Cost vs. Benefit score to each task.

Prioritization Tool: June 22, 2021

Carson City 2021 Hazard Mitigation Plan Update

Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Estimated Cost (\$)	Administrative & Legal	Environmental	Local Champion & Political	Other Community Objectives	Social	Technical	Financial Feasibility	Anticipated Benefits
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> E&O: Education & Outreach LPR: Local Plans & Regulations NSP: Natural Systems Protection P&R: Preparedness & Response S&I: Structure & Infrastructure </div>											
				3 = Highly effective or feasible 2 = Neutral 1 = Ineffective or not feasible	3 = Highly effective or feasible 2 = Neutral 1 = Ineffective or not feasible	3 = Highly effective or feasible 2 = Neutral 1 = Ineffective or not feasible	3 = Highly effective or feasible 2 = Neutral 1 = Ineffective or not feasible	3 = Highly effective or feasible 2 = Neutral 1 = Ineffective or not feasible	3 = Highly effective or feasible 2 = Neutral 1 = Ineffective or not feasible	3 = Highly Feasible 2 - Feasible 1 = Major Challenges	3 = High 2 = Moderate 1 = Limited
Goal 1: Promote increased and ongoing Carson City involvement in hazard mitigation planning and projects.											
1.A - e LPR	ALL	Review and update the Master Plan to be consistent with the hazard area maps and implementation strategies developed in the HMP. Review & update ordinances & code every three years.	Staff Time \$5,000								
1.B - e E&O	ALL	Identify & educate Carson City personnel on high hazard areas.	Staff Time \$16,000								
1.C - e P&R	ALL	Coordinate existing Geographic Information Systems (GIS) capabilities to identify hazards through the City.	Staff Time \$5,000								
1.D - e P&R	ALL	Develop the data sets that are necessary to test hazard scenarios and mitigation tools, including HAZUS MH.	Staff Time \$29,000								
1.E - e E&O + P&R	ALL	Continue to utilize the Internet as a communication tool, as well as an education tool.	Staff time for Six weeks/ \$24,000 Yr								
1.F - e P&R	Drought, Earthquake, Flood, Landslide, Severe Weather, & Wildfire	Continue to adopt and implement city building codes and ordinances that protect people and structures from drought, earthquake, flood, landslide, severe weather, and wildfire.	Staff Time \$5,000								
1.G - e LPR	Wildfire	Collaborate and support the continued update of the Community Wildfire Plan.	Staff time/ \$20,000 Yr								
1.H - n LPR	Earthquake, Flood, Severe Weather, Wildfire	Design and construct a City-owned fuel facility, including emergency fuel storage to support critical infrastructure during an extended power outage.	\$900,000								
1.I - n P&R	Severe Weather	Reduce the risk of power outages by collaborating with NV Energy to determine areas where disruption is most likely and the feasibility of underground power lines.	Staff Time (2 People for 3 mos & Travel)/ \$129,500								
Goal 2: Build and support local capacity to enable the community to prepare for, respond to, and recover from disasters.											
2.A - e P&R	Flood and Wildfire	Maintain and update emergency evacuation programs for neighborhoods in flood prone and wildland areas.	Staff Time \$5,000								
2.B - e LPR	ALL	Annually review the City's Emergency Operations Plan and update and integrate w/local Hazard Mitigation Plan.	Staff time \$18,000 Yr								
2.C - e P&R	ALL	Conduct a minimum of one disaster exercise per year.	Staff time \$18,000 Yr								
2.D - e E&O	ALL	Establish a budget and identify funding sources for mitigation outreach.	Staff time \$12,000 Yr								
2.E - e E&O	ALL	Continue to work with school district to promote education on the Standard Response Plan, a public outreach campaign that teaches children, staff, and families how to avoid danger and behave during an emergency.	Materials available @ no cost \$25,000 Staff Time Yr								

Prioritization Tool: June 22, 2021

Carson City 2021 Hazard Mitigation Plan Update

Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Estimated Cost (\$)	Administrative & Legal	Environmental	Local Champion & Political	Other Community Objectives	Social	Technical	Financial Feasibility	Anticipated Benefits
		E&O: Education & Outreach LPR: Local Plans & Regulations NSP: Natural Systems Protection P&R: Preparedness & Response S&I: Structure & Infrastructure		3 = Highly effective or feasible 2 = Neutral 1 = Ineffective or not feasible	3 = Highly effective or feasible 2 = Neutral 1 = Ineffective or not feasible	3 = Highly effective or feasible 2 = Neutral 1 = Ineffective or not feasible	3 = Highly effective or feasible 2 = Neutral 1 = Ineffective or not feasible	3 = Highly effective or feasible 2 = Neutral 1 = Ineffective or not feasible	3 = Highly effective or feasible 2 = Neutral 1 = Ineffective or not feasible	3 = Highly Feasible 2 - Feasible 1 = Major Challenges	3 = High 2 = Moderate 1 = Limited
2.F – e E&O	ALL	Continue to prepare, develop, and distribute appropriate public information about hazard mitigation programs and projects at Carson City-sponsored events and on the Carson City and Fire Department websites.	Staff time \$6,000								
2.G – n S&I	All	Plan and construct an Emergency Operations Center (EOC), including a fire station and backup emergency dispatch center	\$12.5M								
Goal 3: Reduce the possibility of damage and losses due to earthquakes.											
3.A – e LPR	Earthquake	Continue to develop, adopt, and enforce policies and regulations pertaining to grading and related construction relative to seismic hazards.	Staff Time \$5,000								
3.B – n S&I	Earthquake	Evaluate unreinforced masonry structure inventory; using benefit-cost analysis, identify priorities for retrofitting buildings; and complete the necessary upgrades.	Staff Time Tasks 1 & 2 Only \$178,000								
3.C – e P&R	Earthquake, Wildfire, Flood, Severe Weather, Landslides	Maintain a structure database using GIS.	Staff Time \$5,000								
3.D – e S&I	Fire	Acquire and install clean-agent systems for the City Hall and Public Safety computer rooms to reduce damage to computer equipment due to fire.	One time cost \$50,000								
Goal 4: Reduce the possibility of threat to life and losses due to Infectious Disease.											
4.A – e LPR	Infectious Disease	Update Mass Illness Plan and integrate with local Hazard Mitigation Plan.	One time cost \$3,500								
4.B – e P&R	Infectious Disease	Continuation of training and exercise program relative to infectious disease.	Yearly \$42,000								
4.C – e P&R	Infectious Disease	Prepare by acquiring and storing needed medical PPE to help support medical response due to infectious disease and managing the rotation of stock.	Yearly \$25,000								
4.D – e E&O & P&R	Infectious Disease	Maintain a public program for information and education.	Yearly \$12,000								
4.E – n E&O & P&R	Infectious Disease	Reduce disparities and inequities in the distribution of infectious disease information during and prior to outbreaks.	\$50,000 for implementation Yearly Personnel & Operating Bdgt. \$116,000								
4.F – n LPR P&R	Infectious Disease	Establish a plan that addresses the development, protection, retention, and resilience of the public health workforce and identifies options for expanding the workforce quickly for a health-related emergency that extends beyond 30 days.	Consultant Estimate \$65,000								
Goal 5: Reduce the possibility of damage and losses due to floods.											

Prioritization Tool: June 22, 2021

Carson City 2021 Hazard Mitigation Plan Update

Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Estimated Cost (\$)	E&O: Education & Outreach LPR: Local Plans & Regulations NSP: Natural Systems Protection P&R: Preparedness & Response S&I: Structure & Infrastructure						Financial Feasibility	Anticipated Benefits
				Administrative & Legal	Environmental	Local Champion & Political	Other Community Objectives	Social	Technical		
				3 = Highly effective or feasible 2 = Neutral 1 = Ineffective or not feasible	3 = Highly effective or feasible 2 = Neutral 1 = Ineffective or not feasible	3 = Highly effective or feasible 2 = Neutral 1 = Ineffective or not feasible	3 = Highly effective or feasible 2 = Neutral 1 = Ineffective or not feasible	3 = Highly effective or feasible 2 = Neutral 1 = Ineffective or not feasible	3 = Highly effective or feasible 2 = Neutral 1 = Ineffective or not feasible	3 = Highly Feasible 2 - Feasible 1 = Major Challenges	3 = High 2 = Moderate 1 = Limited
5.A – e revised LPR	Severe Weather, Flood	Provide a consolidated storm water system Master Plan including development of project proposals to improve storm water facilities.	\$75,000								
5.B – e LPR	Severe Weather, Flood	Continue to update policies that discourage growth in flood-prone areas.	Staff Time \$5,000								
5.C – e LPR	Severe Weather, Flood	Continue to review and update flood plans for coordination w/adjacent counties, cities, and special districts supporting a regional approach to flood mitigation.	Staff Time \$5,000								
5.D – e LPR	Severe Weather, Flood	Update and expand Sandbagging Plan.	Staff Time \$5,000								
5.E – e S&I	Severe Weather, Flood	Continue to install new flood facilities through the City's CIP program to improve the overall effectiveness of the storm drain system.	\$950,000								
5.F – e NSP	Flood, Landslide	Upon completion of land transfers associated with the Lands Bill which includes land trading with Carson City, BLM, US Forestry, and Washoe Tribe; identify/implement projects within transferred lands and other areas within Carson City that need slope stabilization for flood and landslide mitigation.	Staff Time \$5,000								
5.G – e NSP	Flood, Landslide	Design and install facilities to capture debris and sediment within Eagle Valley.	120000								
5.H – e S&I + NSP	Flood	Develop a Flood Management Plan for the New Empire Area and install a new flood control facility for the area.	\$5.8M								
5.I – e NSP + S&I	ALL	Protect and enhance existing municipal water conveyance structures, storage and treatment facilities.	\$50,000								
5.J – e S&I + NSP	Severe Weather, Flood	Install a storm water retention / detention facility in Goni Canyon Watershed and storm drain system at Goni Creek.	\$8.6M								
5.K – e NSP + LPR	Flood, Severe Weather	Continue land acquisition of buildings with recurring loss or of land which could be used as retention and detention basins for flood control projects.	\$1M								
5.L – n LPR	Flood, Severe Weather	Install a storm water retention / detention facility in Ash and Kings Canyon Watersheds	\$2M								
Goal 6: Reduce the possibility of damage and losses due to Severe Weather.											
6.A – e S&I	Severe Weather	In areas at risk to severe weather, retrofit public buildings to withstand snow loads and severe winds to prevent roof collapse/damage.	\$1M								
6.B – e LPR	Severe Weather	Continue the Storm Water Management Plan for snow melt and debris storage.	Training & Staff Time \$10,000								
Goal 7: Reduce the possibility of damage and losses due to terrorist events.											
7.A – e LPR	Acts of Violence	Develop mitigation standards for public and high-risk buildings and associated grounds.	Staff Time \$148,000								
7.B – e LPR	Acts of Violence	Continue following planning procedures to mitigate acts of violence.	Staff Time \$500								

Prioritization Tool: June 22, 2021

Carson City 2021 Hazard Mitigation Plan Update

Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Estimated Cost (\$)	E&O: Education & Outreach LPR: Local Plans & Regulations NSP: Natural Systems Protection P&R: Preparedness & Response S&I: Structure & Infrastructure						Financial Feasibility	Anticipated Benefits
				3 = Highly effective or feasible 2 = Neutral 1 = Ineffective or not feasible	3 = Highly effective or feasible 2 = Neutral 1 = Ineffective or not feasible	3 = Highly effective or feasible 2 = Neutral 1 = Ineffective or not feasible	3 = Highly effective or feasible 2 = Neutral 1 = Ineffective or not feasible	3 = Highly effective or feasible 2 = Neutral 1 = Ineffective or not feasible	3 = Highly effective or feasible 2 = Neutral 1 = Ineffective or not feasible		
7.C – e S&I	Acts of Violence	Retrofit public and high-risk buildings to increase safety and reduce risk associated with acts of violence.	\$500k								
Goal 8: Reduce the possibility of damage and losses due to wildland fires.											
8.A – e LPR	Wildfire	Continue to adopt and enforce new versions of the Wildland Urban-Interface code and International Fire Code.	Staff time, outreach meetings, books \$8,000 (Due 2024) Every Six Yrs								
8.B – e NSP	Wildfire	Continue to conduct current fuel management programs and investigate and apply new and emerging fuel management techniques.	\$325,000								
8.C – e E&O	Wildfire	Continue public outreach campaign on extreme wildland fire dangers and steps that can be taken to reduce these dangers.	\$2,500								
8.D – e NSP + E&O	Wildfire	Expand the community-based vegetation management program.	\$5,000								
8.E – e E&O	Wildfire	Continue to utilize GIS and the internet as information tools.	\$2,500								
8.F – e P&R	Wildfire	Maintain the continuing wildland fire technical working group.	\$1,000								
8.G – e NSP + S&I	Flood, Wildfire	Continue to protect municipal water recharge zones from wildfires and flooding.	\$25,000								
Goal 9: Reduce the possibility of damage and losses due to drought.											
9.A – e NSP + S&I	Drought	Maintain water supply stabilization and recharge programs to maximize the use of surface sources when available and preserve the groundwater sources for system peaking needs and times of drought	\$2M								
9.B – e E&O + LPR	Drought	Continue to encourage public participation in drought strategies through public information programs on water conservation and drought resistant landscaping and through building code ordinances.	Staff Time \$5,000								
9.C – n NSP	Drought	Rehabilitate and upgrade the Quill Water Treatment Plant to maximize the use of available surface water resources and increase water supply.	\$15M								
Goal 10: Reduce the possibility of damage and losses due to landslide.											
10.A – e NSP	Landslide	Evaluate natural slopes to determine whether there are slope stabilization treatments that would be appropriate to prevent landslides.	\$50k								
10.B – e S&I	Landslide	Conduct slope stabilization projects to prevent landslides.	\$500k								
Goal 11: Reduce the possibility of damage and losses due to hazardous materials.											
11.A – e LPR	Hazardous Materials	Consider and as appropriate, adopt building codes and zoning ordinances to reduce public health risks from hazardous materials releases.	Staff Time \$75,000								

Infectious Disease Mitigation Actions 2016
 Reviewed May 21, 2021
 Nicki Aaker, Dustin Booth, Jeanne Freeman, ROA Staff

Status

4.A	Update Mass Illness Plan & integrate with local Hazard Mitigation Plan.	Health Dept.	NV Health & Human Services, CDC	6-12 months	Protection of lives due to pre-planning.	High
Implemented ? Yes <input type="checkbox"/> No <input type="checkbox"/>	NO Political Support? Yes <input type="checkbox"/> /No <input type="checkbox"/> Enough Funding? Yes <input type="checkbox"/> /No <input type="checkbox"/> Workload realistically or equitably distributed? Yes <input type="checkbox"/> /No <input type="checkbox"/> New Information about the risk or community that made implementation difficult or no longer reasonable? Yes <input type="checkbox"/> /No <input type="checkbox"/> Sufficient resources (staff, technical assistance, etc.) Yes <input type="checkbox"/> /No <input type="checkbox"/>	YES: Losses avoided? Results of implementation? Were the outcomes as expected? Explain			Photos of implemented project	
Comments: We are in the process of updating the mass illness plan. Was updated in 2017 – needs to go through another update – continue the project – funding to support the effort is coming from CDC – between 2017 and 2020 – the state of NV mass illness plan has not been updated since 2015—holding up projects. Intent is to move forward without the updated state plan. Does State of an estimated timeline, was in the scope for five years—but not done. Updated other plans with priority. Mass illness to be updated in 21-22 year.						
4.B	Continuation of training and exercise program relative to infectious disease.	Health Dept.	NV Health & Human Services, CDC	6-12 months ongoing	Protection of lives due to pre-planning.	High
Implemented ? Yes <input type="checkbox"/> No <input type="checkbox"/>	NO Political Support? Yes <input type="checkbox"/> /No <input type="checkbox"/> Enough Funding? Yes <input type="checkbox"/> /No <input type="checkbox"/> Workload realistically or equitably distributed? Yes <input type="checkbox"/> /No <input type="checkbox"/> New Information about the risk or community that made implementation difficult or no longer reasonable? Yes <input type="checkbox"/> /No <input type="checkbox"/> Sufficient resources (staff, technical assistance, etc.) Yes <input type="checkbox"/> /No <input type="checkbox"/>	YES: Losses avoided? Results of implementation? Were the outcomes as expected? Explain			Photos of implemented project	
Comments: This program occurs every year with practice distributing flu vaccinations. This was good preparation for the COVID vaccinations. Continuation of training is needed for preparedness. One other thing. . . we have created an internal infectious disease committee including clinic services manager, Dustin, epidemiologist, Jeanne, et al to meet quarterly to review worldwide trends and coordination. Partners. . . see MH notes here. . . Partners are diverse to include school nurses, emergency managers, EMS, including workforce health programs. Table top exercises associated with infectious disease with Quad County partners; on the coalition, two representatives from each of the counties we serve, multi-coordinated attack / exercises . . .						
4.C	Prepare by acquiring/storing needed medical equipment.	Health Dept.	NV Health & Human Services, CDC, Carson	6-12 months ONGOING	Protection of lives due to pre-planning.	Moderate

Infectious Disease Mitigation Actions 2016
 Reviewed May 21, 2021
 Nicki Aaker, Dustin Booth, Jeanne Freeman, ROA Staff

Status

			Hospital			
Implemented ? Yes <input type="checkbox"/> No <input type="checkbox"/>	NO Political Support? Yes <input type="checkbox"/> /No <input type="checkbox"/> Enough Funding? Yes <input type="checkbox"/> /No <input type="checkbox"/> Workload realistically or equitably distributed? Yes <input type="checkbox"/> /No <input type="checkbox"/> New Information about the risk or community that made implementation difficult or no longer reasonable? Yes <input type="checkbox"/> /No <input type="checkbox"/> Sufficient resources (staff, technical assistance, etc.) Yes <input type="checkbox"/> /No <input type="checkbox"/>		YES: Losses avoided? Results of implementation? Were the outcomes as expected? Explain			Photos of implemented project
Comments: Funding from preparedness and response, small cache of PPE for short stop-gap, in a temp controlled storage unit; in 2021/22 fiscal year, intend to build a supply rotation with healthcare entities to prevent loss of expired PPE via borrow and replace to manage supply chain challenges; hospital had trouble getting gloves and cache was not enough to supply gloves; use varied vendors; what is the needed amount in cache, how can we build that collaboratively						
4.D	Maintain a public program for information and education.	Health Dept.	NV Health & Human Services, CDC	6-12 months ONGOING	Protection of lives due to pre-planning.	High
Implemented ? Yes <input type="checkbox"/> No <input type="checkbox"/>	NO Political Support? Yes <input type="checkbox"/> /No <input type="checkbox"/> Enough Funding? Yes <input type="checkbox"/> /No <input type="checkbox"/> Workload realistically or equitably distributed? Yes <input type="checkbox"/> /No <input type="checkbox"/> New Information about the risk or community that made implementation difficult or no longer reasonable? Yes <input type="checkbox"/> /No <input type="checkbox"/> Sufficient resources (staff, technical assistance, etc.) Yes <input type="checkbox"/> /No <input type="checkbox"/>		YES: Losses avoided? Results of implementation? Were the outcomes as expected? Explain			Photos of implemented project
Comments: Infectious disease tool boxes, flyers, social media messaging - tools available for outbreaks of various types – based on CDC messaging and tailored to responses from surveys such as Casper surveys and others, public program info and education. . . continuing; how to put info in a format that works for health care providers that will have them distribute the info + schools outreach, etc. environmental health staff helped share info with employers; gamut of who the public truly is. . .						

Additional action items

- Looking at disparity / equity in distribution of infectious disease info during and prior to outbreaks. . . reduce the gap/disparity . . . CDC: ELC, etc. to support, also tied to agency mission, accreditation,

Infectious Disease Mitigation Actions 2016

Reviewed May 21, 2021

Nicki Aaker, Dustin Booth, Jeanne Freeman, ROA Staff

Status

- Disparities include racial, ethnic, rural, homeless, low income, age, disabilities, etc.
 - Info on durable medical equipment measure. . .
- How do you link with other Quad County Health Departments?
 - Nicki-no health departments in other counties; we coordinate with emergency managers and county health officers in other counties
 - Health District in Clark, Washoe
 - We are health department (vs district) = local health authority
 - During non-emergency times, three County response. . .
- Topic: Workforce development – death of the workforce
 - Public health workforce protection, retention, resilience, expansion
 - How would you work with this workforce? Training/available? Full-time/Part-time?
 - Limitations of volunteers
 - Medical reserve corp – general and medical volunteers
 - National Guard – yes and continues – not able to use until state declaration was made
 - Funding: Leverage grant funding in health department, host interns from UNR, masters in public health or undergrad in public health
 - Currently deluge of grant funding related to professional workforce. . .
 - Advocacy by Director. . .
 - Add full-time positions at city level
- Mitigation Actions
 - Immunization programs exist

SECTION EIGHT

Mitigation Strategy

STATUS - PUBLIC WORKS / NOTES - May 21, 2021

Public Works: Notes from Robb Fellows, PE, Senior Project Manager

Current Plan's Mitigation Action Evaluation Questions

Goal Number	Goal
1	Promote increased and ongoing Carson City involvement in hazard-mitigation planning and projects
2	Build and support local capacity to enable the public to prepare for, respond to, and recover from disasters
3	Reduce the possibility of damage and losses due to earthquakes
4	Reduce the possibility of threat to life and losses due to infectious disease
5	Reduce the possibility of damage and losses due to floods
6	Reduce the possibility of damage and losses due to severe weather
7	Reduce the possibility of damage and losses due to acts of violence
8	Reduce the possibility of damage and losses due to wildland fires
9	Reduce the possibility of damage and losses due to drought
10	Reduce the possibility of damage and losses due to landslide
11	Reduce the possibility of damage and losses due to hazardous materials

Implemented? Yes <input type="checkbox"/> No <input type="checkbox"/>	NO Political Support? Yes <input type="checkbox"/> /No <input type="checkbox"/> Enough Funding? Yes <input type="checkbox"/> /No <input type="checkbox"/> Workload realistically or equitably distributed? Yes <input type="checkbox"/> /No <input type="checkbox"/> New Information about the risk or community that made implementation difficult or no longer reasonable? Yes <input type="checkbox"/> /No <input type="checkbox"/> Sufficient resources (staff, technical assistance, etc.) Yes <input type="checkbox"/> /No <input type="checkbox"/>	YES: Losses avoided? Results of implementation? Were the outcomes as expected? Explain	Photos of implemented project
Comments:			

SECTION EIGHT

Mitigation Strategy

Action Number	Action Item	Department / Division	Potential Funding Source	Implementation Timeline	Economic Justification	Priority Level
1.C	Coordinate existing Geographic Information Systems (GIS) capabilities to identify hazards throughout the City.	Public Works	Local Gen. Fund	Ongoing	Provide information to agencies in their efforts to protect lives and property.	High
<p>We have our asset inventory is bolstered—identifying stormwater features, critical infrastructure mapping improved. For 2017 floods created a status map that located flooding areas/areas to avoid for the public also for sandbag locations, traffic control related, water main breaks, etc. map these. . . Notify public via distribution of status map via Carson City website. . . status map. Live tool. . . We also have a map GEO app available to the public, through the city we put out info to the public – not sensitive info. For live info to emergency staff, etc. a live map is available, on the spot. . .</p> <p>In the last plan we did not have GIS and now we have our own. Previously outsourced to Douglas County. Since then, we have hired a GIS Specialist and Asset Manager. Met the objectives. . . customized enhancements. . .</p>						
2.A.	Develop emergency evacuation	Public Works –	EMPG, SERC,	18-24 months	Protection of lives due to pre-planning.	High
<p>Brunswick Canyon high-hazard dam evaluated scenarios for dam break, including hydraulic modeling, release of effluent impacts of, how long is warning time to structures, updated emergency action plan late 2018 completed.</p> <p>Emergency Evacuation Guide – updated in the last few years, emergency shelter plan. Grant funds used to update it. . . no date on BROCHURE – Post 2016. completed</p>						
3.C	Identify hazard-prone structures through GIS modeling.	Public Works	Local Gen. Fund	Ongoing	Protection of lives and property through improved infrastructure.	High
<p>Updated two or three flood mapping areas. Post 2017 – insurance on a lot of city structures and went through and looked at where they fell within a floodplain. Done in 2017. Table / spreadsheet via overlay flood areas.</p> <p>ongoing</p>						
5.A	Identify flood-prone areas w GIS. Update Provide a consolidated storm water system plans. Masterplan. Include a Develop project proposals to improve storm water facilities.	Public Works	PDM, HMGP, FMA, RFC, USDA, NDEP, USEPA, NDCNR, 319(h) grants (Clean Water Act), USGS, CC PW	24-36 months CHANGE TO ONGOING	Protection of homes, businesses, infrastructure, and critical facilities.	High
<p>See 1C – completed though ongoing – address any new flood prone areas and ongoing stormwater projects updated mapping of stormwater infrastructure, inlets, manholes, etc. what we have is available in Map GEO/Map GEO up to date at this time. Accomplished a number of stormwater capital improvement projects – the largest one S. Carson Street 4\$mil for stormwater improvements – 20 to 25 small projects over the last 2 to 3 years about 1\$mil – ongoing. .</p>						

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SECTION EIGHT

Mitigation Strategy

5.B	Continue to update policies that discourage growth in flood-prone areas	Public Works	Local Gen Fund	Ongoing	Protection of homes, businesses, infrastructure, and critical facilities.	High
<p>RF: Ongoing through open space we have purchased much of the flood hazard areas – about 70% of the special flood hazard is open space – that’s going to increase to 80% of higher. There is private property along the Carson River that would ideally be kept as is or purchased – this is in the policy on open space. Main reason % increase is that our remapping showed that the SFHA is lower within the city than expected. May have acquired a few properties (TBD).</p>						
5.C	Review & update flood plans for coordination w/adjacent counties, cities, and special districts supporting a regional approach to flood mitigation	Public Works	PDM, HMGP, FMA, RFC, USDA, NDEP, USEPA, NDRCS, Local, CC PW	24-36 months ONGOING	Protection of homes, businesses, infrastructure, and critical facilities while strengthening regional coordination.	High
<p>RF: Regional Flood Plan that was initiated via the Subconservancy (a plan with its own goals and objectives) – continuing improvements and updates. WE do have a regional plan – accomplishment – ongoing work on it is needed. (SUBCON Website) Please provide more details on the status of this plan—and/or direct us to the plan.</p>						
5.D	Update and expand Sandbagging Plan.	Public Works	Local Gen. Fund, EMGP	24 months	Protection of homes, businesses, infrastructure, and critical facilities.	Moderate
<p>2016 – we completed sandbagging plan for the city – now we need to update it. Post 2017 flood we did not get a chance to update the sandbag plan. Keep the same timeline status.</p>						
5.E	Install new flood facilities & update storm drain system.	Public Works	PDM, HMGP, FMA, RFC, USDA, NDEP, USEPA, NRCS, Local, CC PW	24-36 months ONGOING	Protection of homes, businesses, infrastructure, and critical facilities.	Moderate
<p>Major master plan for storm water infrastructure. We have applied for two grants – but not yet notified formally – but internal to NV projects will likely be funded. . . . Please provide the title for each of the two grant projects</p>						
5.F HW-ask Stephanie	Upon completion of land transfers associated with the Lands Bill which includes land trading with Carson City, BLM, US Forestry, and Washoe Tribe; identify/implement projects within transferred lands and other areas within Carson City that need slope stabilization for flood and landslide.	Public Works	PDM, HMGP, USFS, BLM, Local Gen. Fund	24-36 months	Protection of homes, businesses, infrastructure, and critical facilities.	Moderate
<p>At the time, this was pending. Some planned facilities are on BLM/etc property – and transfer occurred. We are now / A couple of years ago – we were invited to identify additional parcels for transfer to the city—due to technical corrections (?). Need to revise this to fit the current status. Additional BLM properties City wants to retain.</p>						
5.G	Design and install facilities to capture debris/sediment within Eagle Valley.	Public Works	PDM, HMGP, FMA, RFC, USDA, NDEP, USEPA, NRCS, Local, CC PW	24-36 months ONGOING	Protection of homes, businesses, infrastructure, and critical facilities.	Moderate

Commented [RF1]: The Sutro Terrace Basin and Storm Drain Scoping Project is a continuation of the North Carson Area Drainage Plan (Plan) completed by Carson City, the Carson Water Subconservancy District, and FEMA in June 2020. The Sutro Terrace project was identified in the Plan as one of the selected alternatives for flood mitigation in the North Carson City area. The scoping project will further development of the mitigation project to include refined hydrology and hydraulic analyses, environmental assessments, public involvement, benefit/cost analysis, 60-90% plans, cost estimate, and mitigation project development for future grant application efforts.

The Maxwell Basin Mitigation Project is a continuation of the North Carson Area Drainage Plan (Plan) completed by Carson City, the Carson Water Subconservancy District, and FEMA in June 2020. The Maxwell Basin project was identified in the Plan as one of the selected alternatives for flood mitigation in the North Carson City area. The mitigation project will design and construct a storm water detention basin to mitigate downstream flooding. Efforts will also include environmental clearances, public involvement, FEMA map revisions, and landscape construction/vegetation restoration.

SECTION EIGHT

Mitigation Strategy

Generic – detention and sediment basins – leave the same. We did the Road Street storm drain – completed \$200k on west side of Carson where sediment rolled onto streets and clogging storm drains. Project built a channel with check dams, riprap, etc. to stabilize soil and settle built 2018. Completed. Also put in a sedimentation basin off of S. Edmonds, last year, 2020.

5.H	Develop a Flood Management Plan for the New Empire Area and install a new flood control facility for the area.	Public Works	PDM, HMGP, FMA, RFC, USDA, NDEP, USEPA, NRCS, Local, CC PW	24-36 months 24 to 48 MONTHS	Protection of homes, businesses, infrastructure, and critical facilities.	Moderate
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We did a few things – a restudy and remapping of flood hazard in New Empire Area and area drainage plan which identified needed improvements in that area as well. . . A specific plan has not been developed as the evaluation of needed pipe sizes, etc. still in progress. Not completed – add another 24 to 36 months? On the list. . .

5.I	Protect & enhance existing municipal water conveyance structures, storage & treatment facilities.	Public Works	PDM, HMGP, FMA, RFC, USDA, NDEP, USEPA, NRCS, FEMA, 319(h) grants (Clean Water Act), CC	24-36 months	Protection of homes, businesses, infrastructure, and critical facilities.	High
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Water treatment plant undergoing a design to rehab/expand Quill water treatment plan – take methods to a new level and allow us to treat and use more surface water – construction anticipated in 2 years. . . Funding for design, pursuing other federal funding opportunities, if not, we would bond. Done some actions that guide potential floodwater around facility – may need to attend to existing pipes/systems for collecting and transferring water on the west side – to water treatment plants and tanks; whole emphasis is on how to treat new plant – but also how to monitor/rehab existing tanks, etc. EXAMPLE wooden boxes burned—move surface systems underground to protect from fire damage. Still structures that could be washed away and need protection. Talk with water utility manager. . .

5.J	Install a storm water retention facility at Goni Canyon & storm drain system at Goni Creek.	Public Works	PDM, HMGP, FMA, RFC, USDA, NDEP, USEPA, NRCS, FEMA, 319(h) grants (Clean Water Act), CC PW	24-36 months	Protection of homes, businesses, infrastructure, and critical facilities.	Moderate
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Retention/detention facility at Goni Canyon - one of our grants deals with part of this goal. Still need funding. Two grants – one in Goni Canyon, the other is next to it. We have started to act on this goal.

5.K	Design & install facilities to capture debris/sediment within Eagle Valley.	Public Works	PDM, HMGP, FMA, RFC, USDA, NDEP, USEPA, NRCS, FEMA, 319(h) grants (Clean Water Act), USGS, CC PW	18-24 Months	Protection of homes, businesses, infrastructure, and critical facilities.	Moderate
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Commented [RF2]: Delete this one. It the same as the one above

DUPLICATE to 5G

5.L	Installation of back-up generators for critical infrastructure and facilities.	Public Works	PDM, HMGP, Local Gen.	6-12 months	Protection of critical infrastructures and facilities.	Moderate
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Accomplished – via HMP grant on purchasing portable generators – successful in installing four permanent generators—on four critical well sites and one also backs up a sewer lift station. Wastewater treatment plant through last four years one included power back-up full plant back up. ONGOING? Another booster station, Ormsby station, as part of the project. New facilities NA. Now mandatory. OR Change to lack of emergency fuel station. . .

5.M	Land acquisition of buildings with	Public Works	PDM, HMGP, FMA,	Ongoing	Protection of homes, businesses,	Low
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SECTION EIGHT

Mitigation Strategy

	recurring loss or of land which could be used as catch-detention/sediment basins for flood control projects.		RFC, USDA, NDEP, USEPA, NRCS, FEMA, 319(h) grants (Clean Water Act), USGS, CC PW		infrastructure, and stopping the cycle of loss.	
Ongoing – directly fits into the Joost property; pursuing an opportunity to acquire land and build a large detention basin to help with downstream flood protection. Still in preliminary stages. Just came up; keep as ongoing; it's going to come up.						
6.A	In areas at risk to severe weather, retrofit public buildings to withstand snow loads and sever winds to prevent roof collapse/damage.	Public Works	PDM, HMGP, Local Gen. Fund	Ongoing ONGOING	Protection of homes, businesses, infrastructure, and critical facilities.	Moderate
Keep codes up – more of a building thing . . . facility issues - ? Capital investment requires compliance with existing building codes. In 2020, consultant did a facility conditions assessment study – through all 90+ city-owned buildings and looked at every component/system/code compliance/repair needs. Recommended a 30-year capital investment plan . CIP – Much is on building status – not on natural disasters – though some relevant. 7.2\$m for city buildings for 2022 CIP.						
6.B	Continue the Storm Water Management Plan for snow melt storage .	Public Works	PDM, HMGP, FMA, RFC, USDA, NDEP, USEPA, NRCS, FEMA, 319(h) grants (Clean Water Act), USGS, CC PW	12-14 months	Protection of homes, businesses, infrastructure, and critical facilities.	High
We have not convened to discuss this plan. How we store extra store in the City is the primary focus of this effort. Snow disasters resulted in snow being removed to a floodplain area. Operational – snow removal standards/locations. Snow plow operators are trained to anticipate impacts of stored snow.						
7.C	Retrofit public and high risk buildings to increase safety and reduce the impact of terrorist events.	Public Works, Building Maintenance	EMPG, Local Gen Fund	Ongoing ONGOING	Protection of critical facilities.	Moderate
COVID put up barriers for front offices – added entry barriers in 30 buildings. Over the last five years we went to a card lock system – each employee scans for entrance. Locks down and tracks entry/exit. Lots of fencing (referenced the wastewater facility and JAC 3 years ago) and cameras over the last few years.						
9.A	Watershed stabilization and recharge program to maximize the use of surface sources when available and preserving the groundwater sources for system peaking needs and times of drought.	Public Works	NDEP, USEPA, NRCS, FEMA, 319(h) grants (Clean Water Act), USGS, CC PW	24-36 months	Protection of available water.	Moderate
TBD – from water utility manager – good progress - yes						
9.B	Encourage public participation in drought strategies through public information programs on water conservation and drought resistant landscaping and through building code ordinances.	Public Works	NDEP, USEPA, NRCS, FEMA, 319(h) grants (Clean Water Act), USGS, CC PW	Ongoing	Protection of available water.	Moderate

SECTION EIGHT

Mitigation Strategy

TBD – water utility manager						
10.A	Evaluate natural slopes to determine if there are slope stabilization treatments that would be appropriate to prevent landslides.	Public Works	PDM, HMGP, BLM, USFS, Local Gen Fund	24-36 Months	Protection of lives, property and water availability.	Low
King's Canyon, Ash Canyon, Eicee Canyon, potential failure – over the years actions - no action to date. Continue to next 5 years. . .						
10.B	Conduct slope stabilization projects to prevent landslides.	Public Works	PDM, HMGP, BLM, USFS, Local Gen Fund	24-36 Months	Protection of lives, property and water availability.	Moderate
Similar to 10A – overall – look at hazard map for west side places in Carson River Canyon where this might apply. Still needed.						

STATUS - PUBLIC WORKS / NOTES - May 19, 2021

Public Works: Dan Stucky, Andy Hummel, ROA staff

Current Plan's Mitigation Action Evaluation Questions

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11	Reduce the possibility of damage and losses due to hazardous materials

Implemented? Yes <input type="checkbox"/> No <input type="checkbox"/>	NO Political Support? Yes <input type="checkbox"/> /No <input type="checkbox"/> Enough Funding? Yes <input type="checkbox"/> /No <input type="checkbox"/> Workload realistically or equitably distributed? Yes <input type="checkbox"/> /No <input type="checkbox"/> New Information about the risk or community that made implementation difficult or no longer reasonable? Yes <input type="checkbox"/> /No <input type="checkbox"/> Sufficient resources (staff, technical assistance, etc.) Yes <input type="checkbox"/> /No <input type="checkbox"/>	YES: Losses avoided? Results of implementation? Were the outcomes as expected? Explain	Photos of implemented project
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5.A	Identify flood prone areas w GIS. Update storm water system plans. Develop project proposals to improve storm water facilities.	Public Works	PDM, HMGP, FMA, RFC, USDA, NDEP, USEPA, NDCNR, 319(h) grants (Clean Water Act), USGS, CC PW	24-36 months CHANGE TO ONGOING	Protection of homes, businesses, infrastructure, and critical facilities.	High
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5.D	Update and expand Sandbagging Plan.	Public Works	Local Gen. Fund, EMGP	24 months	Protection of homes, businesses, infrastructure, and critical facilities.	Moderate
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Mitigation Strategy

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DUPLICATE to 5G						
5.L	Installation of back-up generators for critical infrastructure and facilities.	Public Works	PDM, HMGP, Local Gen.	6-12 months	Protection of critical infrastructures and facilities.	Moderate
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5.M	Land acquisition of buildings with recurring loss or of land which could	Public Works	PDM, HMGP, FMA, RFC, USDA, NDEP,	Ongoing	Protection of homes, businesses, infrastructure, and stopping the cycle	Low

SECTION EIGHT

Mitigation Strategy

	be used as catch basins for flood control projects.		USEPA, NRCS, FEMA, 319(h) grants (Clean Water Act), USGS, CC PW		of loss.	
Ongoing – directly fits into the Joost property; pursuing an opportunity to acquire land and build a large detention basin to help with downstream flood protection. Still in preliminary stages. Just came up; keep as ongoing; it's going to come up.						
6.A	In areas at risk to severe weather, retrofit public buildings to withstand snow loads and sever winds to prevent roof collapse/damage.	Public Works	PDM, HMGP, Local Gen. Fund	Ongoing ONGOING	Protection of homes, businesses, infrastructure, and critical facilities.	Moderate
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6.B	Continue the Storm Water Management Plan for snow melt.	Public Works	PDM, HMGP, FMA, RFC, USDA, NDEP, USEPA, NRCS, FEMA, 319(h) grants (Clean Water Act), USGS, CC PW	12-14 months	Protection of homes, businesses, infrastructure, and critical facilities.	High
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7.C	Retrofit public and high risk buildings to increase safety and reduce the impact of terrorist events.	Public Works, Building Maintenance	EMPG, Local Gen Fund	Ongoing ONGOING	Protection of critical facilities.	Moderate
COVID put up barriers for front offices – added entry barriers in 30 buildings. Over the last five years we went to a card lock system – each employee scans for entrance. Locks down and tracks entry/exit. Lots of fencing (referenced the wastewater facility and JAC 3 years ago) and cameras over the last few years.						
9.A	Watershed stabilization and recharge program to maximize the use of surface sources when available and preserving the groundwater sources for system peaking needs and times of drought.	Public Works	NDEP, USEPA, NRCS, FEMA, 319(h) grants (Clean Water Act), USGS, CC PW	24-36 months	Protection of available water.	Moderate
TBD – from water utility manager – good progress - yes						
9.B	Encourage public participation in drought strategies through public information programs on water conservation and drought resistant landscaping and through building code ordinances.	Public Works	NDEP, USEPA, NRCS, FEMA, 319(h) grants (Clean Water Act), USGS, CC PW	Ongoing	Protection of available water.	Moderate
TBD – water utility manager						

SECTION EIGHT

Mitigation Strategy

10.A	Evaluate natural slopes to determine if there are slope stabilization treatments that would be appropriate to prevent landslides.	Public Works	PDM, HMGP, BLM, USFS, Local Gen Fund	24-36 Months	Protection of lives, property and water availability.	Low
King's Canyon, Ash Canyon, Eicee Canyon, potential failure – over the years actions - no action to date. Continue to next 5 years. . .						
10.B	Conduct slope stabilization projects to prevent landslides.	Public Works	PDM, HMGP, BLM, USFS, Local Gen Fund	24-36 Months	Protection of lives, property and water availability.	Moderate
Similar to 10A – overall – look at hazard map for west side places in Carson River Canyon where this might apply. Still needed.						

Wildfire Mitigation Actions Review

May 12, 2021

Dave Ruben, Fire Marshall

Rodd Rummel, Wildfire Fuels Management Officer

Elizabeth Ashby, Marie Hulse, and Kate Cunningham

8A

Updated community WUI interface. Delte NV Division of Forestry; Updates to code completed in fall of 2018; Expected outcomes achieved.

8B

Fire code updated at same time as WUI; no weed abatement, city code enforcement handles in non-wildland – urban interface in terms of defensible space around structures. Provisions in non-WUI are codes for weed abatement, have regulatory authority but code enforcement handles that Codes adopted in fall of 2018 (BOTH WUI and Fire Code)

MH: ON state roof resistance—DR – likely removing that – state forester fire warden determines for certain areas of the state—what roofing materials are acceptable. That was determined many years ago prior to WUI and used to use it as WUI code boundary. As built environment has expanded into WUI and state can't keep up – and roof boundary not able to stay current. Coming out of the legislature and left to local government.

8C

Continue conducting fuel management programs. Do you have a report? Rodd: no annual total on a yearly basis. Can do that quickly. Report as a result of the implementation. In Appendice? Total acres treated – area and no. of acres treated – with a visual. DR: don't indicate where critical infrastructure is but highlight critical infrastucture projects as “in the benchmark”

Use Rodd's pictures? Yes – ask for updated copies?

8D

Public outreach: number of people? What kind of outreach? Last year and a half, limited to virtual outreach, participate with living with fire, online series, publicize on social media (TRACKING? HITS?), outreach for new homeowners, NV wildfire awareness month, May, participate in, virtual conference annual for 2021 with living with fire; DR: we did participate in annual virtual;

EA: Outcomes as expected. No record of . . . ? DR: Nice note from Clear Creek folks—very appreciated. Kudos! From residents;

8E: Chipping programs: RR: Modified “chipping” program equivalent; community-based vegetation management and fuel removal program; You call we haul program/ trailer program; barely advertise and they are swamped; can just keep up with demand; no “chipping” program established; homeowners fill it with; hazardous vegetation = within five feet of structure; stock photos of dumpsters and trailers to follow; DR: Do you have the ones from Lakeview? ; Use GIS and internet to identify potential project areas and for developers to know whether they are building in a WUI or not; (WUI BOUNDARY MAP?); eligibility = lives within the WUI; Public system includes the WUI – the link to MAP GEO;

8G: Establish continuing wildland fire technical working group. We are looking at them. Public hearings are part of the WUI code adoption; targeted outreach to development community and chamber of

Wildfire Mitigation Actions Review

May 12, 2021

Dave Ruben, Fire Marshall

Rodd Rummel, Wildfire Fuels Management Officer

Elizabeth Ashby, Marie Hulse, and Kate Cunningham

commerce; etc; Current level of staffing is appropriate – available SMEs as needed; for this program technical working group = enough ? Yes; Link to the fire code? on CC website already; fire code amendments etc.

8H: We do not do erosion control; we do recharge; (Is it Robb Fellows for erosion control? Check with him) Water recharge - fuel reduction work and critical infrastructure fuel reduction work to protect those resources; when done – throughout the five years of the plan and ongoing;

Do you want to continue these actions?

DR:

8A, yes; Update 2024 for 8B, code adoption, yes continue;

8B but modify and remove weed abatement piece for 8B – and leave it in WUI Code only not Fire Code;

8C: continue

8D: continue

8E: continue – remove chipping

8F: continue – update GIS with code adoption, about every six years, or in between if significant development between cycles;

8G: continue

8H: Protect from wildfire and flooding – as needed? Change language to say protect municipal water recharge zones and flooding. . . delete stabilizing. . .

8I: Retrofit buildings. . . list of locations . . . DR: grant opportunities were coming out – to update roof – DR says, not implemented, no continuance, not relevant in current

RR: New “home retrofit guide”

DR: No grants for retrofitting houses. They are available but don't fit with current plan and staffing levels.

Most are ongoing except code adoption; every six years

DR: Codes come every three years but we regionally agreed to a six year cycle;

DR: Secondary benefit GIS is used by building department for issuing permits; to determine construction requirements in WUI;

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RE MAP: outside is city boundary interior is WUI boundary – interface of built environment with the wildland; mostly wildland; most is BLM on east side and west side is Forest Service, federally owned; also state, Lake Tahoe state park.

Guess – less than 10% of the area is undeveloped.

Rodd: Map of treatment areas and short narrative; pictures of trailer program!

INCLUDE: percentage of land in city limits;

Carson City Hazard Mitigation Plan Update - 2021

Weekly Status Meeting– Agenda

May 18, 2021 | 9:00AM

Participants

- a. Jason Danen
- b. E Ashby
- c. K. Cunningham
- d. M. Hulse
- e. K. Ruben

1. Review current ranking results and finalize significance for plan.
2. Prepare for presentation about adoption on July 15th meeting for Board of Supervisors
3. Discuss Dave Fogerson's request to include Water Subconservancy and School District in Plan for funding purposes.
4. Written status report format?
5. Next week's meeting – GIS

Objective(s):

1. Discuss hazard rankings
2. Board of Supervisors meeting date for adoption
3. School District and Water Subconservancy participation
4. Monthly status report

Wildfire Mitigation Actions 2016

Status

Action Number	Action Item	Department / Division	Potential Funding Source	Implementation Timeline	Economic Justification	Priority Level
8.A	ID areas & update & enforce UrbanWildland Interface Code (UWIC).Wildland Urban Interface Code	NV Div. of Forestry, CC Fire Dept.	NDF, BLM, NationalFire Monies, Local Gen Fund	6-12 Months Every 6 years - - regional partnership agreement (verbal) to adopt codes at 6 year cycle.	Ensure a greater number of residential structures and critical facilities and infrastructure benefit from actions to protect lives and property from wildfire.	High
Implemented ? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	NO Political Support? Yes <input type="checkbox"/> /No <input type="checkbox"/> Enough Funding? Yes <input type="checkbox"/> /No <input type="checkbox"/> Workload realistically or equitably distributed? Yes <input type="checkbox"/> /No <input type="checkbox"/> New Information about the risk or community that made implementation difficult or not longer reasonable? Yes <input type="checkbox"/> /No <input type="checkbox"/> Sufficient resources (staff, technical assistance, etc.)Yes <input type="checkbox"/> /No <input type="checkbox"/>		YES: Losses avoided? Results of implementation? Were update to the code Were the outcomes as expected? Yes Explain –Wildland Urban Interface Code was updated 2018 - authority to acquire bldg. materials for wui structures, improvement on parcels, powerlines and utility infrastructure. Access to water supply requirements			Photos of implemented project International code council.
Comments: Fire prevention and design codes on CC's website Continuation – Update due 2024						
8.B	Update the CC Fire code and modelweed abatement and fuel modification ordinances.	Fire Dept.	National Fire monies,USFS, BLM, NDF	Ongoing	Ensure a greater number of residential structures and critical facilities and infrastructure benefit from actions to protect lives and property from wildfire.	High
Implemented ? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	NO Political Support? Yes <input type="checkbox"/> /No <input type="checkbox"/> Enough Funding? Yes <input type="checkbox"/> /No <input type="checkbox"/> Workload realistically or equitably distributed? Yes <input type="checkbox"/> /No <input type="checkbox"/> New Information about the risk or community that made implementation difficult or not longer reasonable? Yes <input type="checkbox"/> /No <input type="checkbox"/> Sufficient resources (staff, technical assistance, etc.)Yes <input type="checkbox"/> /No <input type="checkbox"/>		YES: Losses avoided? Results of implementation? Were the outcomes as expected? Adopted in 2018 Explain			Photos of implemented project

Wildfire Mitigation Actions 2016

Status

Action Number	Action Item	Department / Division	Potential Funding Source	Implementation Timeline	Economic Justification	Priority Level
Comments: Weed abatement in WUI through defensible space requirement around structures Provision in Fire code in non wui Reg authority to be involved – cc’s code enforcement does the enforcement (roofing material r?code will be removed. Authority at the state level only) Continue – remove weed abatement - Update the Wildfire Interface Code - 2024						
8.C	Continue conducting Fuel Management Programs.	NV Div. of Forestry, CC Fire Dept.	HMGP, PDM, NDF, BLM, National Fire Monies, Stimulus , funds, USFS, Local General Fund	6-12 Months	Ensure a greater number of residential structures and critical facilities and infrastructure benefit from actions to protect lives and property from wildfire.	High
Implemented ? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	NO Political Support? Yes <input type="checkbox"/> /No <input type="checkbox"/> Enough Funding? Yes <input type="checkbox"/> /No <input type="checkbox"/> Workload realistically or equitably distributed? Yes <input type="checkbox"/> /No <input type="checkbox"/> New Information about the risk or community that made implementation difficult or not longer reasonable? Yes <input type="checkbox"/> /No <input type="checkbox"/> Sufficient resources (staff, technical assistance, etc.) Yes <input type="checkbox"/> /No <input type="checkbox"/>		YES: Losses avoided? Results of implementation? Rod – annual work Were the outcomes as expected? Explain			Photos of implemented project
Comments: Continue						
8.D	Develop Continue a public outreach campaign of the extreme wildland fire dangers and steps that can be taken to reduce these dangers.	CC Fire Dept.	HMGP, PDM, Local General Fund, National Fire Monies	12-24 Months	Ensure a greater number of residential structures and critical facilities and infrastructure benefit from actions to protect lives and property from wildfire.	Moderate
Implemented ? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	NO Political Support? Yes <input type="checkbox"/> /No <input type="checkbox"/> Enough Funding? Yes <input type="checkbox"/> /No <input type="checkbox"/> Workload realistically or equitably distributed? Yes <input type="checkbox"/> /No <input type="checkbox"/> New Information about the risk or community that made implementation difficult or not longer reasonable? Yes <input type="checkbox"/> /No <input type="checkbox"/>		YES: Losses avoided? Results of implementation?- 1.5 yrs limited to virtual outreach, participation with living w fire, social media and outreach for new home owners. Participating of NV wildfire awareness month. Virtual annual conference w living w fire participation Were the outcomes as expected? Yes – no record of # of people reached at the			Photos of implemented project

Wildfire Mitigation Actions 2016

Status

Action Number	Action Item	Department / Division	Potential Funding Source	Implementation Timeline	Economic Justification	Priority Level
	Sufficient resources (staff, technical assistance, etc.) Yes <input type="checkbox"/> /No <input type="checkbox"/>		community level – good response reported from residents. Explain			
Comments: Continue						
8.E	Develop Continue to build and new and maintain current partnerships for a community based vegetation management program including chipping programs.	CC Fire Dept.	HMGP, PDM, Local General Fund, National Fire Monies	12-24 Months	Ensure a greater number of residential structures and critical facilities and infrastructure benefit from actions to protect lives and property from wildfire.	Moderate
Implemented ? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	NO Political Support? Yes <input type="checkbox"/> /No <input type="checkbox"/> Enough Funding? Yes <input type="checkbox"/> /No <input type="checkbox"/> Workload realistically or equitably distributed? Yes <input type="checkbox"/> /No <input type="checkbox"/> New Information about the risk or community that made implementation difficult or not longer reasonable? Yes <input type="checkbox"/> /No <input type="checkbox"/> Sufficient resources (staff, technical assistance, etc.) Yes <input type="checkbox"/> /No <input type="checkbox"/>		YES: The chipping portion not implementd Trailer and dump – we call you haul program. Home owners fill with vegetation removed for defensible space – CC hauls away Losses avoided? - Results of implementation? Were the outcomes as expected? Yes Explain			Photos of implemented project
Comments: continue						
8.F	Continue to Utilize GIS and the internet as information tools.	CC Fire Dept.	HMGP, PDM, Local General Fund, National Fire Monies	Ongoing	Ensure a greater number of residential structures and critical facilities and infrastructure benefit from actions to	High

Wildfire Mitigation Actions 2016

Status

Action Number	Action Item	Department / Division	Potential Funding Source	Implementation Timeline	Economic Justification	Priority Level
Implemented ? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	NO Political Support? Yes <input type="checkbox"/> /No <input type="checkbox"/> Enough Funding? Yes <input type="checkbox"/> /No <input type="checkbox"/> Workload realistically or equitably distributed? Yes <input type="checkbox"/> /No <input type="checkbox"/> New Information about the risk or community that made implementation difficult or not longer reasonable? Yes <input type="checkbox"/> /No <input type="checkbox"/> Sufficient resources (staff, technical assistance, etc.)Yes <input type="checkbox"/> /No <input type="checkbox"/>		YES: Losses avoided? Results of implementation? Were the outcomes as expected? Explain Development, WUI location, trailer program eligibility, INCLUDE THE LINK TO GIS cc SITE.			Photos of implemented project
Comments: Continue – updated during code adoption process, unless significant construction occurs - Additional benefit – data used by Bldg Dept in determining structural requirements for structures in the WUI						
8.G	Maintain the continuing wildland firetechnical working group.	CC Fire Dept.	HMGP, PDM, Local General Fund, National Fire Monies	12-24 Months	Ensure a greater number of residential structures and critical facilities and infrastructure benefit from actions to protect lives and property from wildfire.	Moderate
Implemented ? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	NO Political Support? Yes <input type="checkbox"/> /No <input type="checkbox"/> Enough Funding? Yes <input type="checkbox"/> /No <input type="checkbox"/> Workload realistically or equitably distributed? Yes <input type="checkbox"/> /No <input type="checkbox"/> New Information about the risk or community that made implementation difficult or not longer reasonable? Yes <input type="checkbox"/> /No <input type="checkbox"/> Sufficient resources (staff, technical assistance, etc.)Yes <input type="checkbox"/> /No <input type="checkbox"/>		YES: Losses avoided? Results of implementation? Public hearings part of adoption of Fire Code, targeted outreach for developers, chamber of commerce as part of hearings. – current level of staffing appropriate for this program. Were the outcomes as expected? Explain			Photos of implemented project
Comments: Link to fire code on website cc Continue -						
8.H	Continue to Protect municipal water recharge zones from wildfires and flooding bystabilizing upper watershed slopes.	CC Fire Dept.	HMGP, PDM, Local General Fund, National Fire Monies	12-24 Months	Ensure a greater number of residential structures and critical facilities and infrastructure benefit from actions to protect lives and property from wildfire.	High

Wildfire Mitigation Actions 2016

Status

Action Number	Action Item	Department / Division	Potential Funding Source	Implementation Timeline	Economic Justification	Priority Level
Implemented ? Yes <input type="checkbox"/> No <input type="checkbox"/>	NO Political Support? Yes <input type="checkbox"/> /No <input type="checkbox"/> Enough Funding? Yes <input type="checkbox"/> /No <input type="checkbox"/> Workload realistically or equitably distributed? Yes <input type="checkbox"/> /No <input type="checkbox"/> New Information about the risk or community that made implementation difficult or not longer reasonable? Yes <input type="checkbox"/> /No <input type="checkbox"/> Sufficient resources (staff, technical assistance, etc.)Yes <input type="checkbox"/> /No <input type="checkbox"/>		YES: Losses avoided? Results of implementation? Were the outcomes as expected? Explain			Photos of implemented project
<p>Comments:</p> <p>Erosion not part of Fire Dept authority</p> <p>Water recharge – fuels reduction work around critical infrastructure and resources – thru life of plan and will continue</p>						
Implemented ? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	NO Political Support? Yes <input type="checkbox"/> /No <input type="checkbox"/> Enough Funding? Yes <input type="checkbox"/> /No <input type="checkbox"/> Workload realistically or equitably distributed? Yes <input type="checkbox"/> /No <input type="checkbox"/> New Information about the risk or community that made implementation difficult or not longer reasonable? Yes <input type="checkbox"/> /No <input type="checkbox"/> Sufficient resources (staff, technical assistance, etc.)Yes <input type="checkbox"/> /No <input type="checkbox"/>		YES: Losses avoided? Results of implementation? Were the outcomes as expected? Explain			Photos of implemented project
<p>Comments:</p>						
8.I Not implemented Not relevant to the current staffing levels or	Retrofit buildings (public and private) to reduce the risk of wild fire in Lakeview, Pinyon Hills, Kings Canyon, Voltaire Canyon and Timberlake Canyon.	CC Fire Dept.	HMGP, PDM, Local General Fund, National Fire Monies	12-24 Months	Ensure a greater number of residential structures and critical facilities and infrastructure benefit from actions to protect lives and property from wildfire.	Moderate

Wildfire Mitigation Actions 2016

Status

Action Number	Action Item	Department / Division	Potential Funding Source	Implementation Timeline	Economic Justification	Priority Level
resources for the FD						

Appendix A: Meeting Notes and Handouts

- Presentations by Subject Matter Experts
 - Acts of Violence

Carson City Hazard Mitigation Plan

May 7th, 2021



“Human Threats”
Previously Section 5 of the
Mitigation Plan

“Acts of Violence”

Carson City Sheriff's Office

We are a consolidated municipality and the primary law enforcement agency in and for Carson City

- Sworn: 101
- Non-sworn: 49

Divisions:

Administration
Investigations

Patrol
Jail

Civil/Records
Communications

Previously Identified Threats

- Civil disorder/riotous behavior
- Terrorism
- Criminal Acts Involving Mass Casualties

Civil Disorder/Riotous Behavior

Criminal vs. Protected Speech

Civil Disobedience

Civil Disturbance

Rioting

The right to peacefully assemble is protected under the First Amendment of the Constitution
Addressed in CCSO Policy 468

Civil Disorder/Riotous Behavior

Nationwide in 2020 , the country saw a historical number of protests/rallies (criminal and protected speech) including at the Capitol on January 6th, 2021



Civil Disorder/Riotous Behavior

STATEWIDE/REGIONALLY

May/June 2020:

- Protest in Las Vegas turned violent - 155 were arrested. Police officer shot in the head
- Reno experienced riots resulting in significant damage to the interior of city hall and vandalism of the police department. Looting, violence, and arson was reported

Civil Disorder/Riotous Behavior

LOCALLY

From about April to November 2020 – In Carson City protests weekly and sometimes multiple times a week

Numerous calls for services

Minor disturbances

Traffic complaints

Disruption to businesses

Negligent discharge resulting in criminal charges

Traffic related citations/arrests

Tolerant rather than enforcement

No damage or injuries were reported

Civil Disorder/Riotous Behavior

Likelihood: Moderate to high

Impact: Significant – short and long term

Terrorism

Definition:

Terrorism is defined as the calculated use of violence or the threat of violence to attain goals that are political, religious, or ideological in nature.

Actors may be domestic or foreign

Terrorism

June 2020- Three arrested in Las Vegas:

Conspiracy

Terrorism

Firearms violation

Explosives possession

Advocating to overthrow the government

Terrorism

The FBI has stated, Domestic Violent Extremism
Poses 'Elevated Threat' in 2021

Targets: Critical Infrastructure
Government Buildings
Military Installations
Soft Targets- Hospitals and Casinos

Terrorism

Likelihood: Low

Impact: High

Criminal Acts: Mass Casualty

Define:

Active Shooter

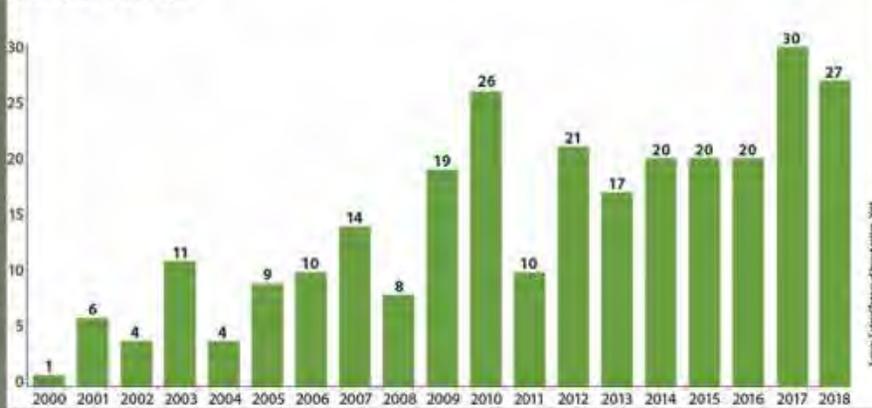
Mass Murder

Workplace Violence

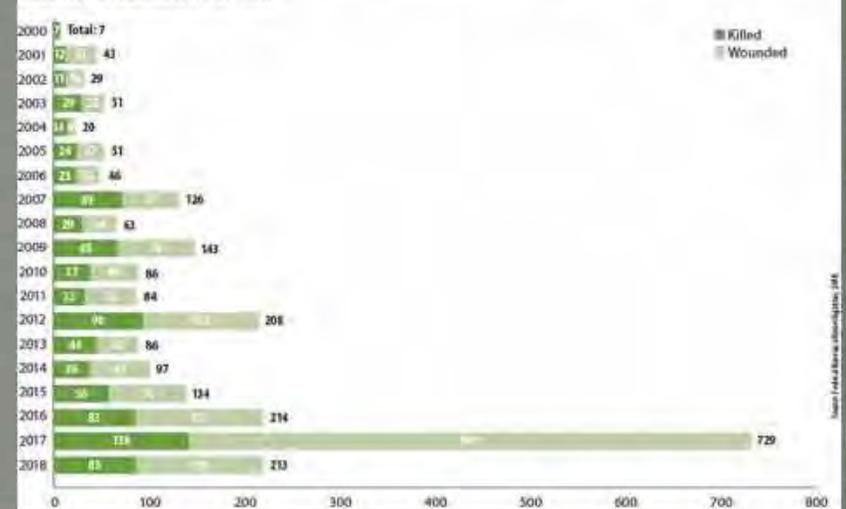


Criminal Acts: Mass Casualty

Quick Look: 277 Active Shooter Incidents in the United States Between 2000 - 2018
Incidents Per Year



Quick Look: 277 Active Shooter Incidents in the United States Between 2000 - 2018
Casualty Breakdown Per Year



Mass Shootings 2016 -2021

Year	#	Killed	Injured
2021	4	30	9
2020	2	9	0
2019	10	73	112
2018	12	80	70
2017	10	112	581
2016	7	76	89

	Incidents	Killed	Injured
2019	28	97	150

Criminal Acts: Incidents

LOCAL, REGIONAL, STATE

October 1, 2017 – Route 91 Concert Las Vegas
60 killed 411 wounded

December 17, 2013 – Renown Medical Campus
1 killed 2 wounded

October 21, 2013 – Sparks Middle School
1 killed 2 wounded

September 6, 2011 – IHOP, Carson City
Four killed 7 wounded

Criminal Acts: Mass Casualty

Likelihood: Medium to High

Impact: High

Hazard Impact: Short and long term

Human Cost – Cannot be fully measured

Untold psychological trauma

Business disruption

Traffic Issues

Cost of investigation/prosecution

Disruption to quality of life

Harm to the community's reputation

Higher insurance rates

Lower property values

Higher prices

Reduced tax revenue

Decreased economic opportunity.

Item for discussion: Cybercrime/terrorism

- A criminal act – Usually federal jurisdiction
- Motives can be political, revenge, extortion, information gathering, profit
- Examples leading to hazards:
 - Ransomware/extortion
 - Takeover of facilities/utilities
 - Denial of service
 - Incitement to disruption/violence

Conclusion

Jerome Tushbant

Undersheriff

Carson City Sheriff's Office

(775) 283-7802

Appendix A: Meeting Notes and Handouts

- Presentations by Subject Matter Experts
 - Earthquake

The Capital of Earthquake Country: Earthquake Hazards of Carson City

Craig M. dePolo

Nevada Bureau of Mines and Geology

University of Nevada, Reno

**Carson City
has the
Highest Earthquake Hazard
in the
Basin and Range Province**

What Would the city with the highest earthquake hazard in the BRP be like?

- Experience Damaging Earthquakes
- High Level of Background Earthquakes
- Many late Quaternary Faults
- High rates of activity and short recurrence intervals of paleoearthquakes

Historical Earthquakes that have Strongly Shaken Carson City

<u>Date</u>	<u>Magnitude</u>	<u>Nearest Community</u>	<u>Effects</u>	<u>CC MMI*</u>
Sept. 3, 1857	6.3	Incline Village(?)	unknown	?
March 15, 1860	6.5	Reno(?)	content damage	VI
May 30, 1868	6.0	Virginia City	two eqs?, panic	VI
Dec. 27, 1869	6.4, 6.2	Virginia City	content dam, wall cracks	VI+
June 3, 1887	6.5	Carson City	build. damage, liquef.	VII-VIII
Jan. 27, 1896	5+?	Carson City	cracked walls, fallen plast.	VI+
May 15 1897	5+?	Virginia City?	fallen plaster	VI+
Dec. 20, 1932	7.1	Gabbs	surface rupt., chim. dam.	VI
June 25, 1933	6.0	Wabuska	build. and chim. damage	VI+
July 6, 1954	6.2	Fallon	build. and plaster damage	VI
Dec. 16, 1954	7.1, 6.9	Fallon	build. and plaster damage	VI+

* Modified Mercalli Intensity in Carson City

June 3, 1887

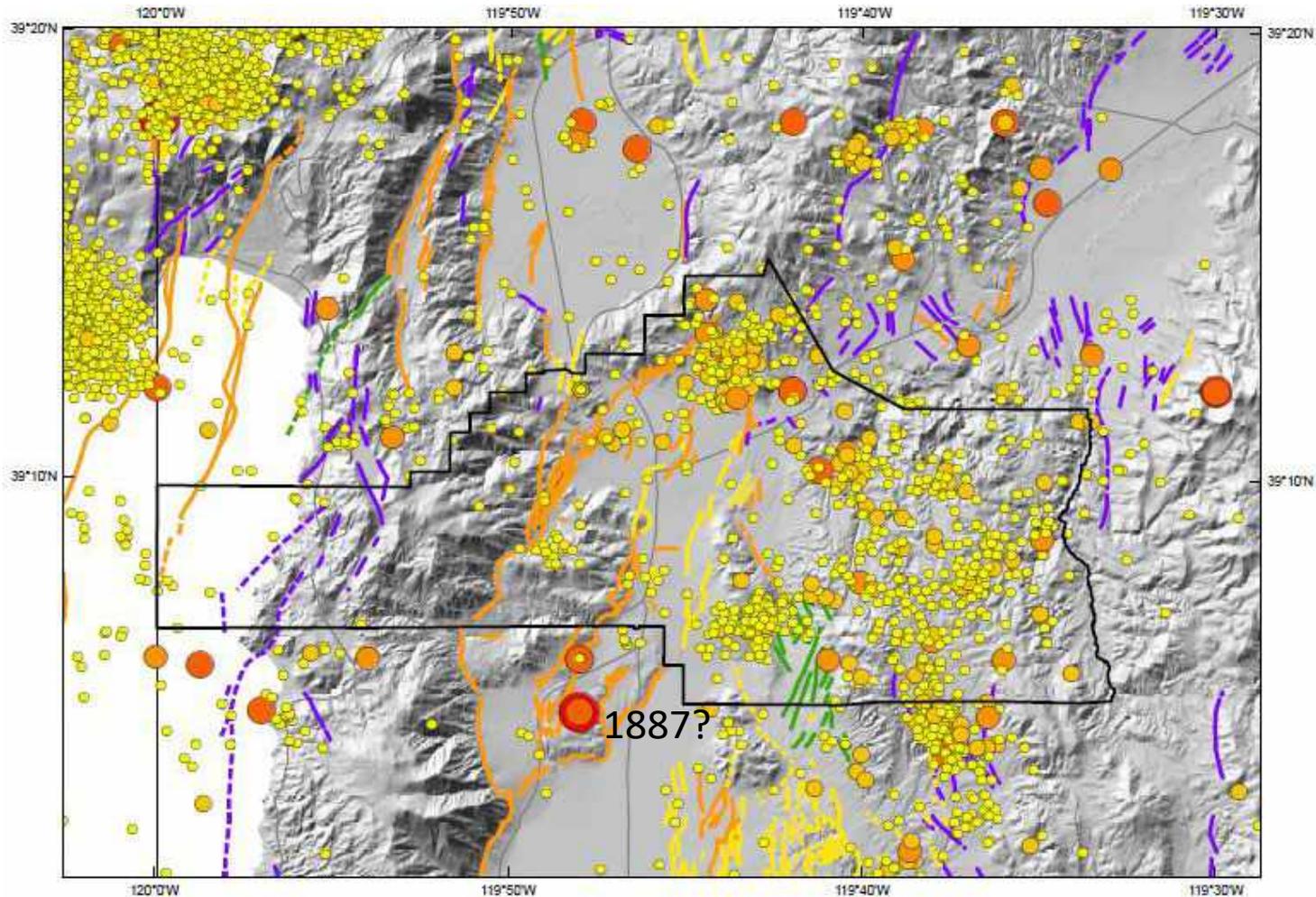
Carson City Earthquake

- No foreshocks. 2:40 a.m. quake
- Difficult to stand; people fled to the safety of the streets; general hysteria.
- All stone and brick buildings showed the effects of the earthquake. Cracked and separated walls, damaged chimneys, fallen plaster, broken windows, glassware, and crockery.
- Genoa badly damaged as well; Glenbrook chimney

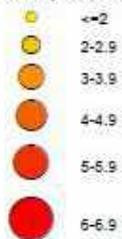
1887 Carson City Earthquake

- Liquefaction of the ground occurred in Carson Valley and probably in Eagle Valley.
- Ground offsets in the western flanks of the Virginia Range in Washoe Valley (landslide?). Rock falls in the mountains.
- Earthquake-related fire burns down hotel in Mound House.

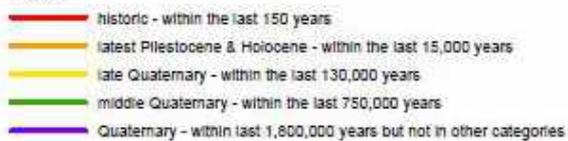
Historical Earthquakes 1857 to 2014



Earthquake Magnitudes



Faults



0 1.25 2.5 5 Miles

0 2.5 5 10 Kilometers



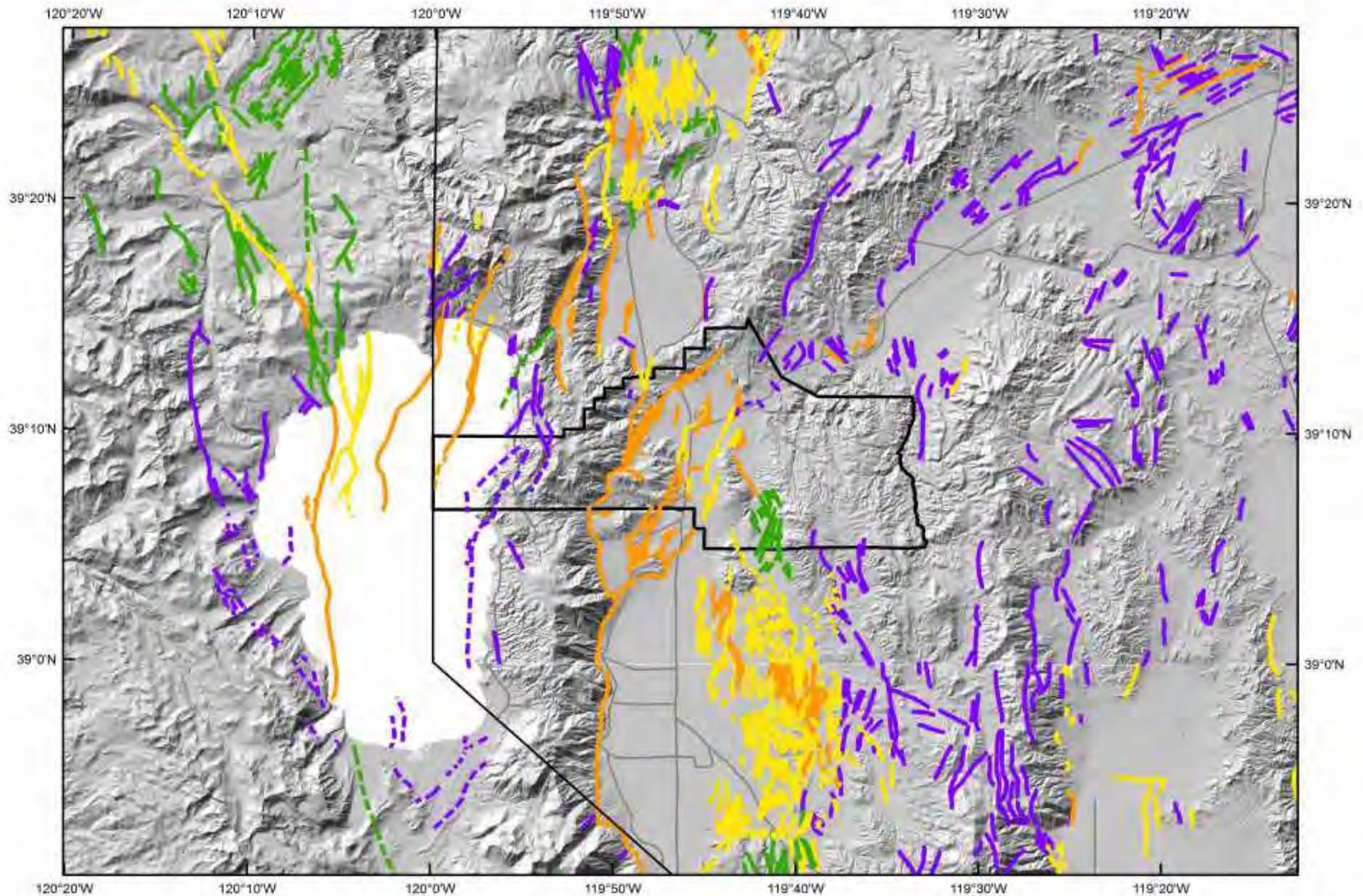
Historical Earthquakes that have Strongly Shaken Carson City

13 to 14 Eqs with Intensity VI shaking in 158 years

On average that is 1 event every 12 years

1 earthquake in 158 years with Intensity VII

Quaternary Faults



Faults

- historic - within the last 150 years, solid
- latest Pleistocene & Holocene - within the last 15,000 years, solid
- late Quaternary - within the last 130,000 years, solid
- middle Quaternary - within the last 750,000 years, solid
- Quaternary - within last 1,800,000 years but not in other categories, solid

0 2.5 5 10 Miles

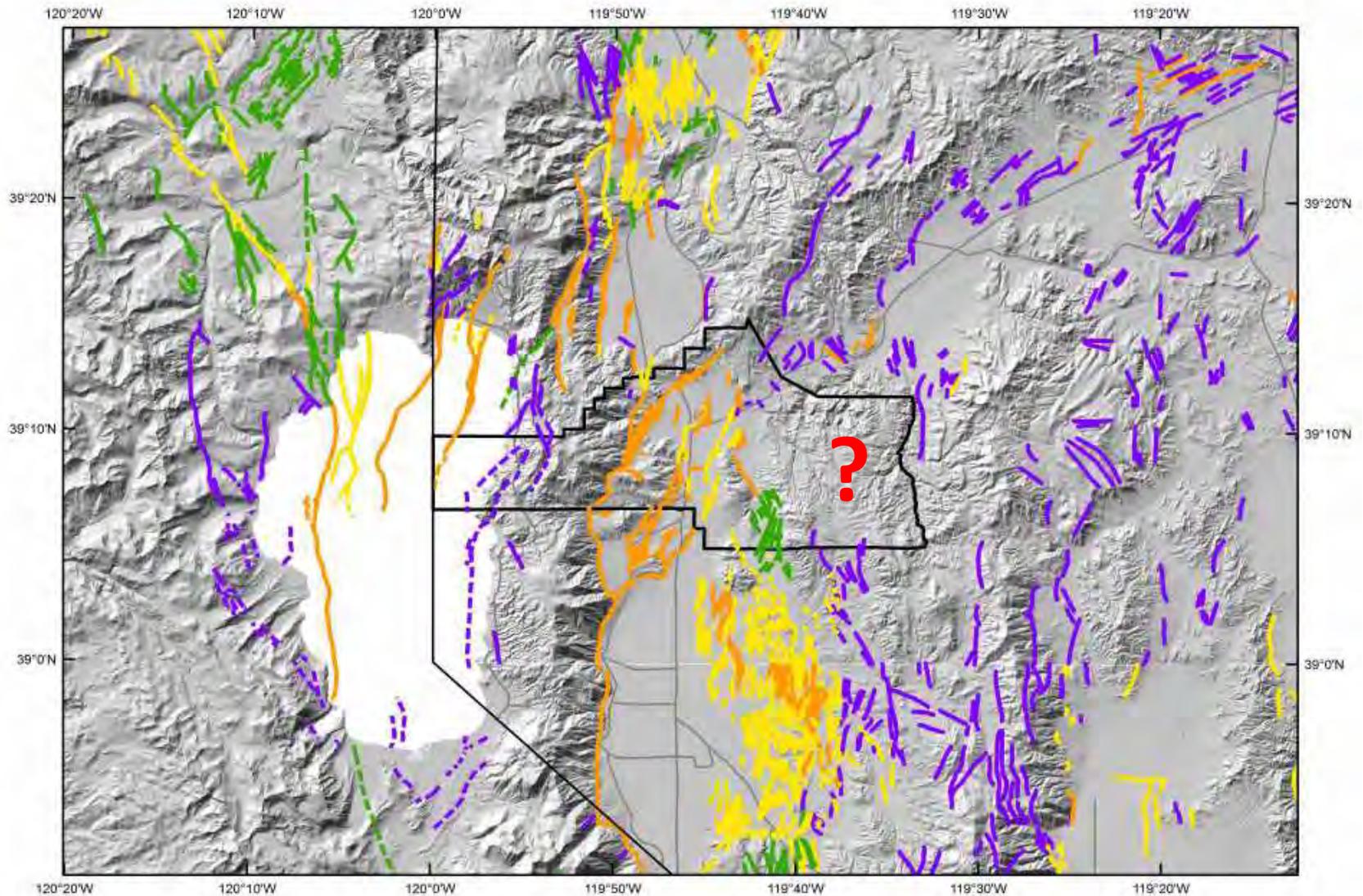
0 5 10 20 Kilometers





View north – Indian Hills bottom, Carson City mid-upper right

Quaternary Faults



Faults

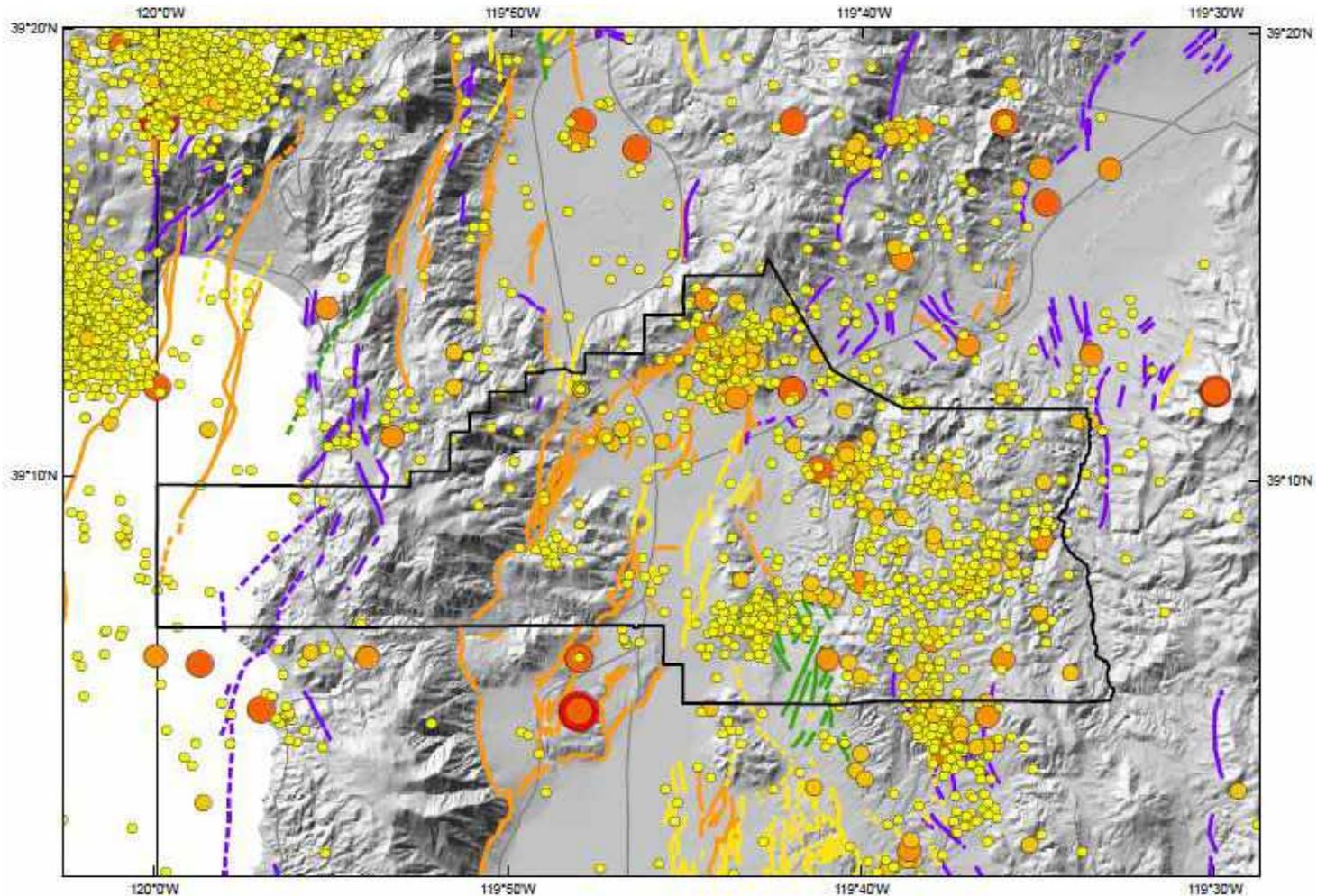
- historic - within the last 150 years, solid
- latest Pleistocene & Holocene - within the last 15,000 years, solid
- late Quaternary - within the last 130,000 years, solid
- middle Quaternary - within the last 750,000 years, solid
- Quaternary - within last 1,800,000 years but not in other categories, solid

0 2.5 5 10 Miles

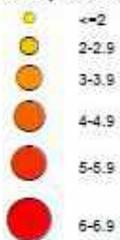
0 5 10 20 Kilometers



Historical Earthquakes 1857 to 2014

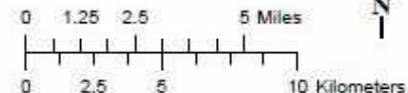


Earthquake Magnitudes

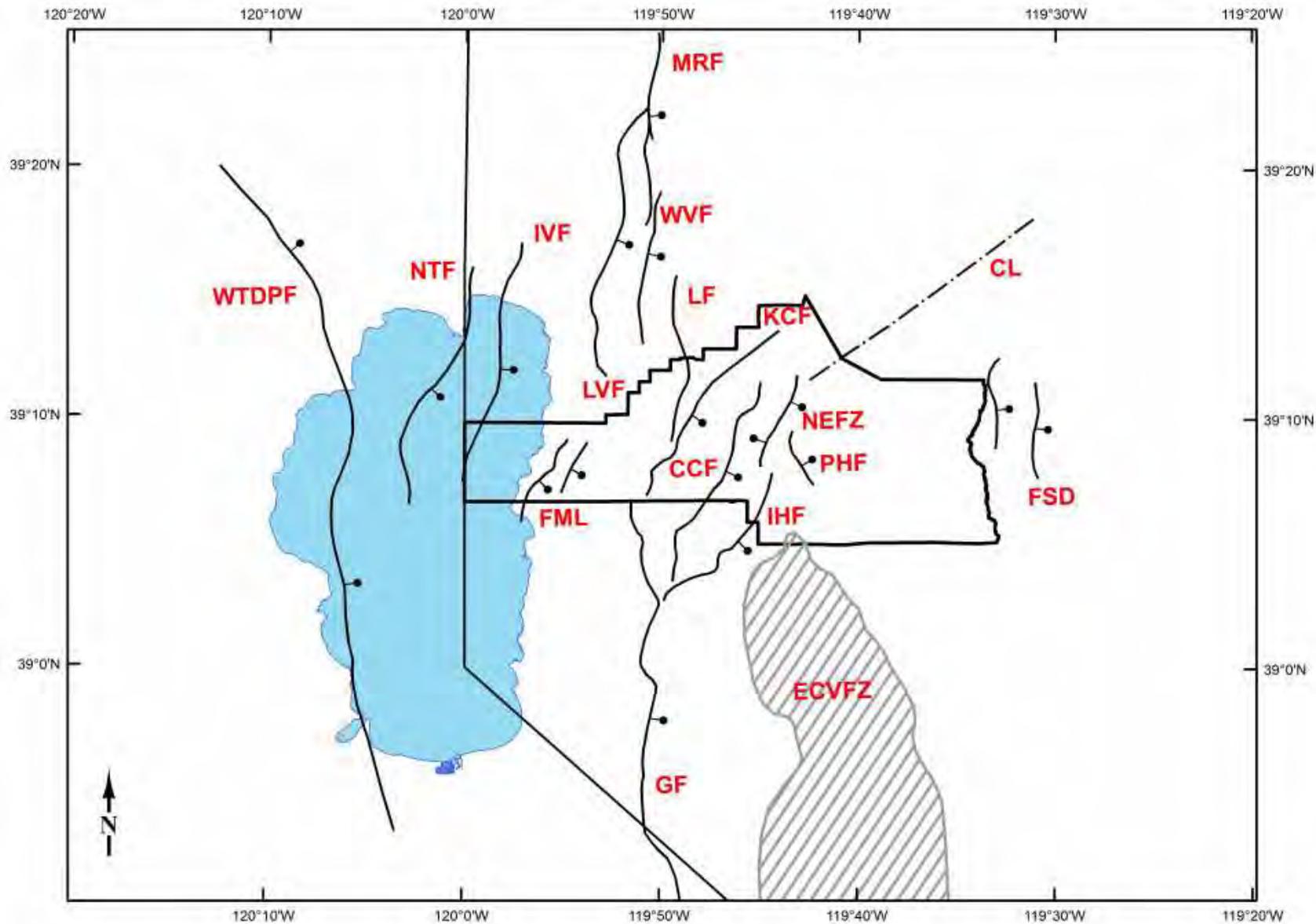


Faults

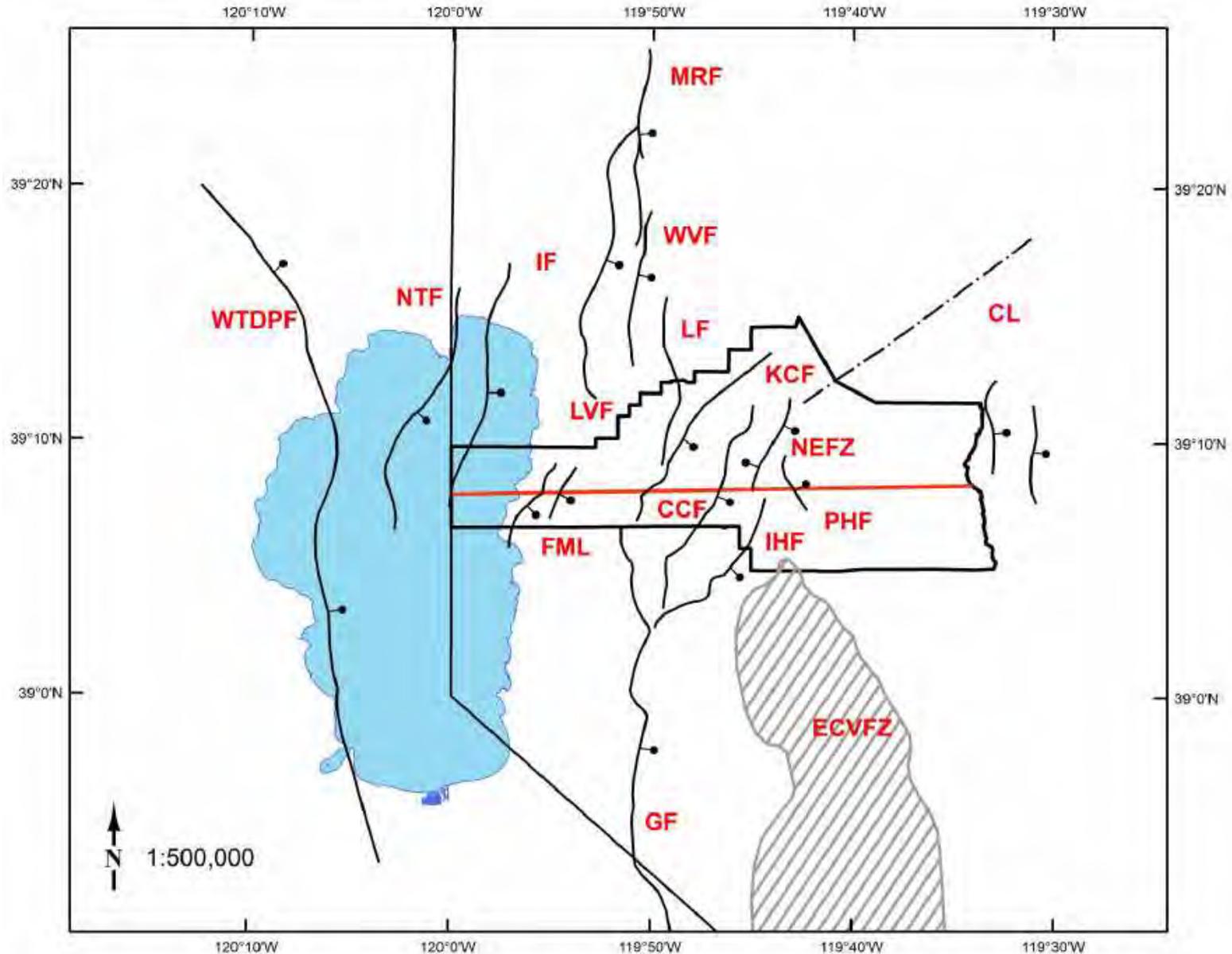
- historic - within the last 150 years
- latest Pleistocene & Holocene - within the last 15,000 years
- late Quaternary - within the last 130,000 years
- middle Quaternary - within the last 750,000 years
- Quaternary - within last 1,800,000 years but not in other categories



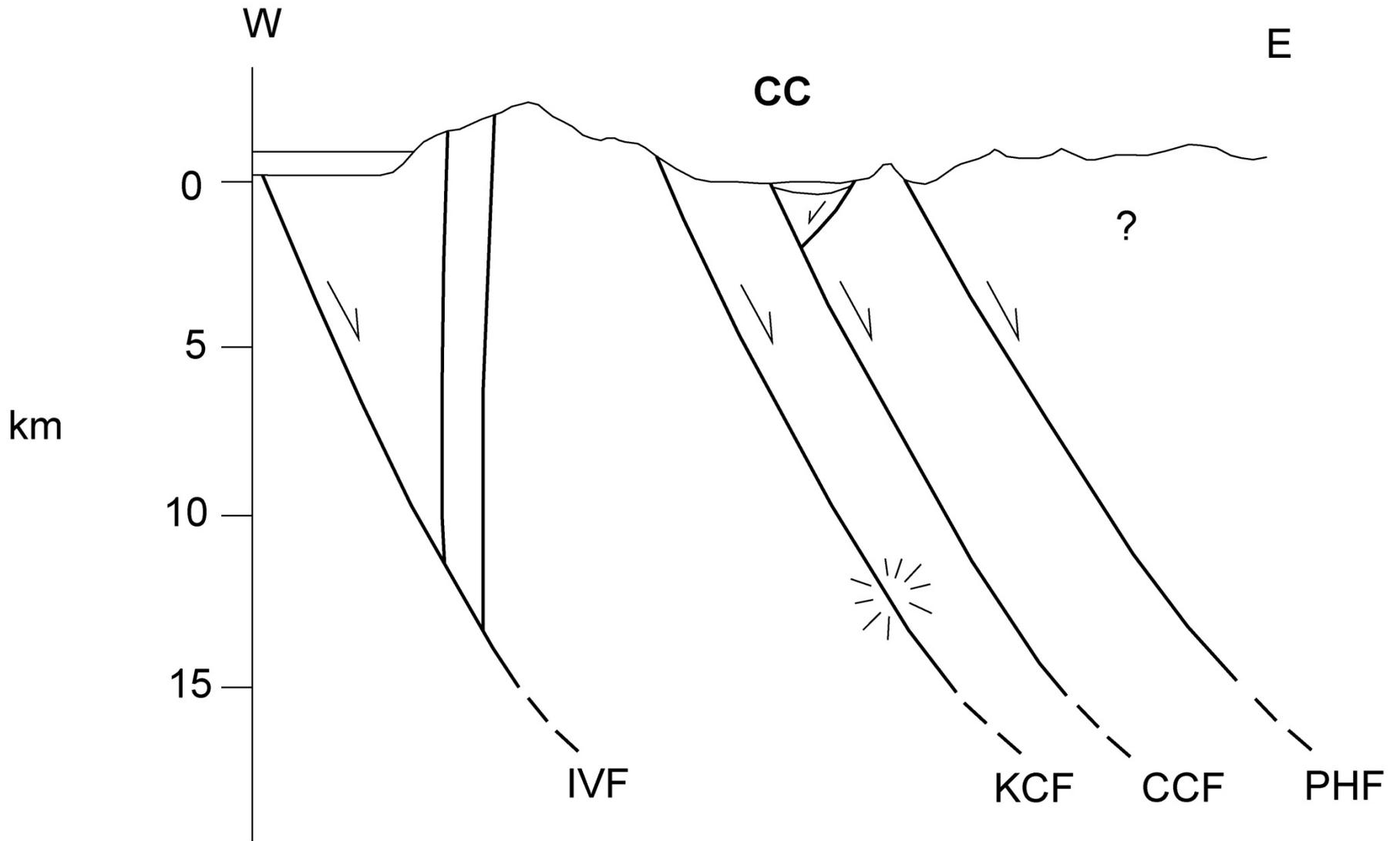
Major Late Quaternary Faults



Down-Dip Extensions of Faults



Carson City Fault Cross Section



Paleoearthquakes in the Carson City Region

<u>Date</u>	<u>Elapsed Time(y)</u>	<u>Fault</u>	<u>~EQ. Magnitude</u>	<u>Lake Tahoe Tsunami</u>	<u>Comments</u>
2015 AD	300				
ca 1715 AD	100	Genoa f.	7.2	?	cluster of events
ca 1615 AD	100	Mt. Rose-W.V. f.z.	6.9	?	
ca 1515 AD	100	Incline Village f.	7.0	Yes	
ca 1415 AD	820	E. Carson V. f.z.	6.8	No	
ca 595 AD	210	Kings Canyon f.z.	6.9	?	cluster of events
ca 385 AD	70	Kings Canyon f.z.	6.9	?	
ca 315 AD	100	Genoa f.	7.2	?	
ca 214 AD	19	Mt. Rose-W.V. f.z.	6.9	?	
ca 195 AD	2141	Kings Canyon f.z.	6.9	?	
ca 1946 BC	339	Kings Canyon f.z.	6.9	?	
ca 2285 BC	1000	S.W. Tahoe f.	6.6	Yes	
ca 3285 BC	-	W. Tahoe f.	7.1	Yes	

last 1800 years - Average Recurrence Interval = 250 yr

last 600 years - Average Recurrence Interval = 150 yr

Probabilities of Earthquakes

What is the chance Carson City will experience a strong earthquake in the next 50 years?

2014 National Seismic Hazard Map Data – HAZARD CURVES

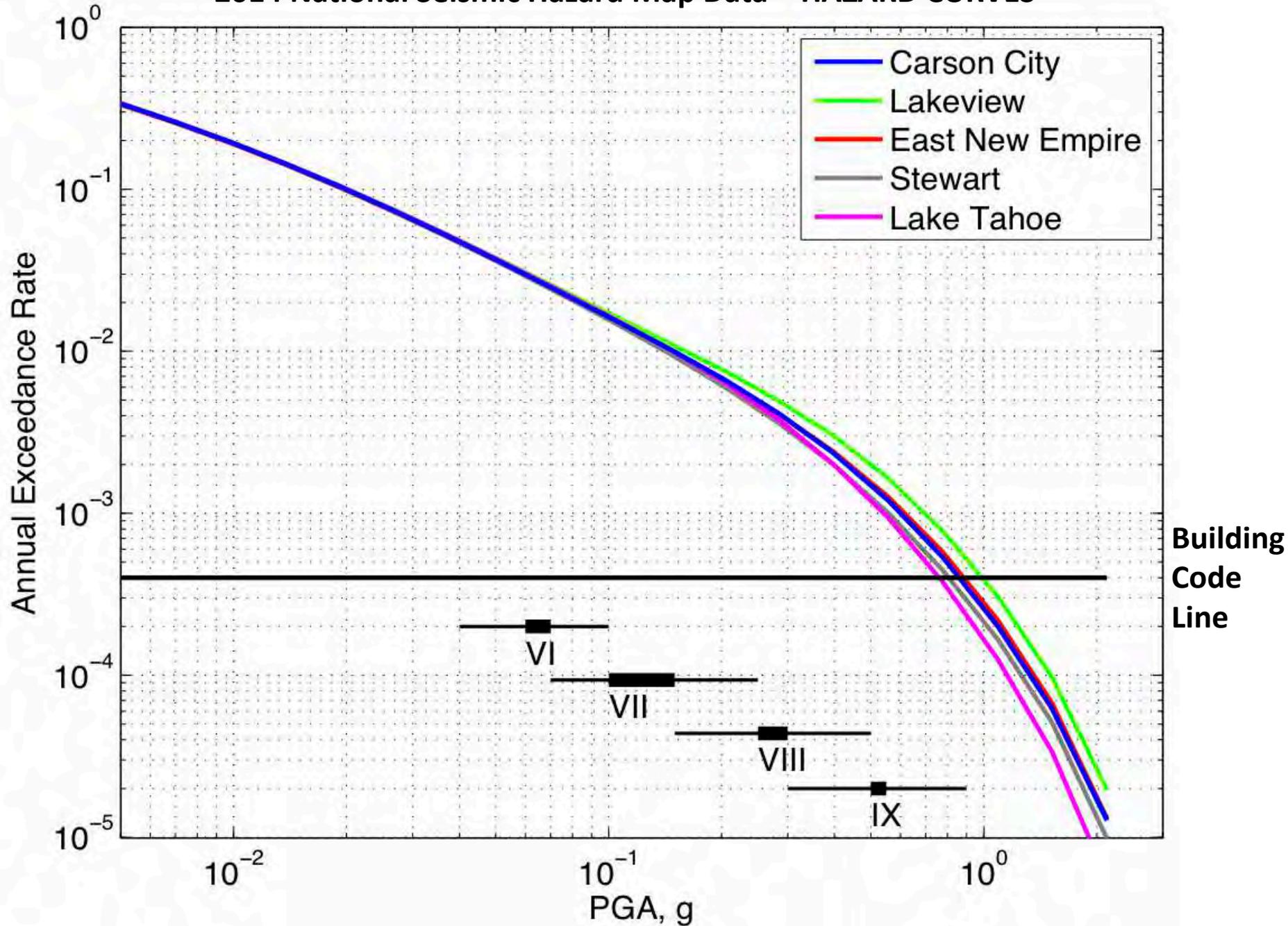


Figure courtesy of Dr. John Anderson, NSL

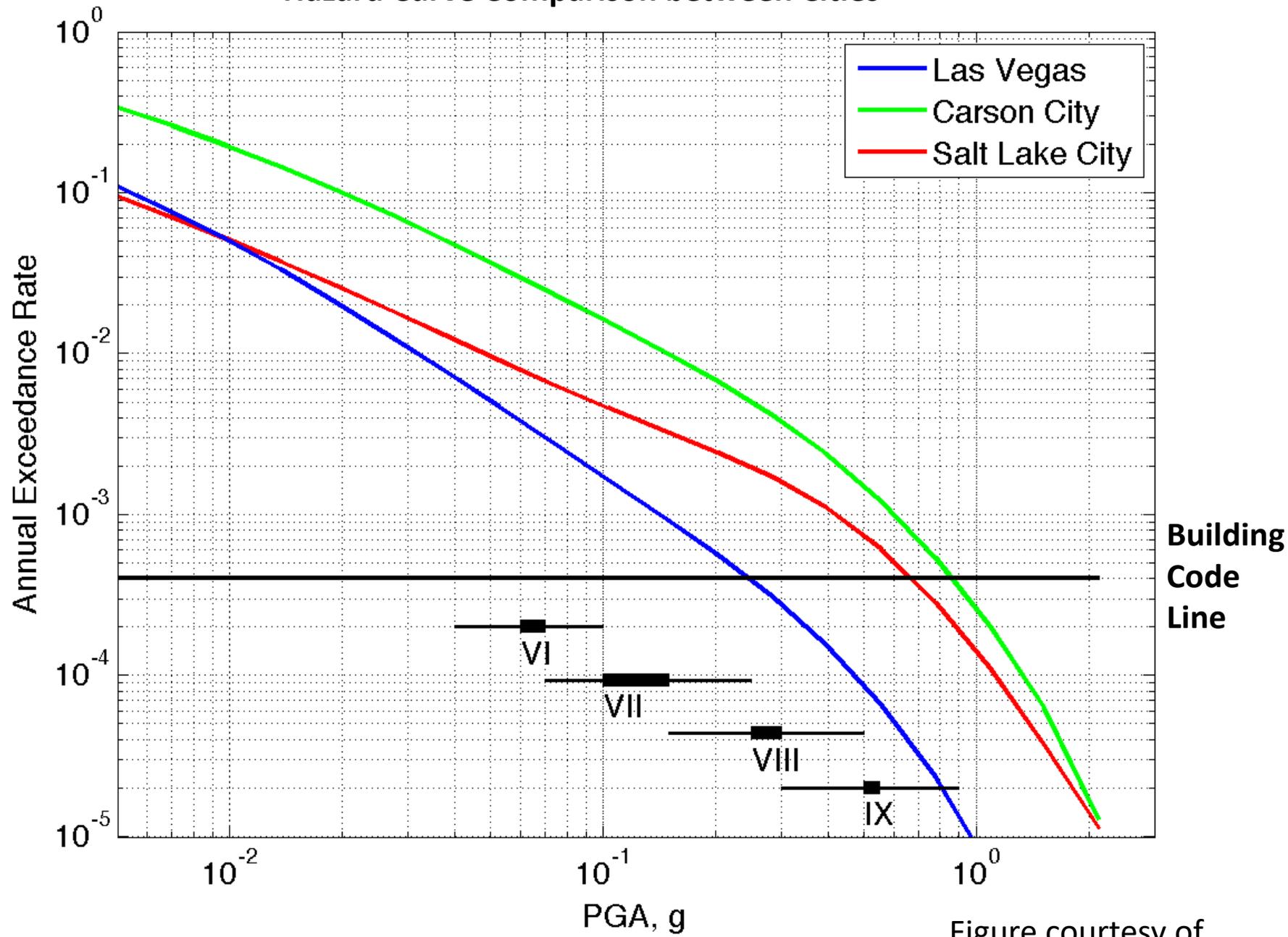
Probability of Earthquake Damage in Carson City within 50 Years

MMI VI	78-79%	cracked walls, people frightened
MMI VII	55-57%	chimney damage, emerg. resp.
MMI VIII	19-25%	building damage, recovery
MMI IX	6-10%	serious reconstruction

MMI = Modified Mercalli Intensity

(These probabilities can be affected by mitigation)

Hazard Curve Comparison between Cities



(Shaking Strength $>$ \rightarrow)

Figure courtesy of
Dr. John Anderson, NSL

Collateral Earthquake Hazards

- **Rock falls and landslides**
- **Liquefaction**
- **Fire following earthquake**
- **Multiple HAZMAT incidences**
- **Communication failures**
- **Tahoe Tsunami**

Synopsis

- **There is a very serious earthquake hazard in Carson City and it is a matter of time before damaging and potentially deadly shaking occurs.**
- **Carson City has addressed this threat with strong building code requirements, but public awareness and vulnerable buildings remain a challenge. [still true?]**

Mitigative Steps

- **Drop, Cover, and Hold On; universal message**
- **Keep the earthquake safety message in front of the public; fliers, web site, windows-of-opportunity**
- **Keep up with building codes; seismic provisions**
- **Prioritize URM Building risk; strategies for handling the highest risk buildings**
- **Steady push to mitigate dangerous, high risk buildings**

Volcanoes, Tsunamis, & Landslides

Oh My!

- **Volcanoes:** Lake Tahoe, McClellan Peak; lowish but real; dikes injected at base of crust northern Lake Tahoe.
- **Lake Tahoe Tsunami/ Seiche:** limited exposure to CC. Devise tsunami safety zone (say 50? or 75? ft up; hoping it is something like this; need to study inundation zone); advise lakeside residents to make a safety area.
- **Landslides:** steep terrain; faulted fronts, deep canyons (Kings Canyon, Ash Canyon). Need a map of where landslides have occurred before and estimate potential runout areas if there is risk. New areas as well. Planning to keep critical facilities out of landslide areas.



529

580

531

Carson City Fwy

W Winnie Ln

520

NF-039

Carson City

513

50T

395T

S Saliman Rd

Lincoln Hwy

Silver Sage Dr

E Clearview Dr

S Edmonds Dr

Snyder Ave

518

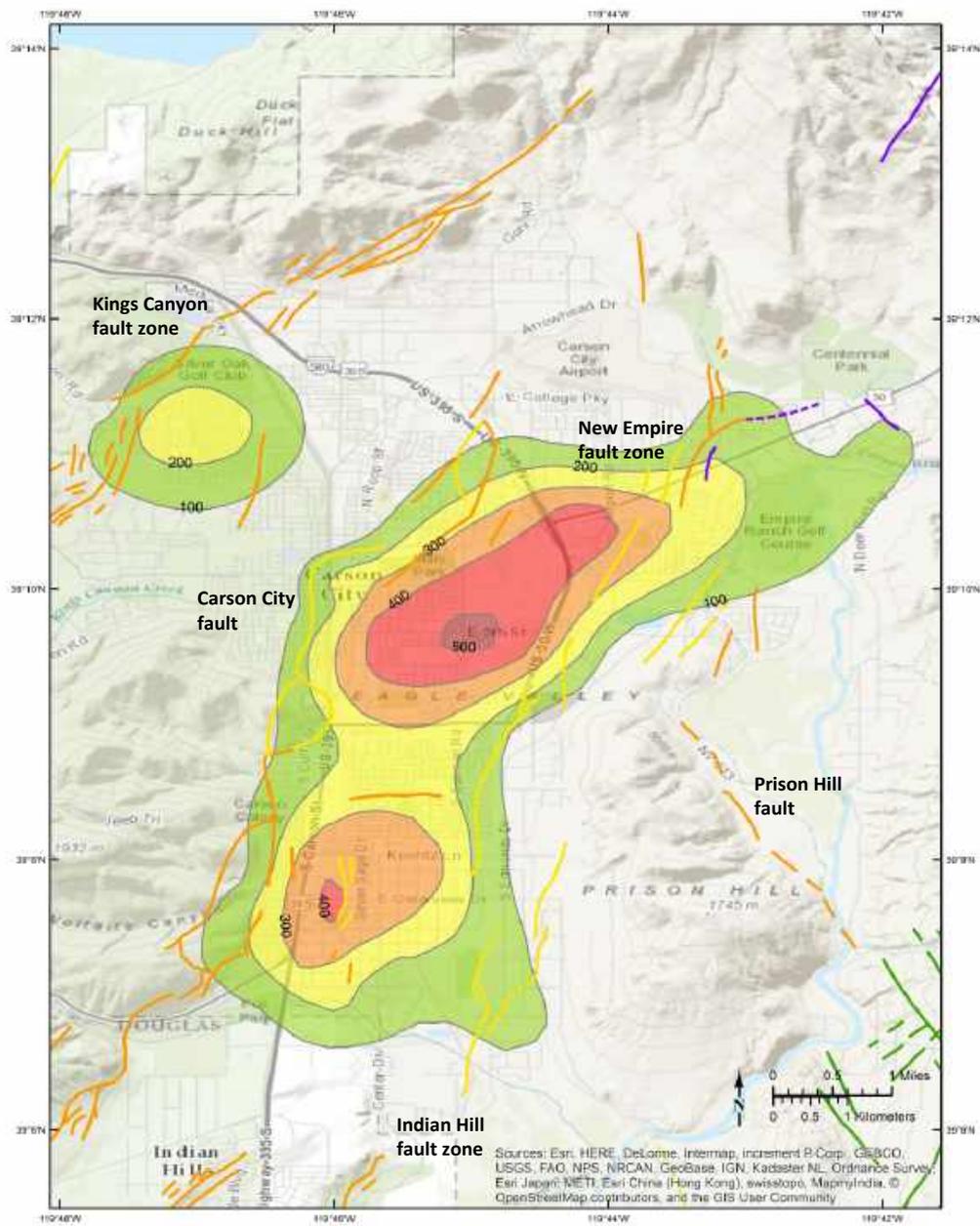
2.17 mi

50

395

© 2015 Google

Carson City Basin Depth and Faults



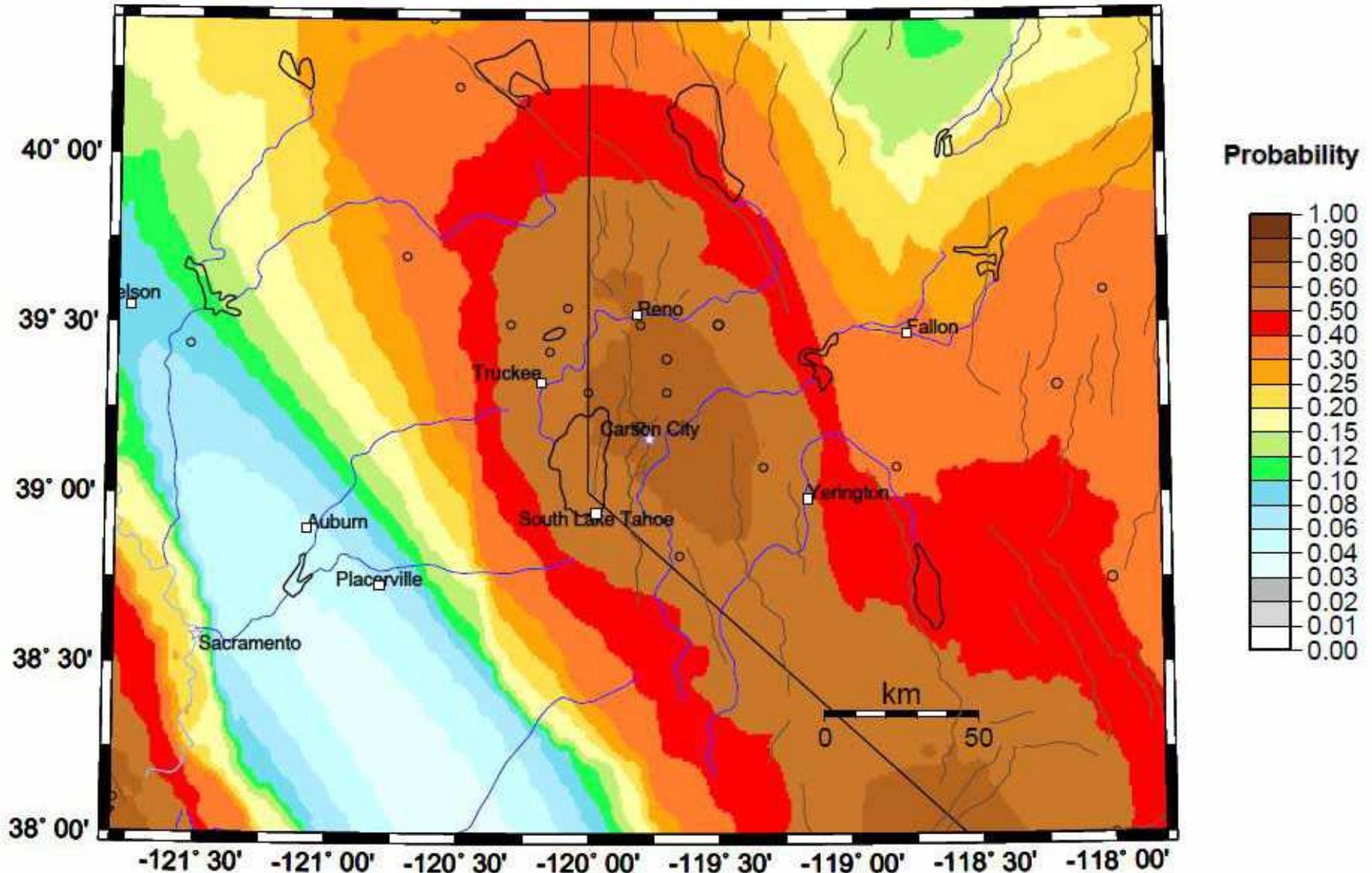
Basin Depths
from Abbott and
Louie (2000)

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), Swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Probability of an Earthquake of Magnitude ≥ 6 within 31 Miles – 50 yrs

U.S. Geological Survey 2009 PSHA Model

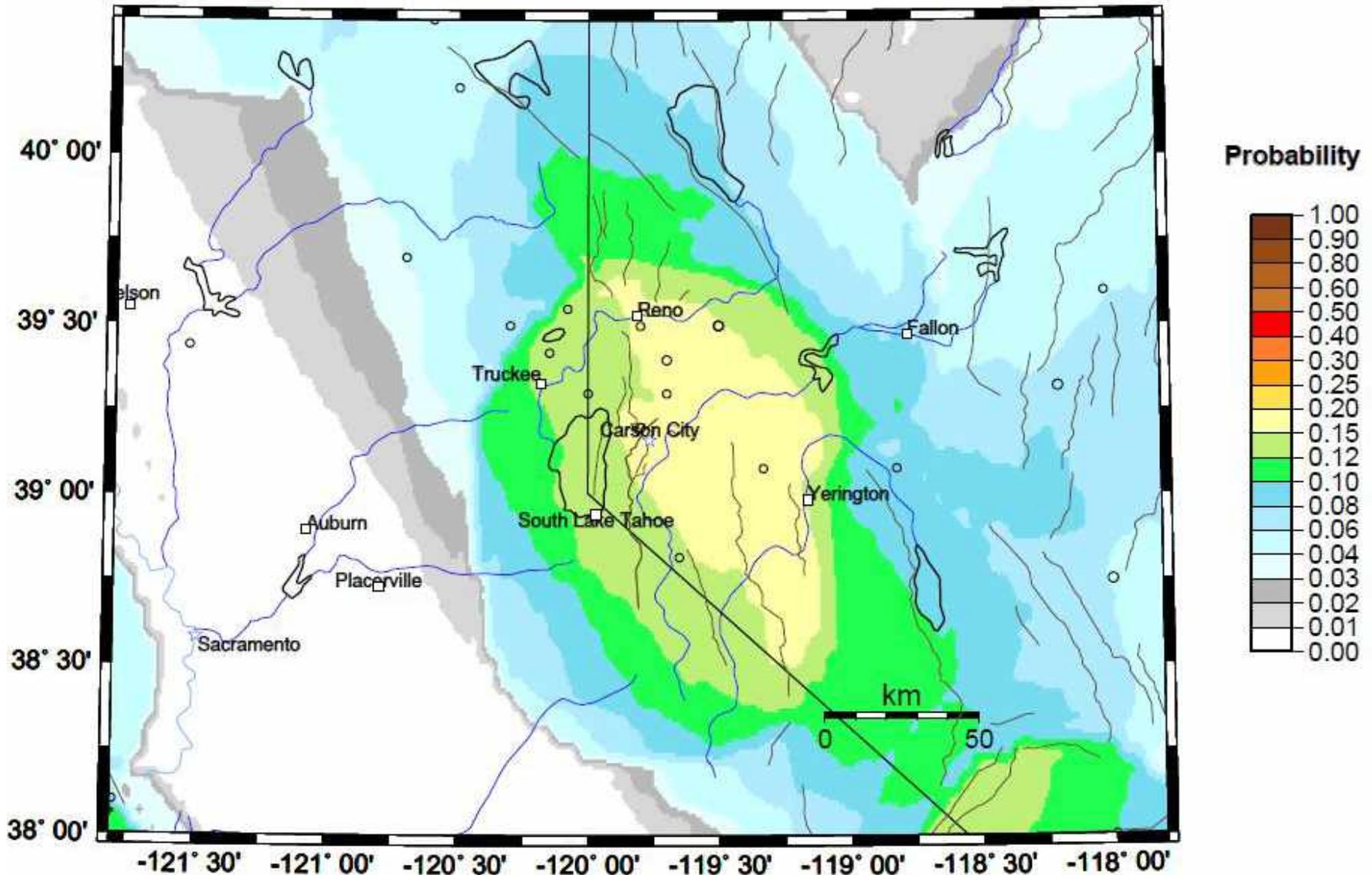
Site: -119.81 d E 39.20



Probability of an Earthquake of Magnitude ≥ 7 within 31 Miles – 50 yrs

U.S. Geological Survey 2009 PSHA Model

Site: -119.81 d E 39.20



Appendix A: Meeting Notes and Handouts

- Presentations by Subject Matter Experts
 - Flooding in Carson City

Flooding in Carson City

Presentation

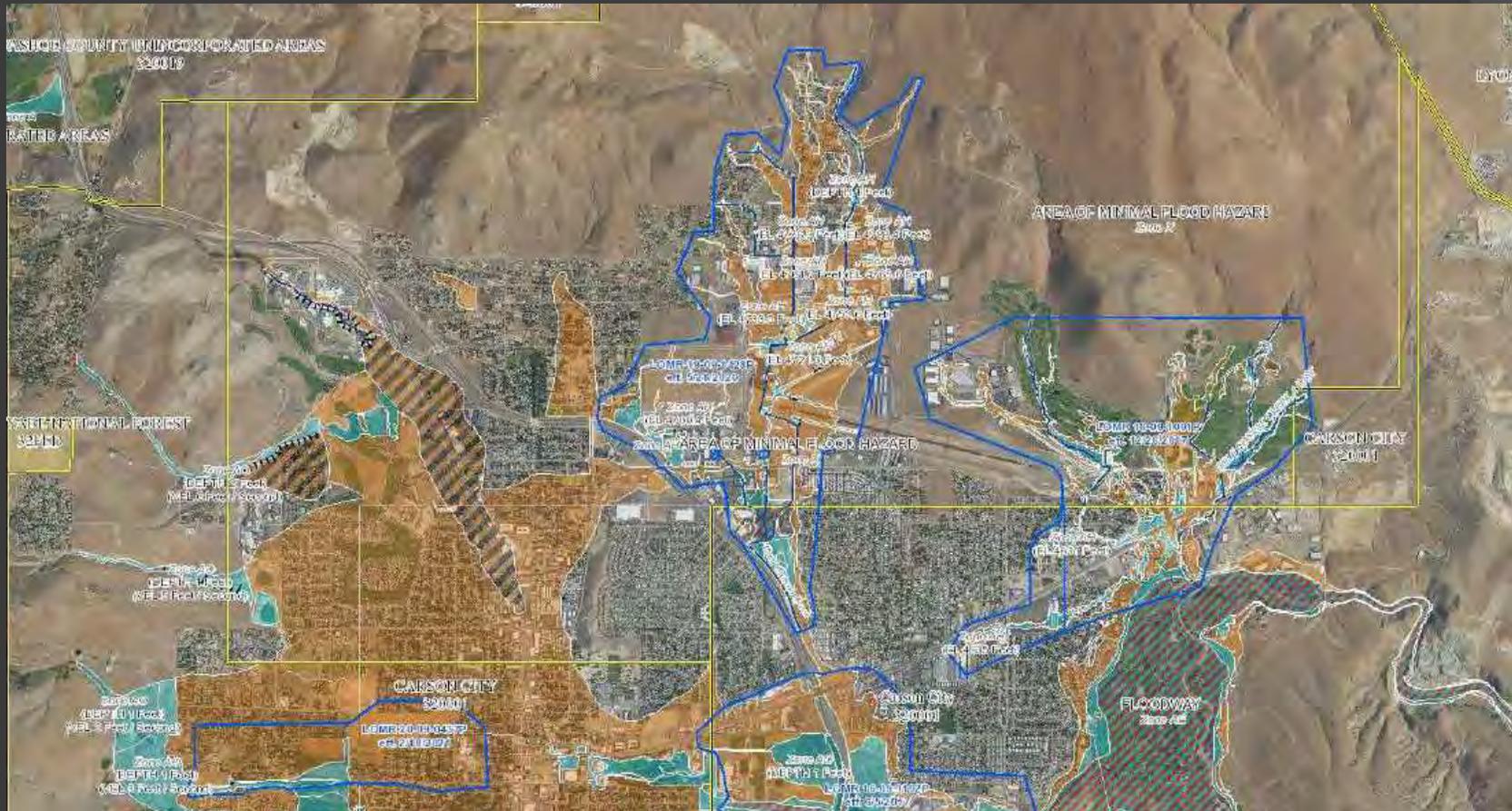
May 7, 2021



Robert Fellows, P.E., Floodplain
Manager & Chief Stormwater Engineer



Current Flood Maps





Past Floods

Year	Season		Year	Season
1861	Winter		1955	Winter
1868	Winter		1964	Winter
1874	Winter		1983	Summer
1875	Summer		1986	Winter
1886	Winter		1989	Winter
1906	Winter		1995	Summer
1913	Summer		1997	Winter
1927	Summer		2005	Winter
1949	Summer		2014	Summer
1950	Winter		2017	Winter



Past Floods

Year	Season		Year	Season	
1861	Winter		1955	Winter	5
1868	Winter	7	1964	Winter	9
1874	Winter	6	1983	Summer	19
1875	Summer	1	1986	Winter	3
1886	Winter	11	1989	Winter	3
1906	Winter	20	1995	Summer	6
1913	Summer	7	1997	Winter	2
1927	Summer	14	2005	Winter	8
1949	Summer	22	2014	Summer	9
1950	Winter	1	2017	Winter	3



2017 Flood





2017 Flood





2017 Flood





2017 Flood





2014 Flood





2014 Flood





Trouble Areas in Carson City after 2017 Flood & Solutions

- Lompa Ranch Channel – 2020
- North Carson Drainage Area Plan – 2020
- Pending FEMA grant for Sutro Basins - 2020
- Pending FEMA grant for Goni Basin - 2020
- West Carson Area Drainage Plan – 2021 pending



Trouble Areas in Carson City after 2005 Flood & Solutions

- Vicee Retention Basin – 2005
- Voltaire Detention Basin - 2009
- Quill Meadow Basins - 2011
- I-580 Freeway south of Fairview Dr. - 2015
- Sierra View Road Improvements - 2016



Trouble Areas in Carson City after 1997 Flood & Solutions

- Vicee Watershed – Vicee Basins built in 1998
- Sutro Area – Northwest Drainage Project built in 2000
- Southeast Carson – Drainage channel/pipe improvements 1997
- Hwy 50 East – New system built in 2003
- North Carson St – New system built in 2002



HMP Storm Water Goals

5.B	Continue to update policies that discourage growth in flood-prone	Public Works	Local Gen Fund	Ongoing	Protection of homes, businesses, infrastructure, and critical facilities.	High
5.C	Review & update flood plans for coordination w/adjacent counties, cities, and special districts supporting a regional approach to flood.	Public Works	PDM, HMGP, FMA, RFC, USDA, NDEP, USEPA, NDRCS, Local, CC PW	24-36 months	Protection of homes, businesses, infrastructure, and critical facilities while strengthening regional coordination.	High
5.D	Update and expand Sandbagging Plan.	Public Works	Local Gen. Fund, EMGP	24 months	Protection of homes, businesses, infrastructure, and critical facilities.	Moderate
5.E	Install new flood facilities & update storm drain system.	Public Works	PDM, HMGP, FMA, RFC, USDA, NDEP, USEPA, NRCS, Local, CC PW	24-36 months	Protection of homes, businesses, infrastructure, and critical facilities.	Moderate



HMP Storm Water Goals

5.F	Upon completion of land transfers associated with the Lands Bill which includes land trading with Carson City, BLM, US Forestry, and Washoe Tribe; identify/implement projects within transferred lands and other areas within Carson City that need slope stabilization for flood and landslide.	Public Works	PDM, HMGP, USFS, BLM, Local Gen. Fund	24-36 months	Protection of homes, businesses, infrastructure, and Moderate critical facilities.	
5.G	Design and install facilities to capture debris/sediment within Eagle Valley.	Public Works	PDM, HMGP, FMA, RFC, USDA, NDEP, USEPA, NRCS, Local, CC PW	24-36 months	Protection of homes, businesses, infrastructure, and Moderate critical facilities.	



HMP Storm Water Goals

5.H	Develop a Flood Management Plan for the New Empire Area and install a new flood control facility for the area.	Public Works	PDM, HMGP, FMA, RFC, USDA, NDEP, USEPA, NRCS, Local, CC PW	24-36 months	Protection of homes, businesses, infrastructure, and Moderate critical facilities.	
5.J	Install a storm water retention facility at Goni Canyon & storm drain system at Goni Creek.	Public Works	PDM, HMGP, FMA, RFC, USDA, NDEP, USEPA, NRCS, FEMA, 319(h) grants (Clean Water Act), CC PW	24-36 months	Protection of homes, businesses, infrastructure, and Moderate critical facilities.	



HMP Storm Water Goals

5.K	Design & install facilities to capture debris/sediment within Eagle Valley.	Public Works	PDM, HMGP, FMA, RFC, USDA, NDEP, USEPA, NRCS, FEMA, 319(h) grants (Clean Water Act), USGS, CC PW	18-24 Months	Protection of homes, businesses, infrastructure, and critical facilities.	Moderate
6.B	Continue the Storm Water Management Plan for snow melt.	Public Works	PDM, HMGP, FMA, RFC, USDA, NDEP, USEPA, NRCS, FEMA, 319(h) grants (Clean Water Act), USGS, CC PW	12-14 months	Protection of homes, businesses, infrastructure, and critical facilities.	High



Questions



Appendix A: Meeting Notes and Handouts

- Presentations by Subject Matter Experts
 - Infectious Disease

**INFECTIOUS DISEASES:
2021 CARSON CITY HAZARD
MITIGATION PLAN UPDATE
INITIAL MEETING**

NICKI AAKER, MSN, MPH, RN

**CARSON CITY HEALTH AND HUMAN
SERVICES DIRECTOR**

MAY 7, 2021



1

**Carson City Health and Human Services
(CCHHS)**

Our Mission

To protect and improve the quality of life for our community through disease prevention, education and support services.

Our Vision

CCHHS leads the region providing services that support healthy communities.

Our Values

Respect for Others: We treat everyone equally.

Competence: We stay current with the latest resources available.

Collaboration: We work together to meet the mission and move towards our vision.

Ethical: We work professionally, respecting confidentiality and following laws and regulations.



2

DISEASE PREVENTION & CONTROL DIVISION

Epidemiology tracks diseases in our community by performing:

- Public health surveillance & detection
- Outbreak investigation of reportable diseases
- Compiling data

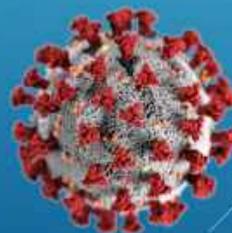


3

PUBLIC HEALTH PREPAREDNESS (QUAD COUNTY)

The mission of Public Health Preparedness is to prevent, respond to, and rapidly recover from public health threats to the community by engaging in:

- Community Response – Public Health
- Community Preparedness Activities
- Healthcare System Preparedness Activities



4

Outbreak – Small, but unusual. A disease that is noticeable, often small, increase over the expected number of cases.
 Examples: Measles, Pertussis

Epidemic – Bigger and spreading. An outbreak over a larger geographic area. Examples: H1N1 in 2009-2010, Zika Virus

Pandemic – International and out of control. A disease that spreads to multiple countries or regions of the world.
 Example: COVID-19



5

NEVADA REPORTABLE DISEASES NAC 441A

- AIDS/HIV
- Amebiasis
- Anthrax
- Botulism
- Campylobacteriosis
- Chancroid
- *Chlamydia Trachomatis* infection
- Cholera
- Coccidioidomycosis
- Cryptosporidiosis
- Diphtheria
- Ehrlichiosis/anaplasmosis
- Enterohemorrhagic *E. coli*
- Encephalitis
- Extraordinary occurrence of illness
- Foodborne occurrence of illness
- Giardiasis
- Gonococcal infection
- Granuloma inguinale
- *Haemophilus influenza* type b
- Hansen's disease (leprosy)
- Hantavirus infection
- Hepatitis A: Generally
- Hepatitis A: Presence of case in child
- Hepatitis B, C and Delta
- Hepatitis E
- Hepatitis, unspecified
- Influenza



6

NEVADA REPORTABLE DISEASES NAC 441A

- Legionellosis
- Leptospirosis
- Listeriosis
- Lyme disease
- Lymphogranuloma venereum
- Malaria
- Measles (rubeola)
- Meningitis
- Meningococcal disease
- Mumps
- Pertussis
- Plague
- Poliovirus infection
- Psittacosis
- Q fever
- Relapsing fever
- Respiratory syncytial virus infection (RSV)
- Rotavirus
- Rubella
- Salmonellosis
- Severe acute respiratory syndrome (SARS)
- Severe reaction to immunization
- Shigellosis
- Smallpox (variola)
- Spotted fever rickettsioses
- *Staphylococcus aureus*:
Vancomycin resistant and intermediate



7

NEVADA REPORTABLE DISEASES NAC 441A

- *Streptococcal* toxic shock syndrome
- *Streptococcus pneumoniae*: Invasive
- Syphilis
- Tetanus
- Toxic shock syndrome, other than streptococcal toxic shock syndrome
- Trichinosis
- Tularemia
- Typhoid fever
- Vibriosis
- Viral hemorrhagic fever
- West Nile virus
- Yellow fever
- Yersiniosis
- AND OF COURSE – COVID-19



8

HISTORY

- ❖ “Spanish Flu” of 1918 and 1919
- ❖ Measles
- ❖ Ebola Outbreak (2013 – 2016)
- ❖ Pertussis (Whooping Cough)
- ❖ H1N1 Influenza
- ❖ Rabies
- ❖ West Nile Virus
- ❖ Severe Acute Respiratory Syndrome (SARS)
- ❖ COVID-19 Pandemic











9

HISTORY

- ❖ Foodborne Illness
 - Top 5 germs that cause illness in US:
 - > Norovirus
 - > Salmonella
 - > Clostridium perfringens
 - > Campylobacter
 - > Staphylococcus Aureus (Staph)
 - Germ that cause illnesses that likely lead to hospitalizations:
 - > Clostridium botulinum (botulism)
 - > Listeria
 - > Escherichia coli (E. coli)
 - > Vibrio







10

PLANNING SIGNIFICANCE

- ▶ The 2016 Carson City Hazard Mitigation Plan rated the Planning Significance high for infectious disease
- ▶ Suggestion for this version is to keep the planning significance rated high



11



CARSON CITY, NV 89706
775-887-2190

www.gethealthycarsoncity.org

www.facebook.com/cchhs



12

Appendix A: Meeting Notes and Handouts

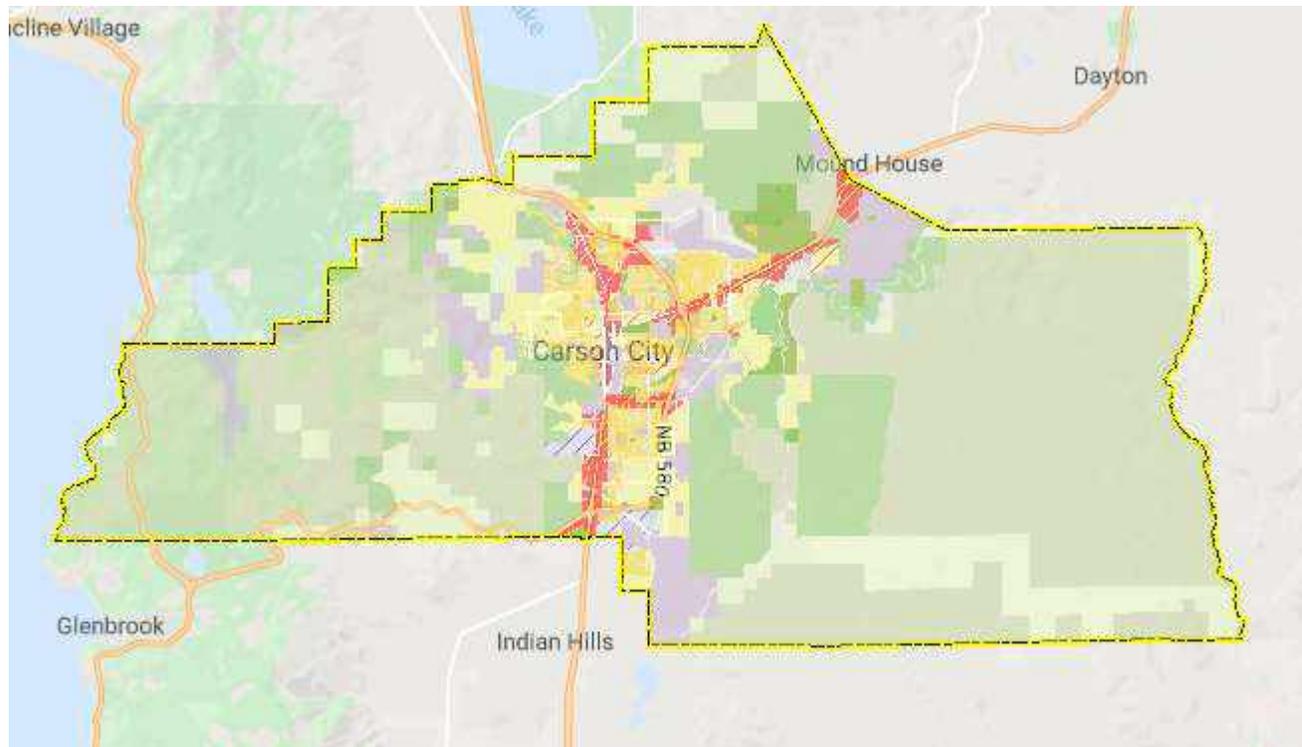
- Presentations by Subject Matter Experts
 - Overview of Residential Development



An Overview of Residential Development in Carson City, Nevada

May 2021

Overview on Policy / Process



New Housing Starts

	<u>2019</u>	<u>2020</u>	<u>2021 *</u>
• Single Family Residential	97	176	50
• Multi-Family Residential	282	0	8
• TOTAL	379	176	58

* Through April 30, 2021

Where is the housing under construction?



ARBOR VILLAS (147 attached SFR)



Location: Northside Little Lane



Arbor Villas
CAPSTONE COMMUNITIES

Front Elevation

JACKSON VILLAGE (41 SFR lots)

Location: Northside Eagle Station Lane



LITTLE LANE VILLAGE (149 lots)

Location: Northside
Little Lane

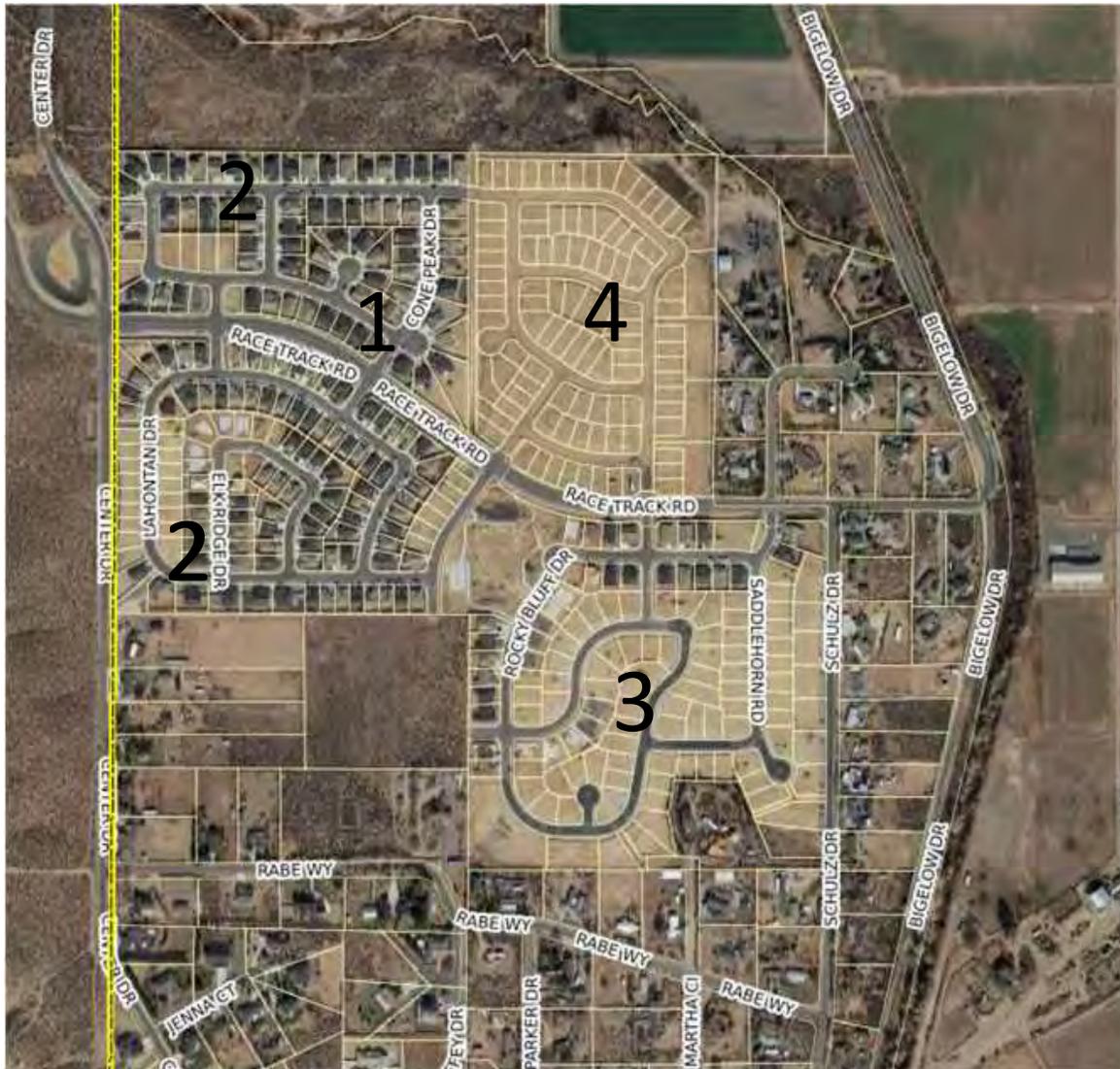


MILLS LANDING (142 units)

Location: Westside State Street



SCHULZ RANCH PHASES 1-4 (416 lots)



Location: Westside Center Drive



SILVER OAK Phase 23B (29 Lots)

Location: North end
Ormsby Blvd.

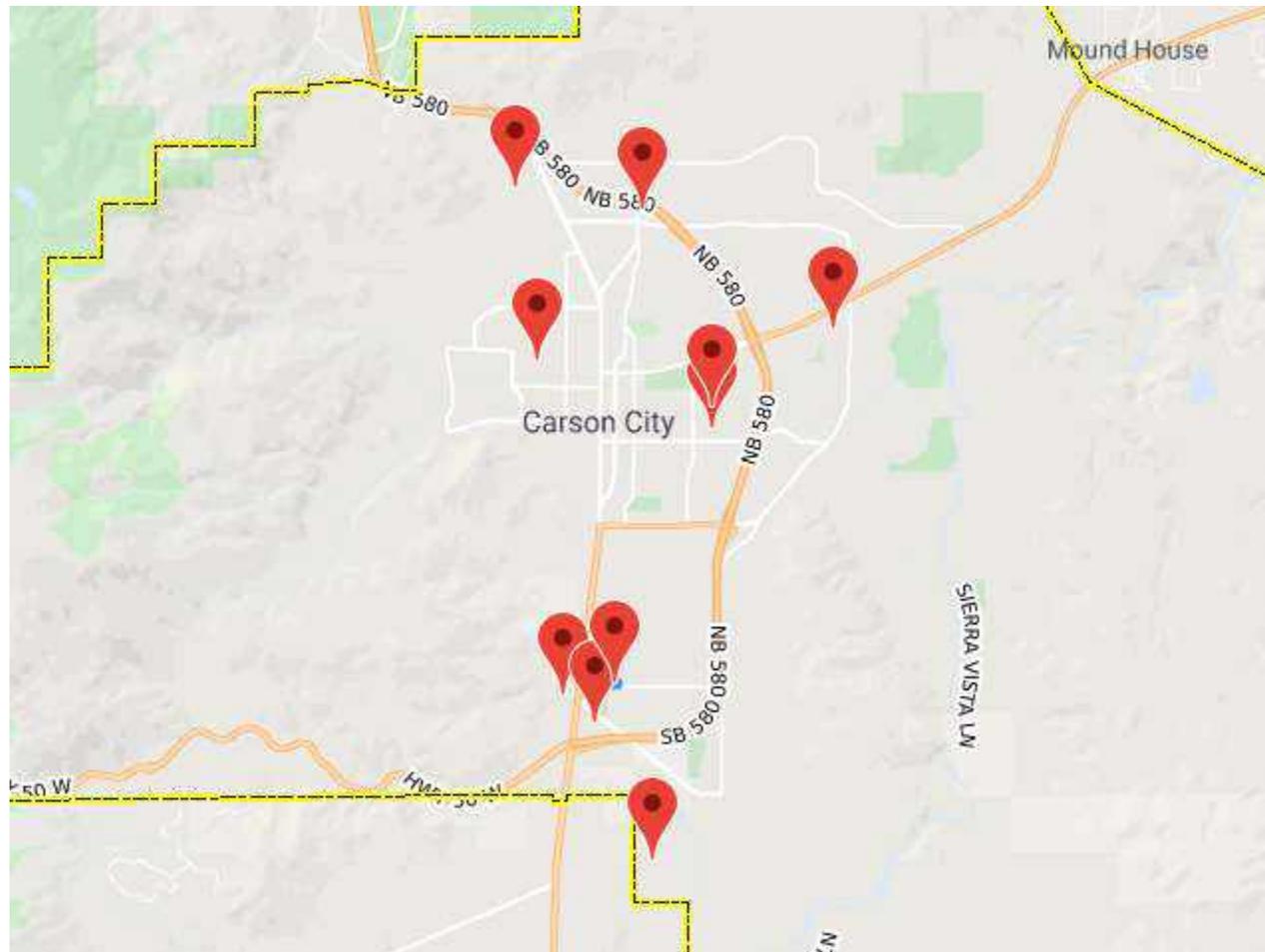


CARSON HILLS APARTMENTS (370 units)

Location: Westside S. Curry St.



Where is the site under construction in anticipation of building houses?



ANDERSON RANCH (203 lots)

Location: Westside Mountain Street



BLACKSTONE RANCH – PHASE 1 (189 units)/PHASE 2 (204 units)

Location: North of 5th Street



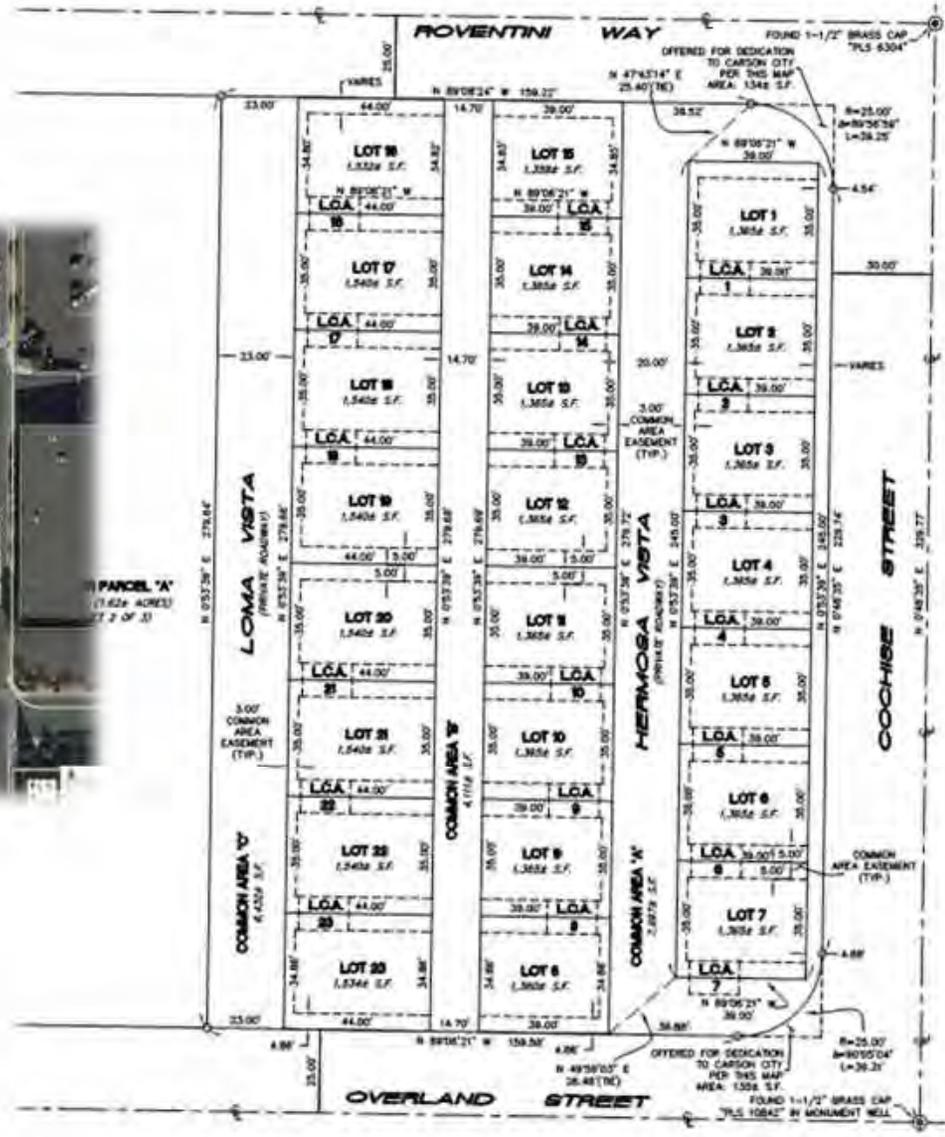
Phase 1

Phase 2



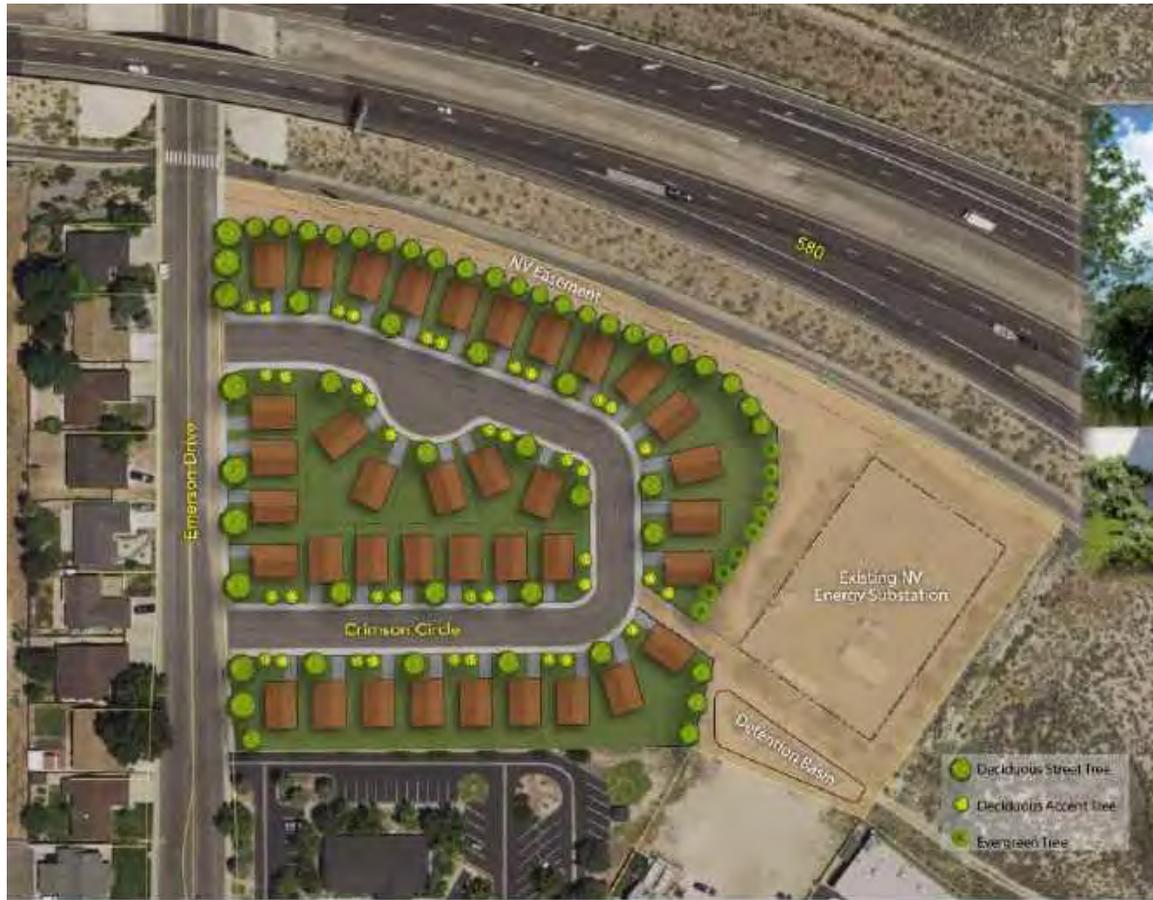
CLEARVIEW RIDGE (73 lots)

Location: Westside Cochise St.



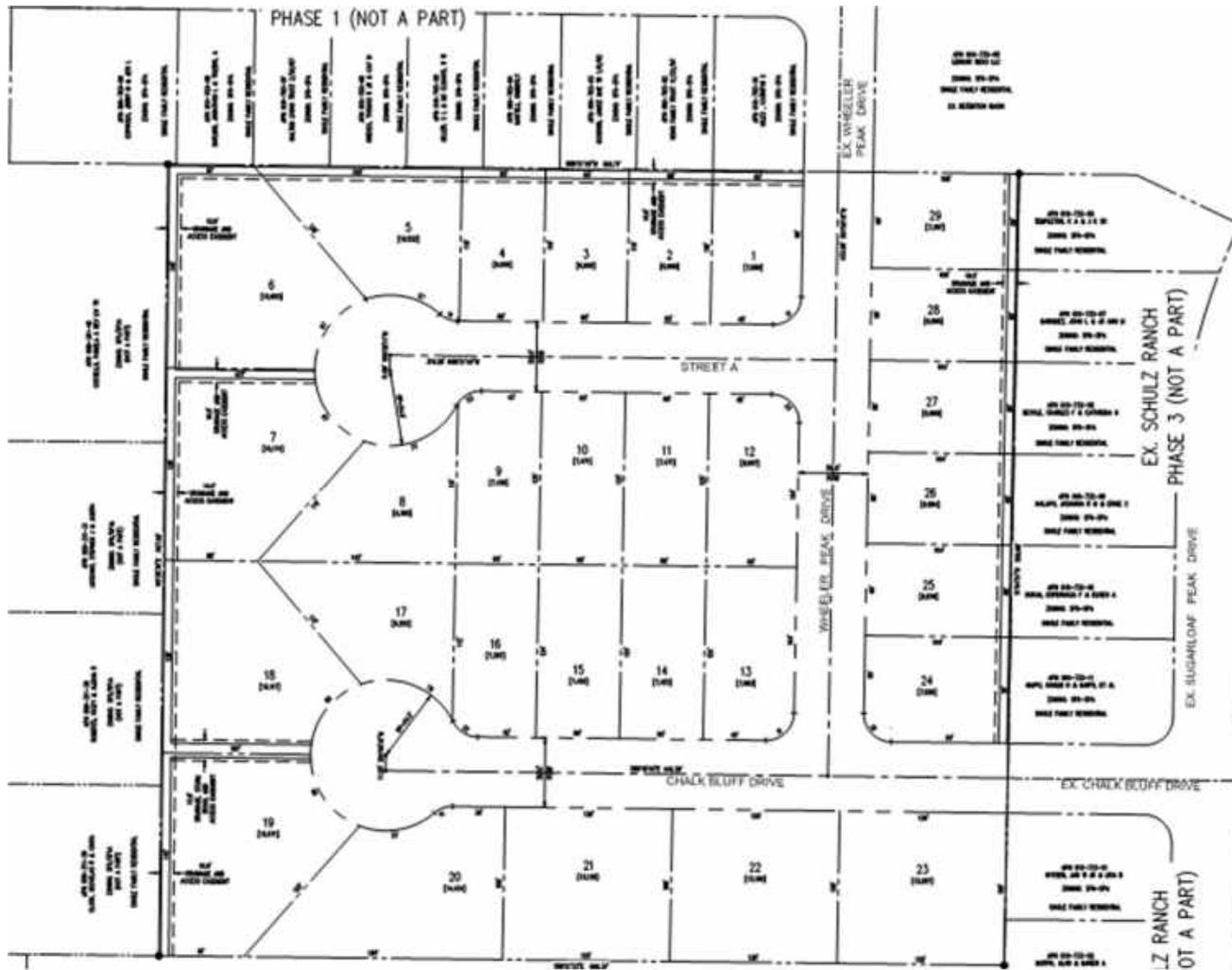
EMERSON COTTAGES (37 lots)

Location: Eastside Emerson Drive



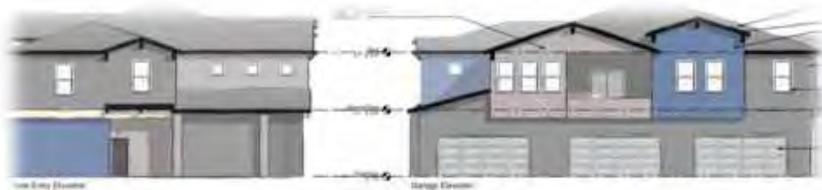
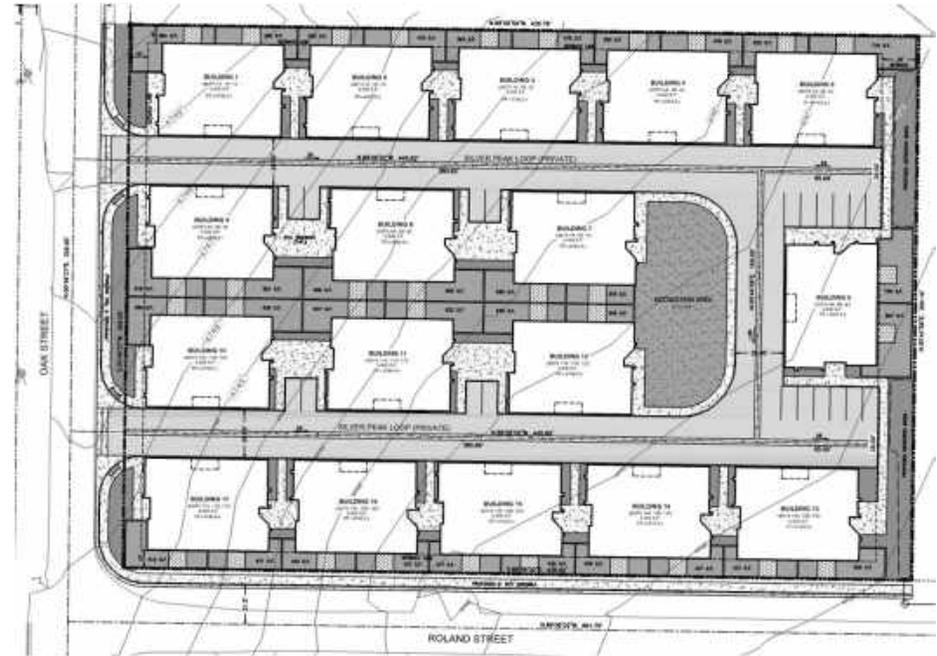
SCHULZ RANCH – PHASE 5 (29 lots)

Location: North of Rabe Way



SILVER CREST CONDOMINIUMS (51 lots)

Location: Northeast of the corner of Oak Street and Roland Street



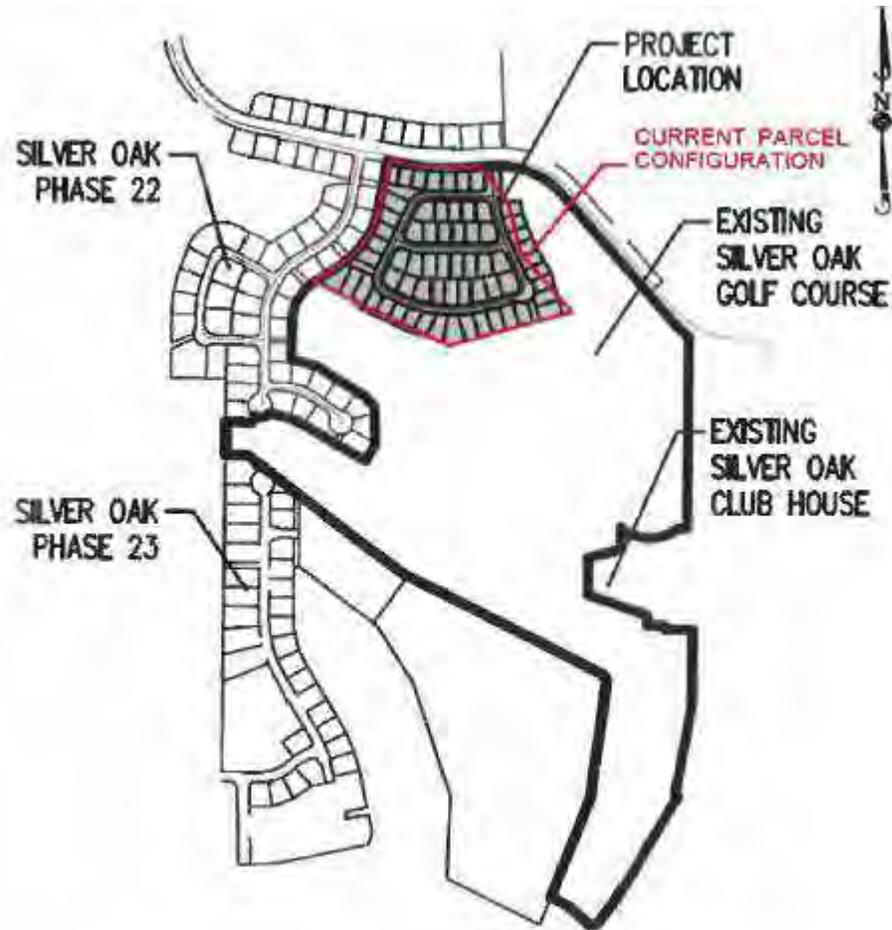
SILVER VIEW TOWNHOMES (34 LOTS)

Location: Northwest corner of Clearview Drive and Silver Sage Drive



SILVER OAK Phase 24 (64 lots)

Location: Southside Silver Oak Drive

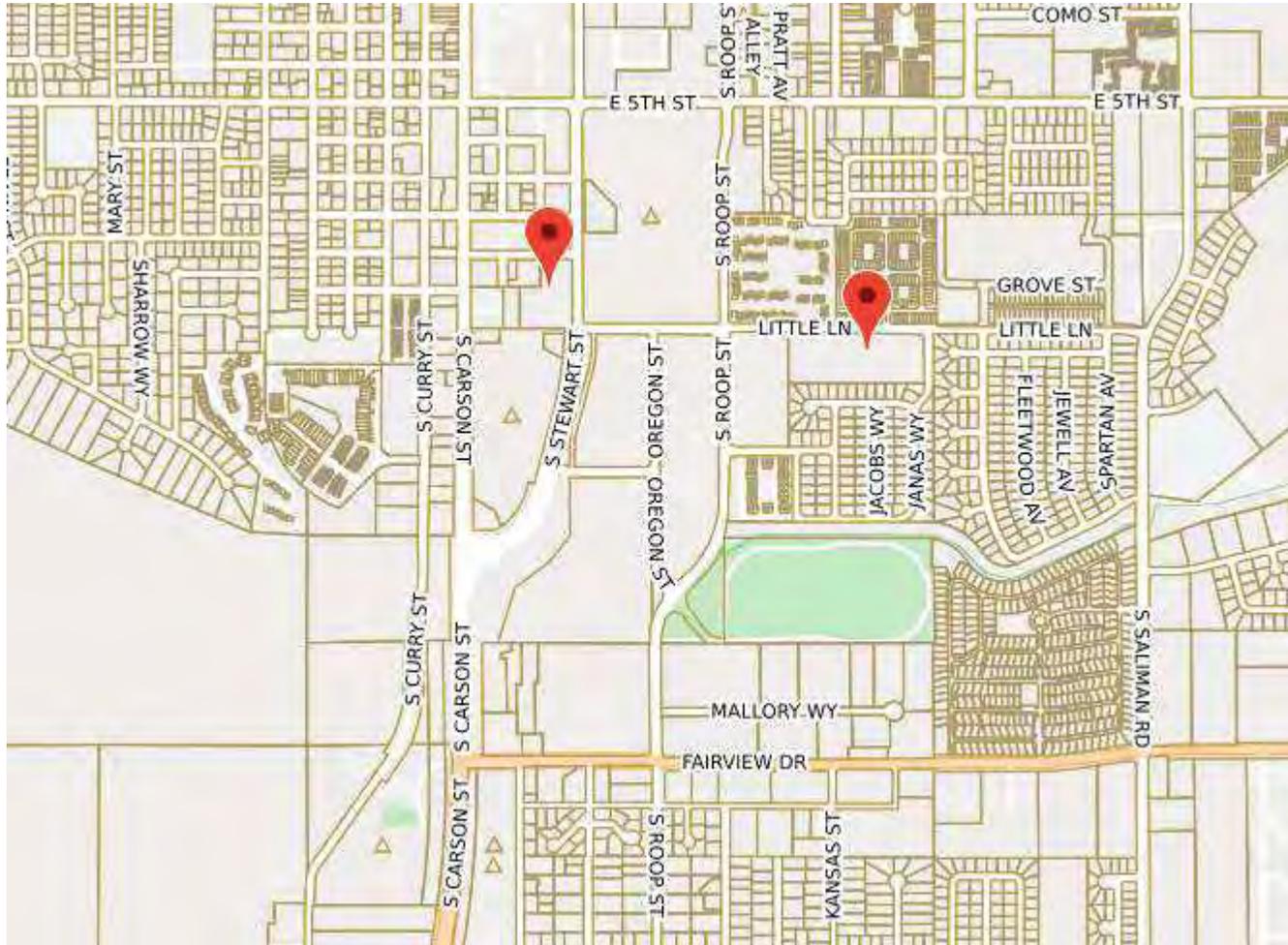


BROWN STREET APARTMENTS (90 units)

Location: Westside Brown St.

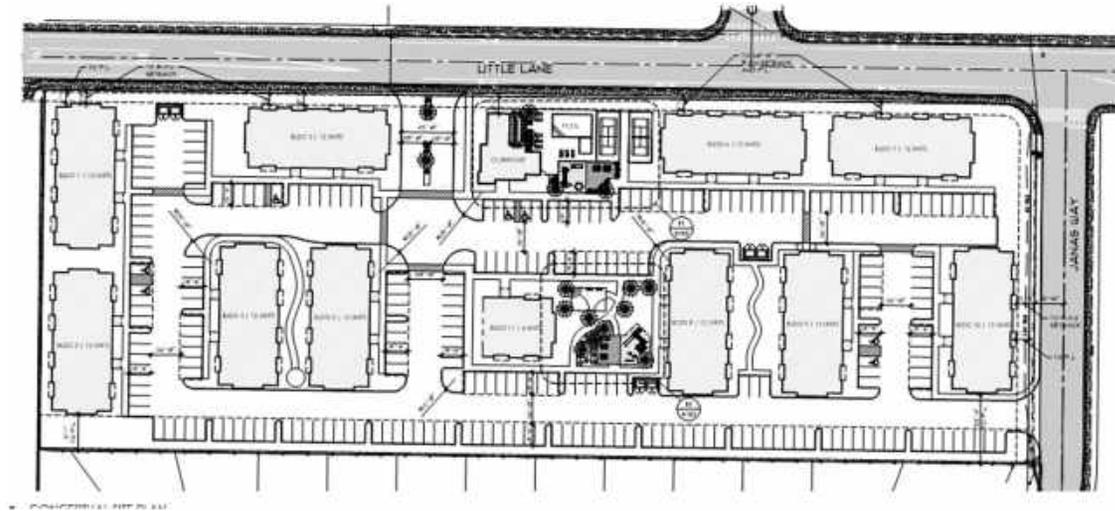


Other Residential Activity



LITTLE LANE APARTMENTS (140 units)

Location: Southside Little Lane



STEWART STREET APARTMENTS (253 Units)

Location: Westside Stewart St.





QUESTIONS?

THANK YOU!!!!

- Presentations by Subject Matter Experts
 - Severe Weather



Carson City Hazard Mitigation Plan

Weather Forecast Office
Reno, NV
Thursday, May 6

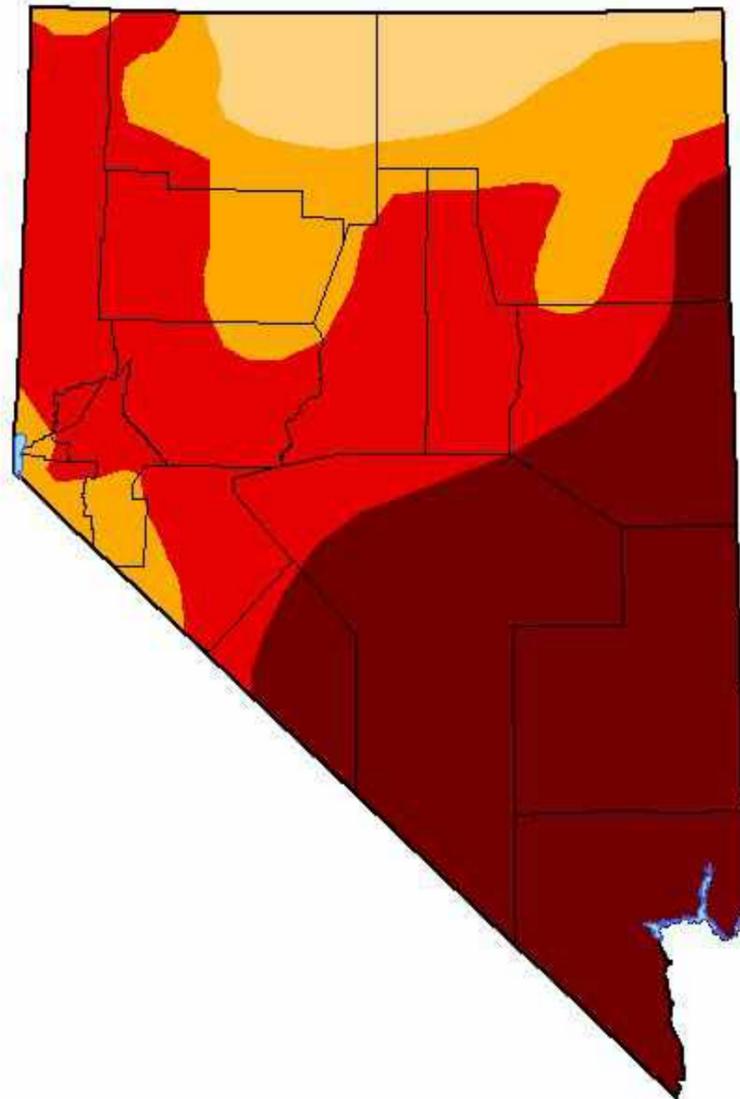
Hazard Mitigation Plan: Severe Weather, Floods, Drought, and Avalanche

Chris Smallcomb
NWS Reno
chris.smallcomb@noaa.gov

*Pic: Silver Saddle Ranch near
Carson City. April 3, 2021*

U.S. Drought Monitor Nevada

April 27, 2021
(Released Thursday, Apr. 29, 2021)
Valid 8 a.m. EDT



Intensity:



The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

Author:

Richard Heim
NCEI/NOAA



droughtmonitor.unl.edu

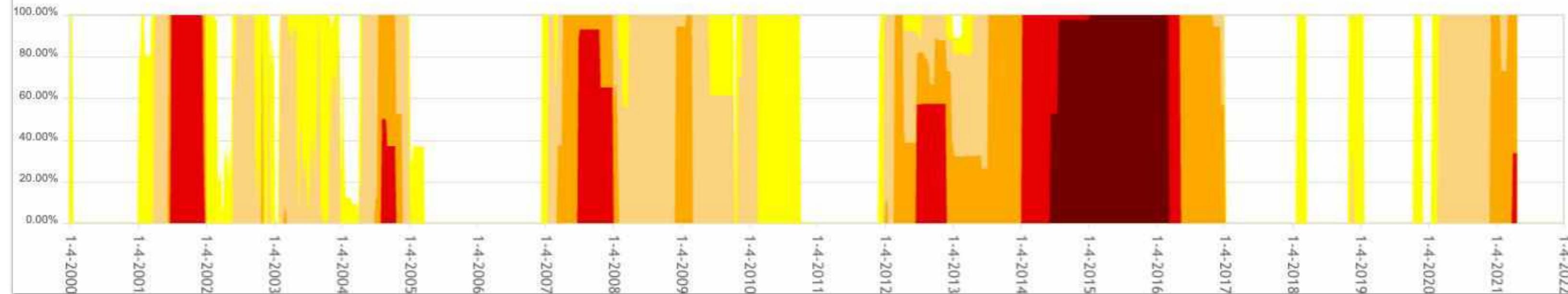
- Drought is a recurring hazard for Carson City.
- Not just lack of rain & snow. Warm temps intensify drought.
- We are entering a new phase of drought in 2021.
- Impacts: water supply, wildfires, forest health.



Longer Term Drought History for Carson City

Weather Forecast Office
Reno, NV
Thursday, May 6

Carson City (NV) Percent Area



Intensity:

- None
- D0 (Abnormally Dry)
- D1 (Moderate Drought)
- D2 (Severe Drought)
- D3 (Extreme Drought)
- D4 (Exceptional Drought)

- Due mainly to limited skill with long-lead time forecasts, drought is not too predictable.
- In the western US, however, we can use snowpack deficits and reservoir levels to anticipate drought impacts for that coming year.



Climate Lookback - Very Wet & Very Dry

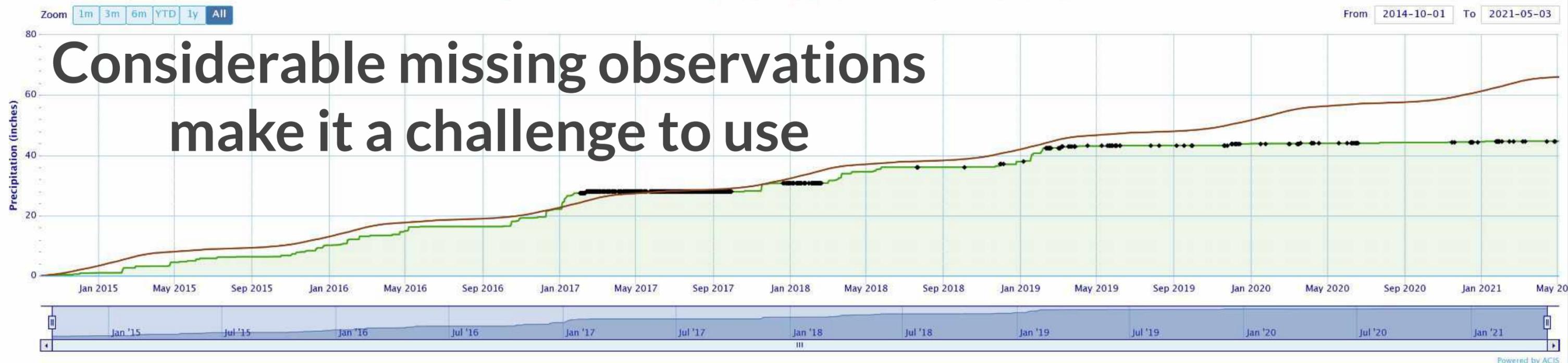
Accumulated Precipitation - MINDEN, NV

Use navigation tools above and below chart to change displayed range; green/black diamonds represent subsequent/missing values



Accumulated Precipitation - CARSON CITY, NV

Use navigation tools above and below chart to change displayed range; green/black diamonds represent subsequent/missing values



**Considerable missing observations
make it a challenge to use**



Climate Lookback - Big Deficits Since 2019

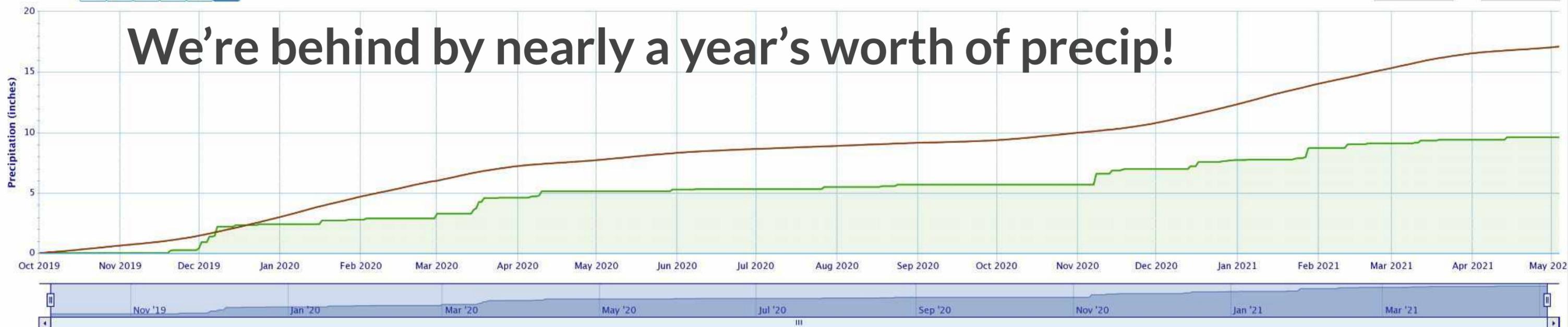
Accumulated Precipitation - MINDEN, NV

Use navigation tools above and below chart to change displayed range; green/black diamonds represent subsequent/missing values

Zoom 1m 3m 6m YTD 1y All

From 2019-10-01 To 2021-05-04

We're behind by nearly a year's worth of precip!



Powered by ACIS

Accumulated Precipitation - Tahoe City Area, CA (ThreadEx)

Use navigation tools above and below chart to change displayed range; green/black diamonds represent subsequent/missing values

Zoom 1m 3m 6m YTD 1y All

From 2019-10-01 To 2021-05-04

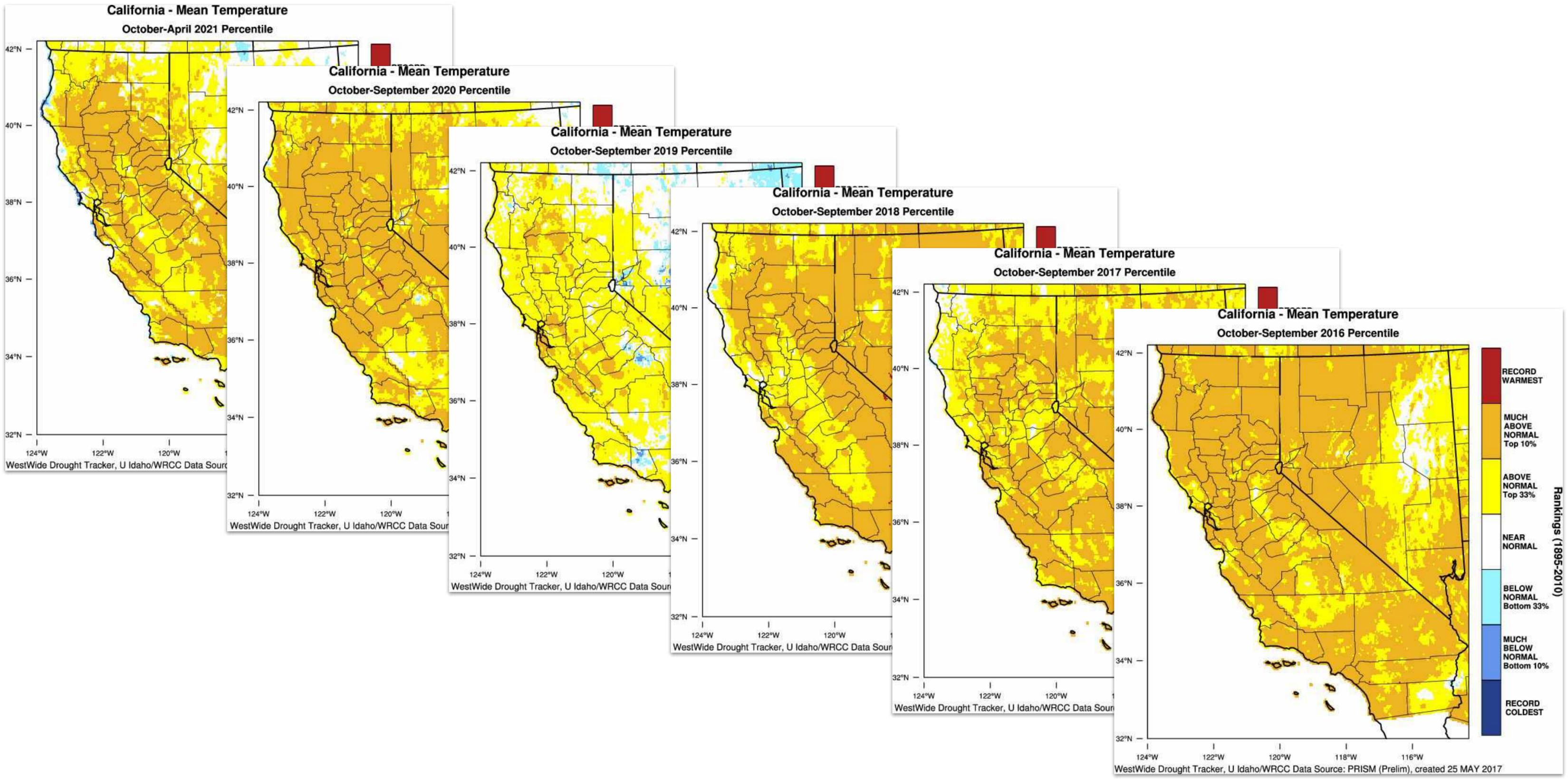


Powered by ACIS



Drought - It's Not Just Precip, It's Been Warm!

Weather Forecast Office
Reno, NV
Thursday, May 6





Avalanche - Not Much Info to Share

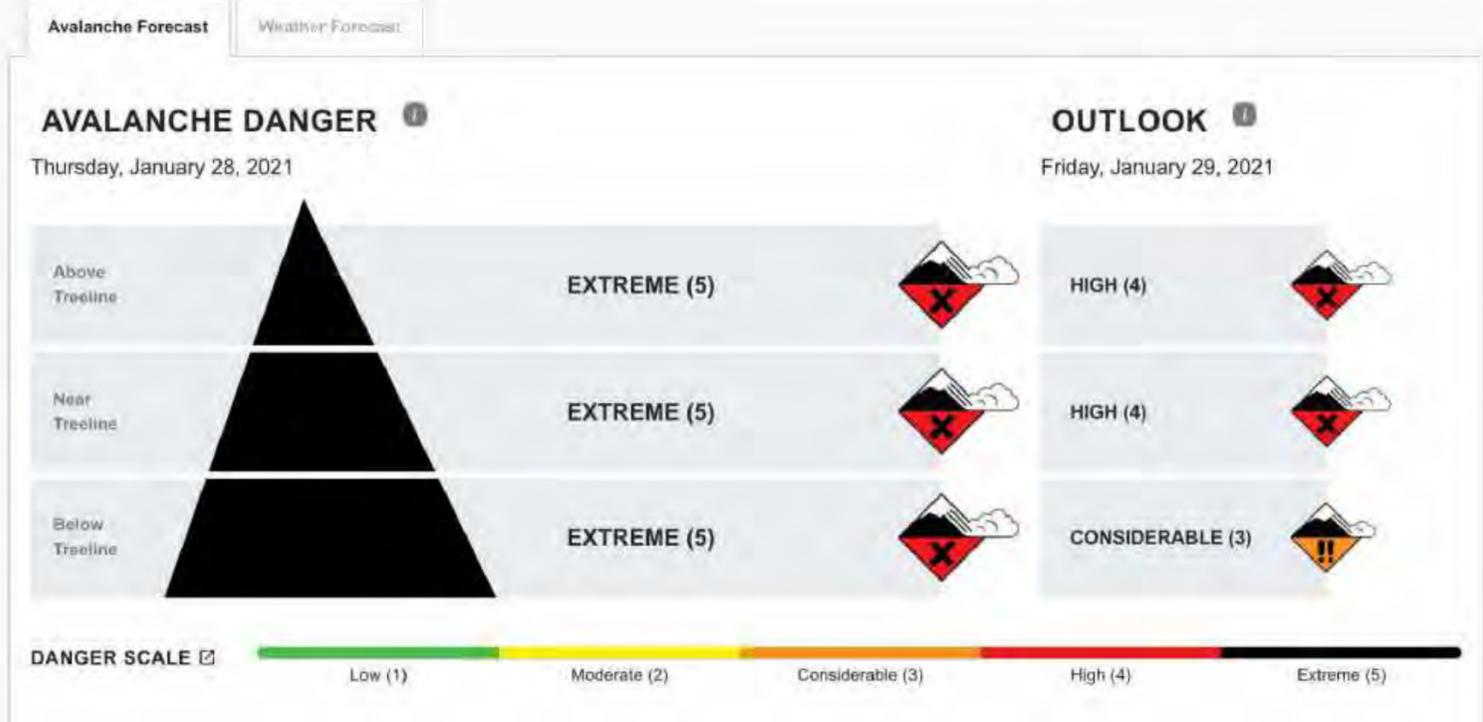
AVALANCHE WARNING
 ISSUED: Tuesday, January 26, 2021 - 7:00PM
 EXPIRES: Friday, January 29, 2021 - 7:00AM
[READ MORE](#)

THIS PRODUCT IS EXPIRED

ISSUED	EXPIRES	AUTHOR
Thursday, January 28, 2021 - 6:59AM	Friday, January 29, 2021 - 6:59AM	Andy Anderson

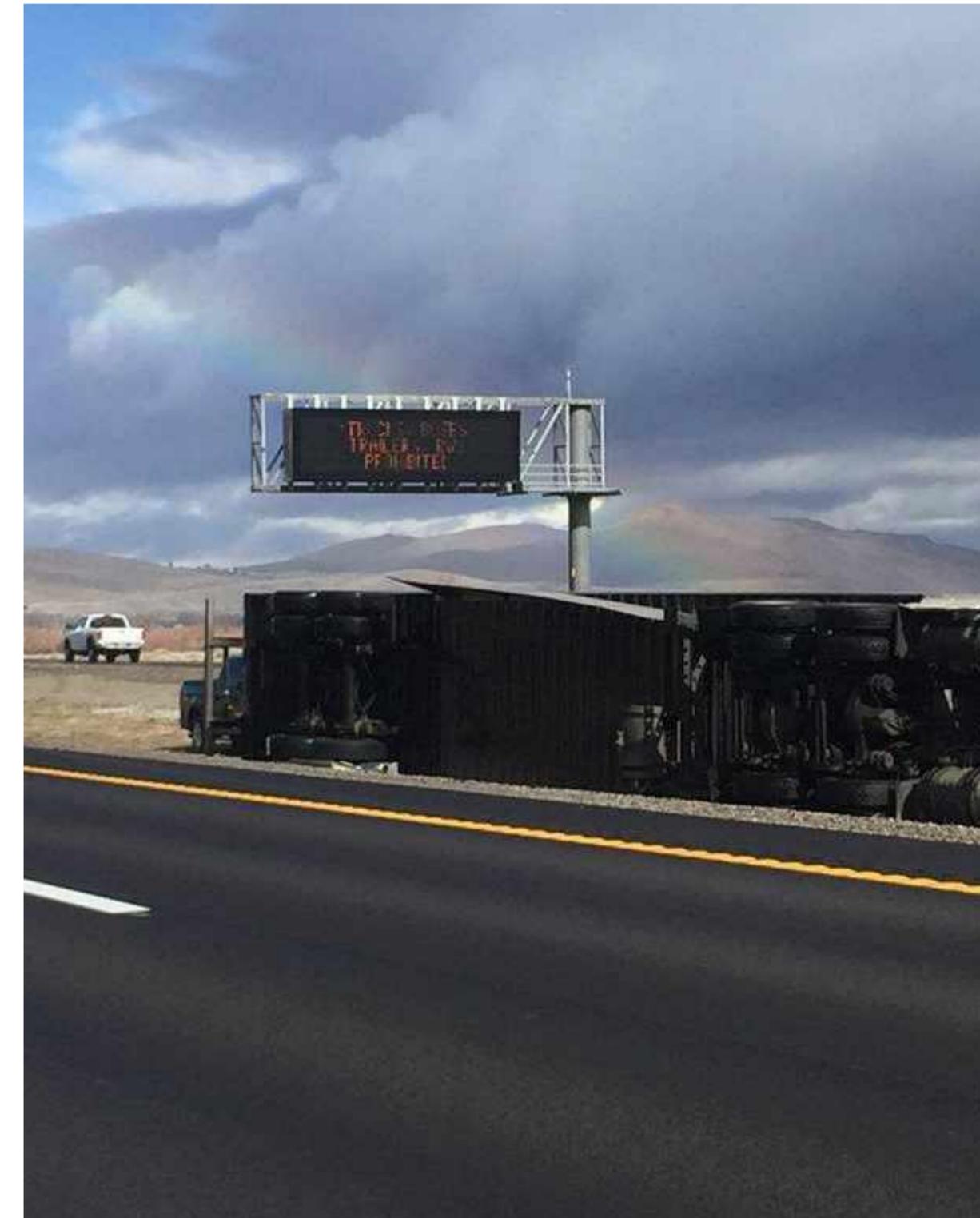
THE BOTTOM LINE

Gale force winds and intense snowfall continue to overload the snowpack. This extreme load combined with new and old weak layers in the snowpack have created very dangerous and complicated avalanche conditions. Large, deep, and destructive **avalanches** are almost certain today. The avalanche danger is **EXTREME**. Fortunately, the travel advice is simple: avoid traveling on any steep slopes, under any steep slopes, near any steep slopes, or across any runout zones. Avoid travel in, near, or below avalanche terrain.



- No reports of avalanche sent to NWS since 2015 for Carson City.
- The area can have them in steeper terrain during big snow winters.
- Sierra Avalanche Center issues warnings for the Tahoe backcountry. Example forecast from 1/28/21 atmospheric river.

- Region is **VERY** prone to high winds, often gusts in excess of 60 MPH. The most common weather hazard.
- 159 episodes of high winds were logged in NWS Storm Data 2015-2020. Note that this data is for the entire “Sierra Front” zone from Reno to Minden.
- High winds are the most frequent October-April. Can result in damage, power outages, and wildfires.





- Red Flag Warning: wind gusts > 30 mph and humidity < 15% for 3+ hours OR numerous t-storms with no rainfall.
- Sierra Front fire weather zone covers Reno, Carson City, Minden.
- Large variability in Red Flag days year to year, but 2020 set the new standard.

Sierra Front Fire Weather Zone	
YEAR	NUM RED FLAG DAYS
2020	29
2019	8
2018	16
2017	14
2016	21
2015	8
2014	16
2013	14
2012	26
2011	7
2010	14
2009	7
AVE	15.0
STDDEV	7.3
TOTAL	180



- Heavy snow resulting in widespread travel difficulties is relatively common however frequency varies widely from year to year.
- 67 episodes of heavy snow were logged in NWS Storm Data 2015-2020. Also for “Sierra Front zone”. Generally 6”+ snowfall.
- Heavy snows are the most frequent December-March.
- Lake effect snow can impact Carson City.





Climate Lookback - Snowfall Since 2015

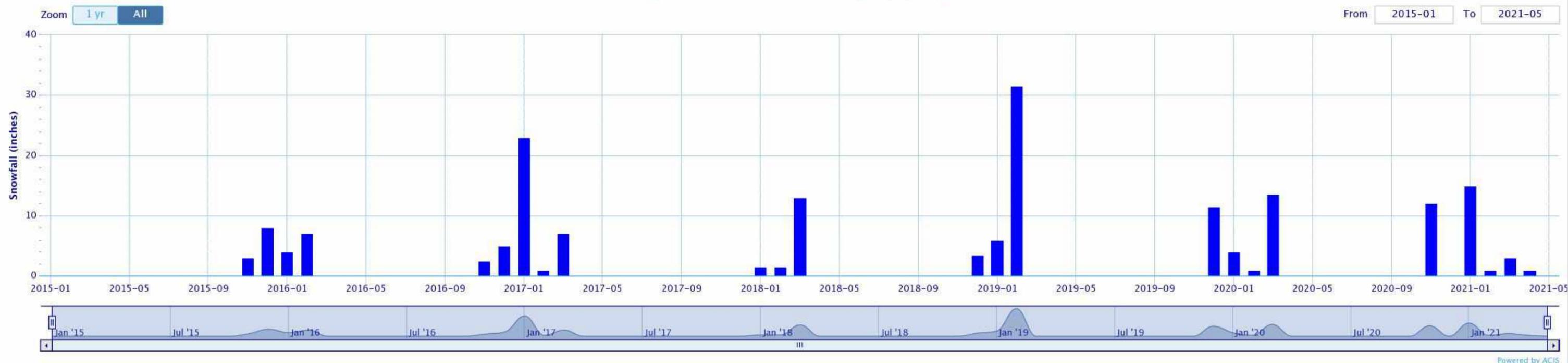
Accumulated Snowfall - MINDEN, NV

Use navigation tools above and below chart to change displayed range; green/black diamonds represent subsequent/missing values

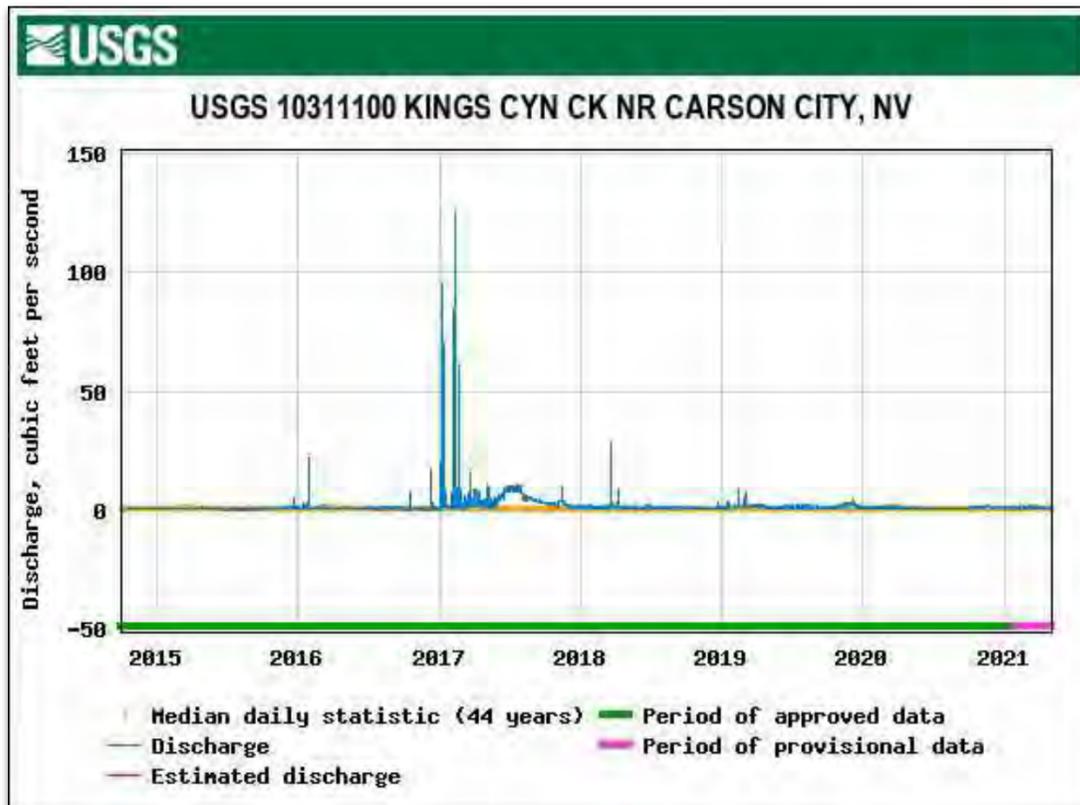
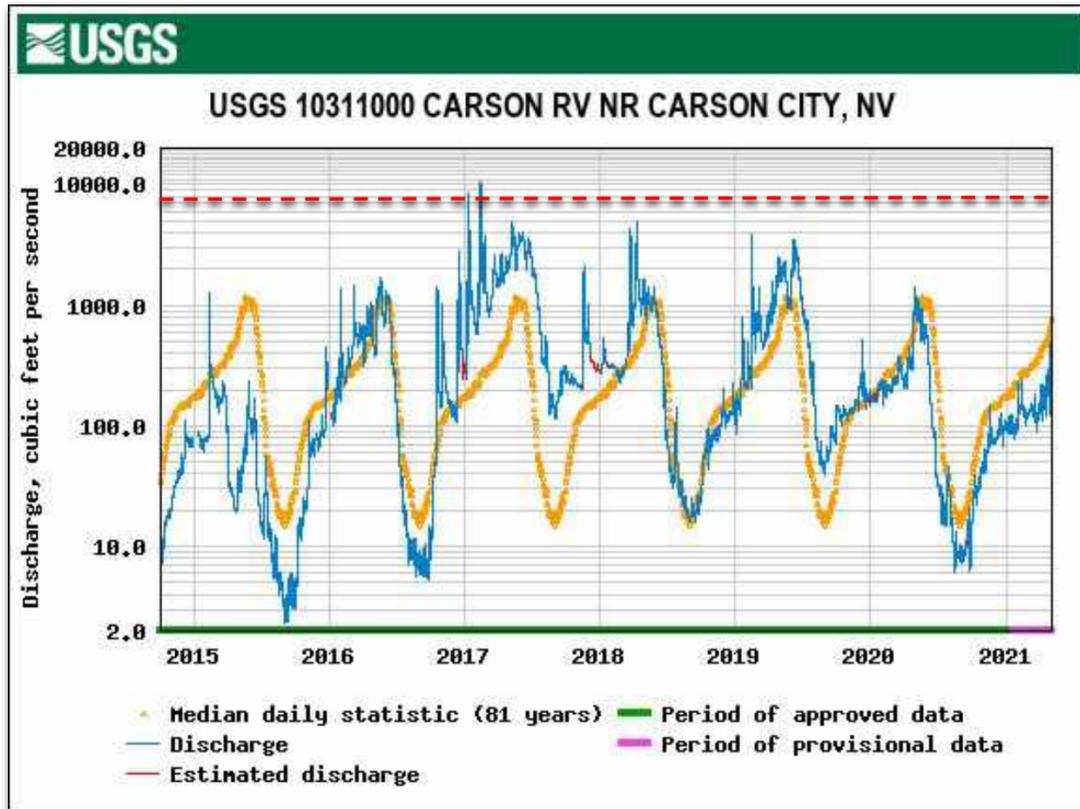


Total Snowfall - MINDEN, NV

Use navigation tools above and below chart to change displayed range



- NWS Storm Data 2015-2020 does not have a good record for flooding or heavy rains for Carson City.
- USGS river and stream gauging shows it was all about 2017! Especially small streams!
- Heavy rains are possible almost any month of the year, but heavily favor winter months in atmospheric rivers.
- Sudden summer t-storms trigger flash flooding but are rare, while longer duration winter atmospheric rivers can result in river, widespread urban flooding.



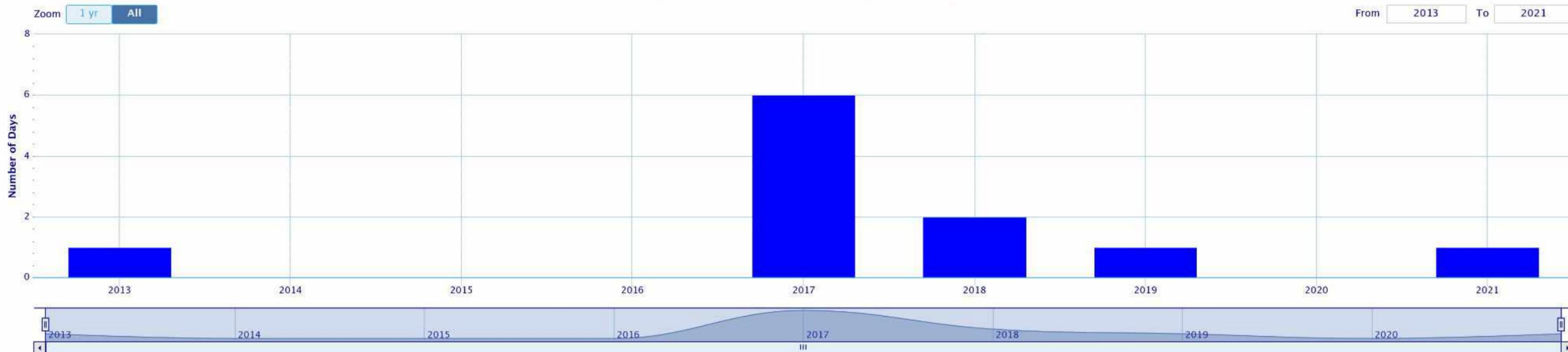


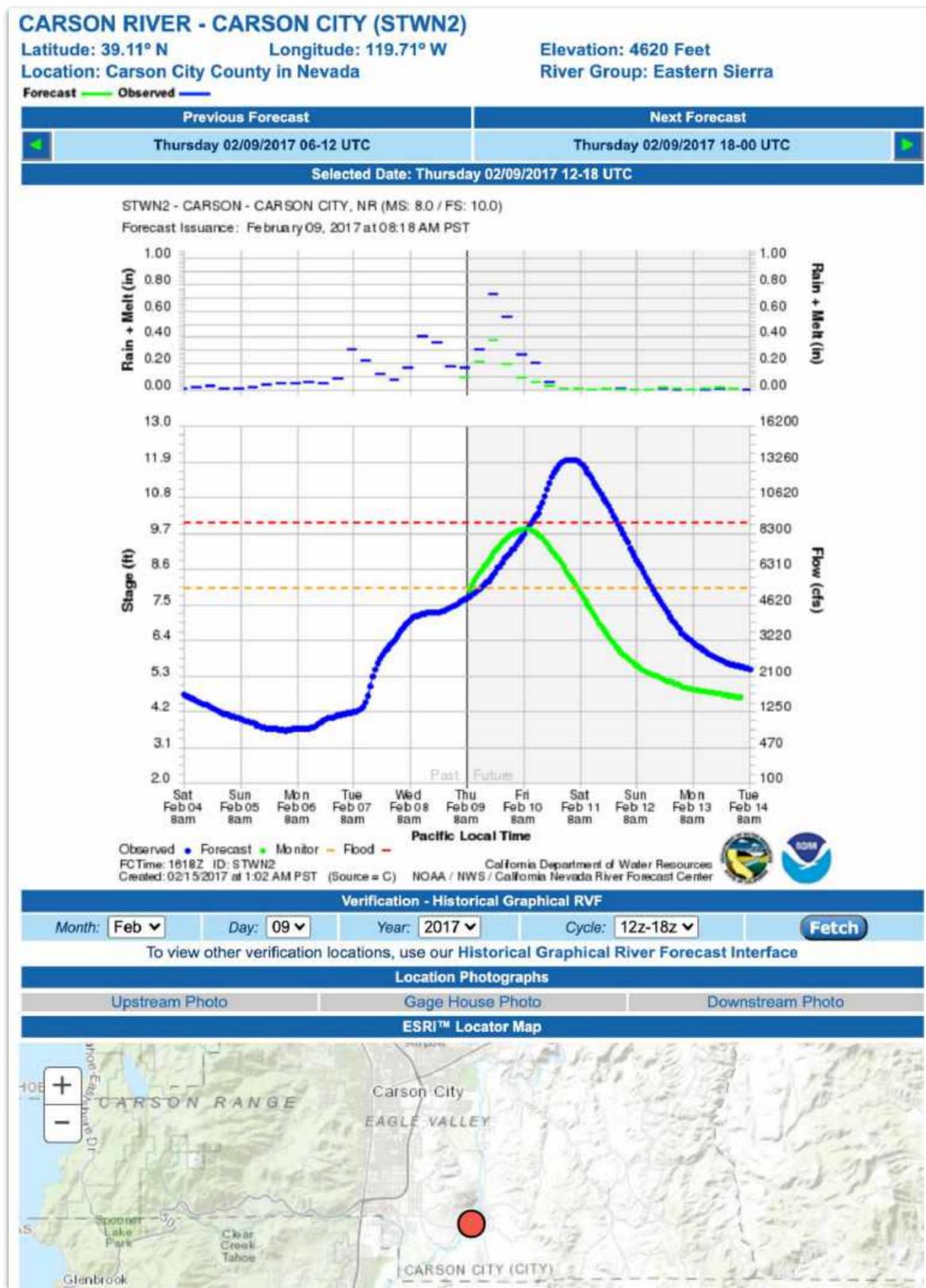
Heavy Rain Climatology in Carson City

- Chris' definition of heavy rain - 10% of average annual precip falling in one day.
- Using the Minden, NV weather station, average annual precipitation is 9.1", so 10% is 0.91"
- Wide variability year to year! 11x since WY2013. All winter.

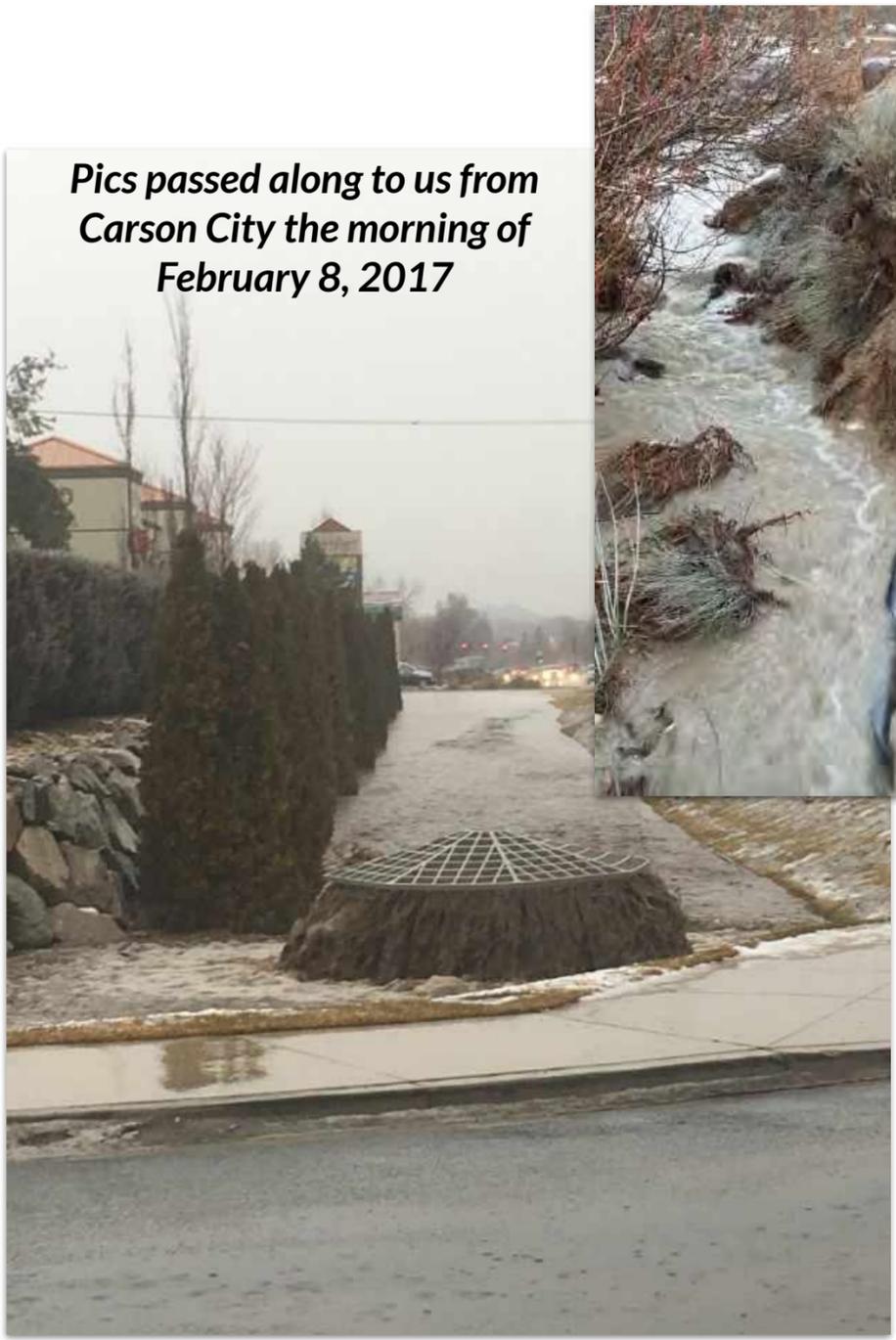
Number of Days Precipitation ≥ 0.90 - Oct through Sep - MINDEN, NV

Use navigation tools above and below chart to change displayed range

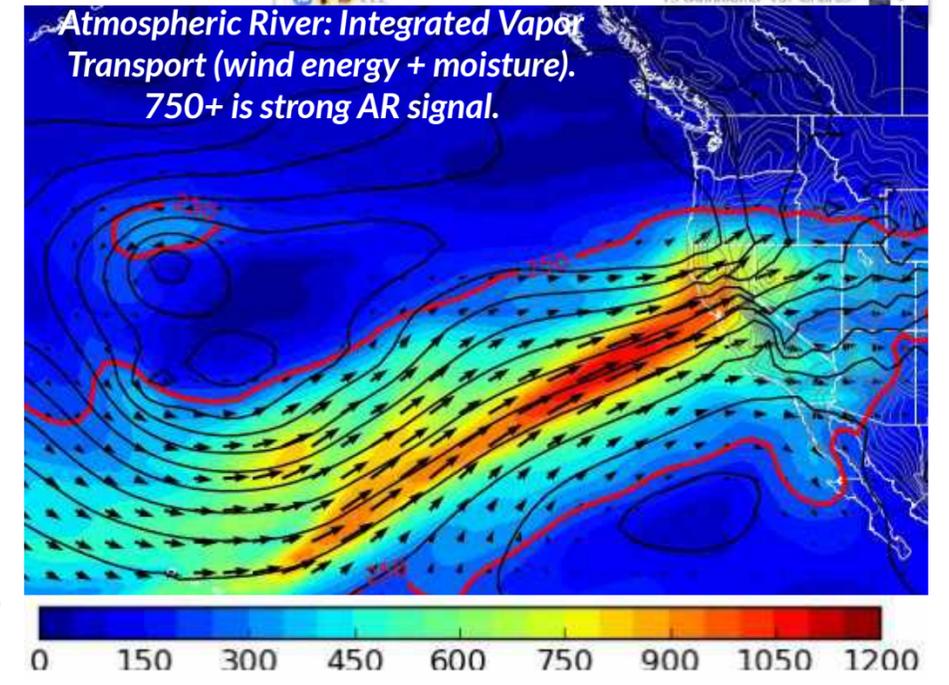




Pics passed along to us from Carson City the morning of February 8, 2017



KEY POINT: Rivers caused plenty of issues, but we saw more problems regionwide with smaller creeks, streams, and terminal lakes!



- Intense wildfires, especially in timber and pinyon juniper areas, lead to dramatically increased runoff (hydrophobic soils).
- This combined with steep terrain can lead to debris flows, mudslides.
- Occur with little warning with as little as 5 minutes of intense rainfall. Rule of thumb - 1"/hour rate or higher is enough to trigger these floods.
- Only 1 Storm Data record of debris flows since 2014 but geography of the area supports an appreciable risk!



Hwy 395 @ Topaz 2018 - NDOT Pic



- Summer thunderstorms in Western Nevada can produce lightning, hail, heavy rains, high winds (microbursts), dust storms, and yes even tornadoes!
- ZERO episodes of severe summer t-storms were logged in NWS Storm Data 2015-2020 for Carson City.
- However plenty of reports in nearby jurisdictions, such as flash flooding in Johnson Lane.
- Thunderstorms are the most common June through August but can happen almost any month.



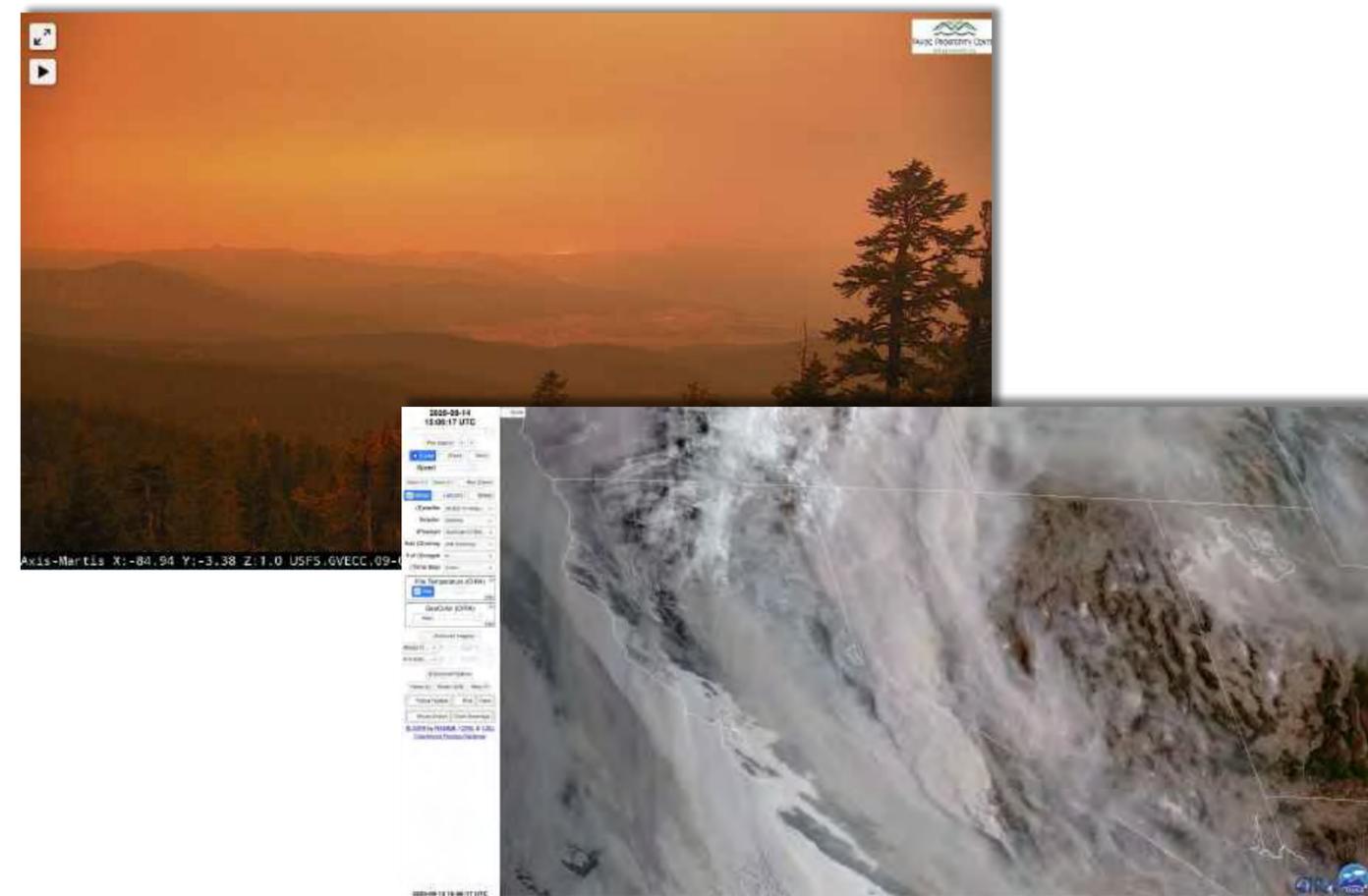
Thunderstorm Warnings for Carson City

Weather Forecast Office
Reno, NV
Thursday, May 6

- **Since October 1, 2014, Carson City has had:**
 - **13 Severe Thunderstorm Warnings**
 - **7 Flash Flood Warnings**
 - **1 Dust Storm Warning**
 - **1 Tornado Warning - waterspout over Lake Tahoe, 9/13/2017**

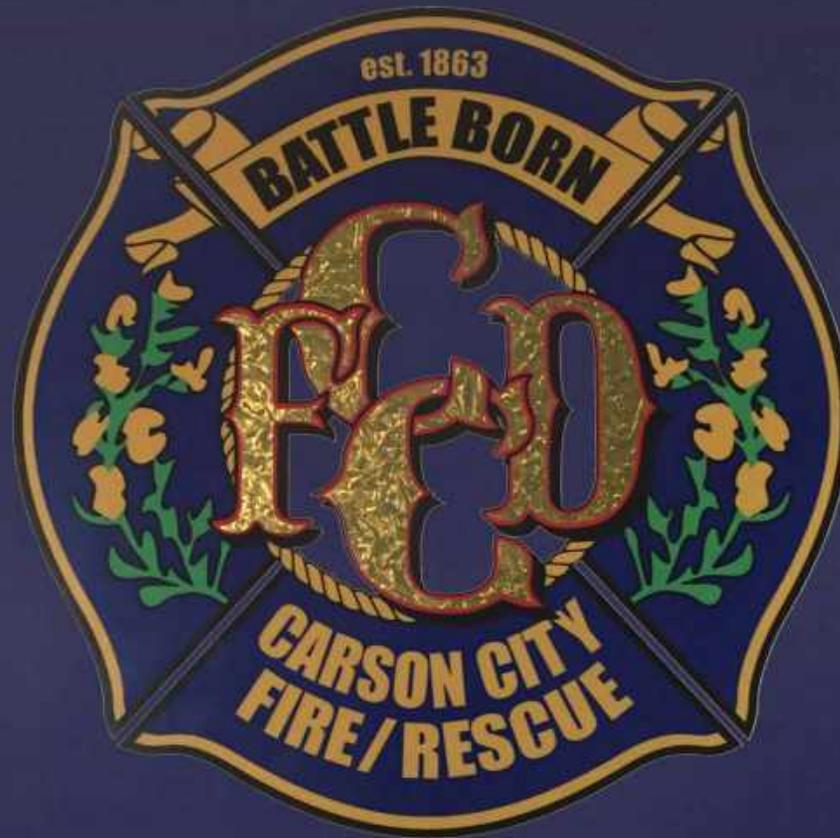


- **Wildfire smoke**
 - **Societal impacts to public health, schools**
 - **State, local air quality management can better speak to these issues.**
 - **NWS focus is on smoke modeling.**

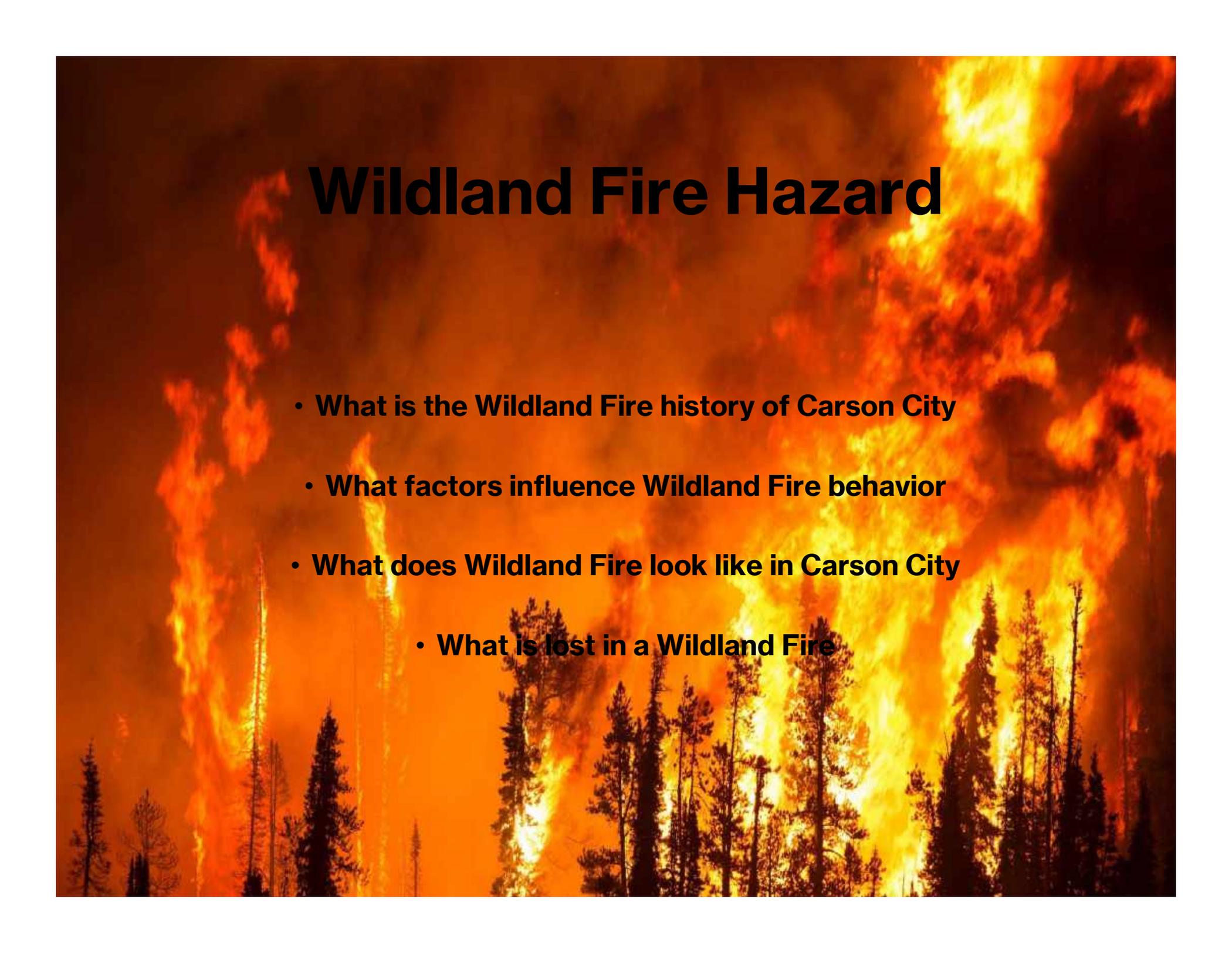


Appendix A: Meeting Notes and Handouts

- Presentations by Subject Matter Experts
 - Wildland Fire



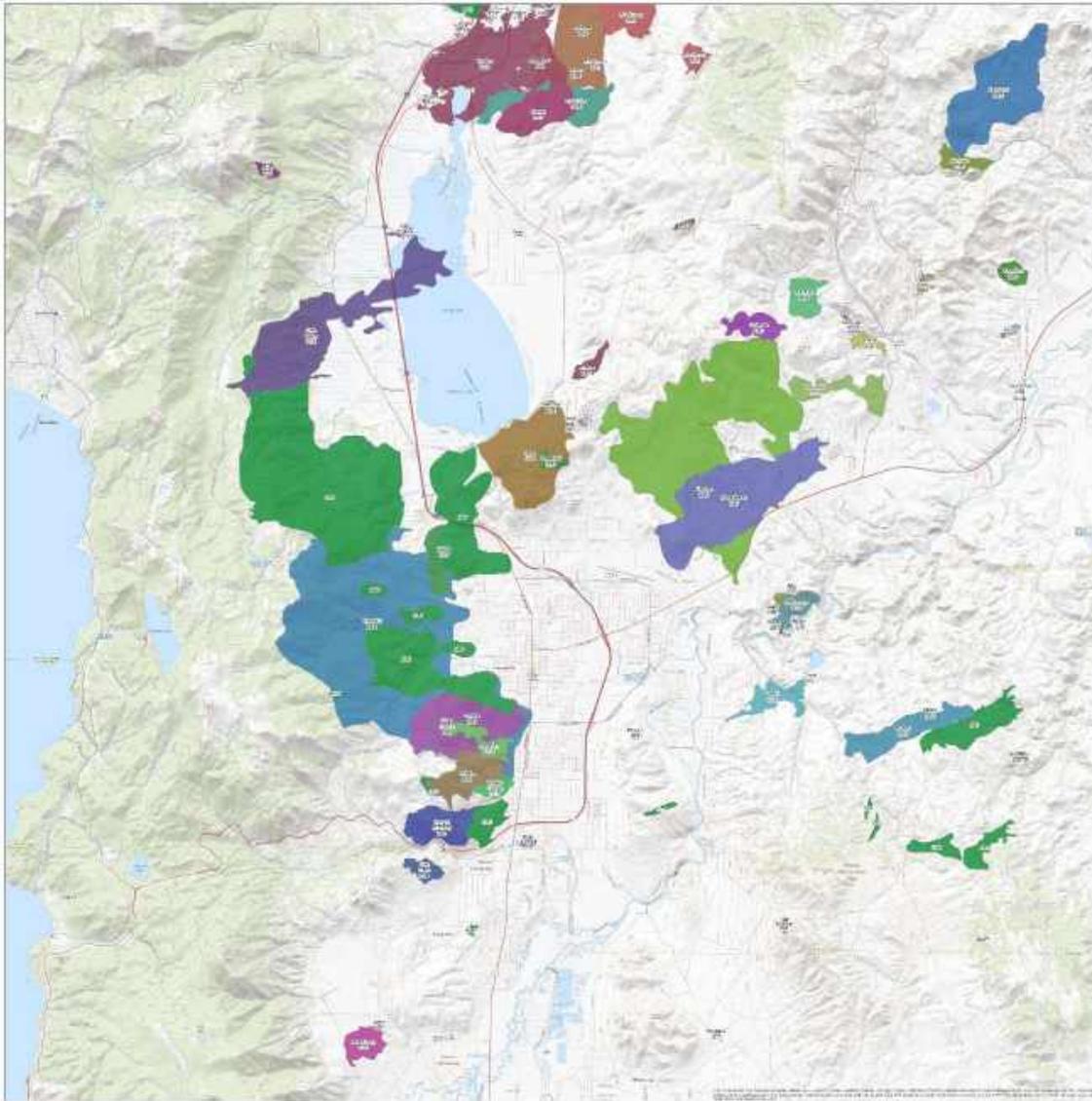
Carson City Fire Dept.
Hazard Mitigation Plan
Wildland Fire



Wildland Fire Hazard

- **What is the Wildland Fire history of Carson City**
- **What factors influence Wildland Fire behavior**
- **What does Wildland Fire look like in Carson City**
 - **What is lost in a Wildland Fire**

Fire History



↳ Major Wildland Fires in Carson City

- ⌘ Waterfall Fire, July 2004, 8,764 acres
- ⌘ Linehan Fire, June 2006, 5,863 acres
- ⌘ Kings Canyon Fire, Aug. 1988, 1,798 acres

↳ 2015 – 2020

- ⌘ 145 Wildfire incidents, 1,176 acres burned

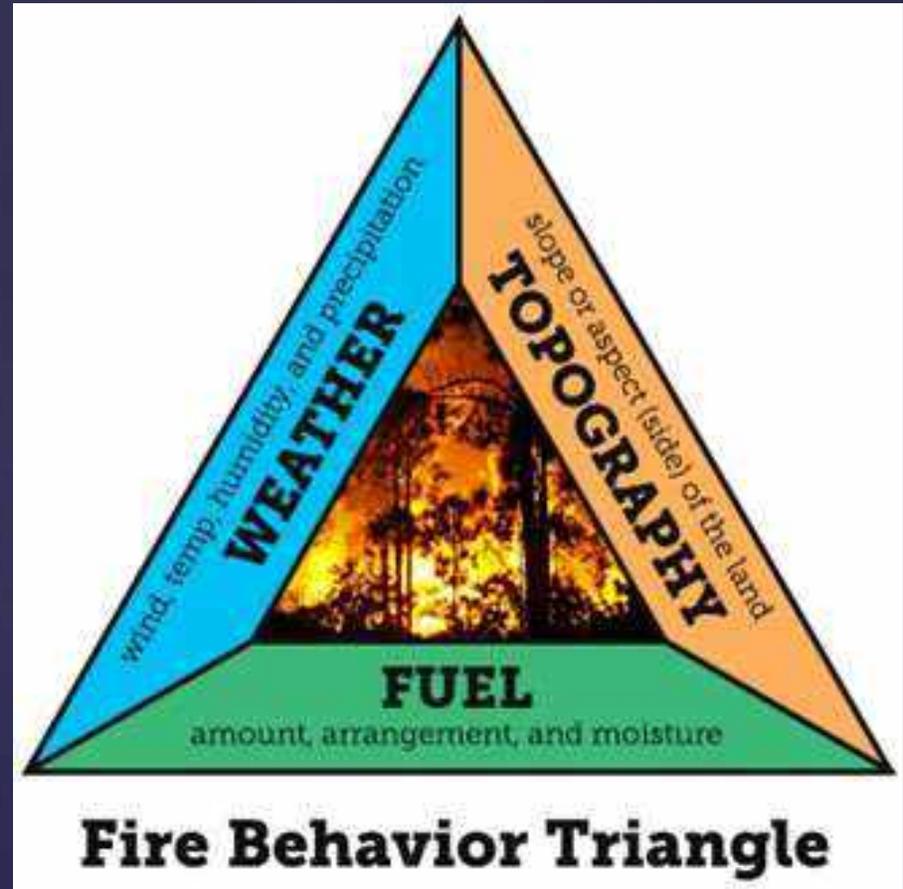
↳ 2000 – 2014

- ⌘ 27 major wildfire incidents, 19,271 acres burned

WEATHER – Carson has hot and dry conditions lasting from May through August leaving natural vegetation with low fuel moisture content

TOPOGRAPHY – How steep the landscape is, and which direction it is facing

FUEL – The amount, arrangement and moisture content of the fuel. This is the only factor we can manipulate.







Waterfall Fire 2004



Timberline Area



Timberline Area

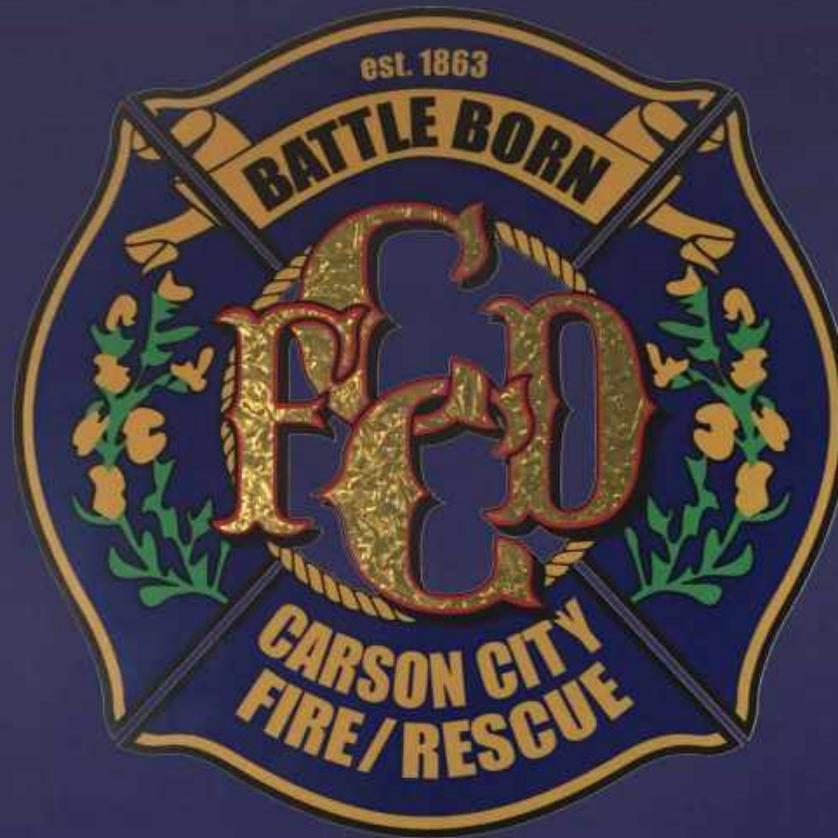


Timberline Area



Losses to the Community After a Wildfire

- People Displaced
- Property Damaged
 - Rebuilding process can take years
- Loss of Water Quality
 - Effects local wells and surface runoff
 - Increases erosion, possible landslides
- Recreation opportunities are lost in the area
- Economic impacts
 - Decreased property values
- Environmental Damage
 - Forests transition back to grasslands



Questions?

Rodd Rummel
Wildland Fuels Management Officer
Carson City Fire Dept.

Appendix B: Public Outreach

- Excerpts from Section 4: Planning Process and Maintenance
- Survey Results

Appendix B: Public Outreach

- Excerpts from Section 4: Planning Process and Maintenance

Public Outreach Documentation
 Excerpted from Section 4: Planning Process and Plan Maintenance

The figure displays four social media posts. The top-left post is from Carson City Fire Department (@CarsonFireDept) dated May 18, stating the Hazard Mitigation survey is still available and providing the URL carson.org/hazardplan. The top-right post is from The Consolidated Municipality of Carson City, dated April 21, featuring a graphic for the 'HAZARD MITIGATION PLAN WORKSHOP' with the URL carson.org/hazardplan. The bottom-left post is also from The Consolidated Municipality of Carson City, dated May 10, featuring a graphic for the 'HAZARD MITIGATION SURVEY' and providing the URL carson.org/hazardplan. The bottom-right post is from Carson City Sheriff's Office, dated May 10, encouraging completion of the Hazard Mitigation Survey and providing the URL carson.org/hazardplan. To the right of the bottom-right post is a performance summary for the post, showing 1575 people reached, 15 likes, 46 total clicks, and a distribution summary indicating 3.1x less post impressions and 5.2x less post clicks compared to other posts.

FIGURE 4-4: SNAPSHOTS FROM SOCIAL MEDIA OUTREACH

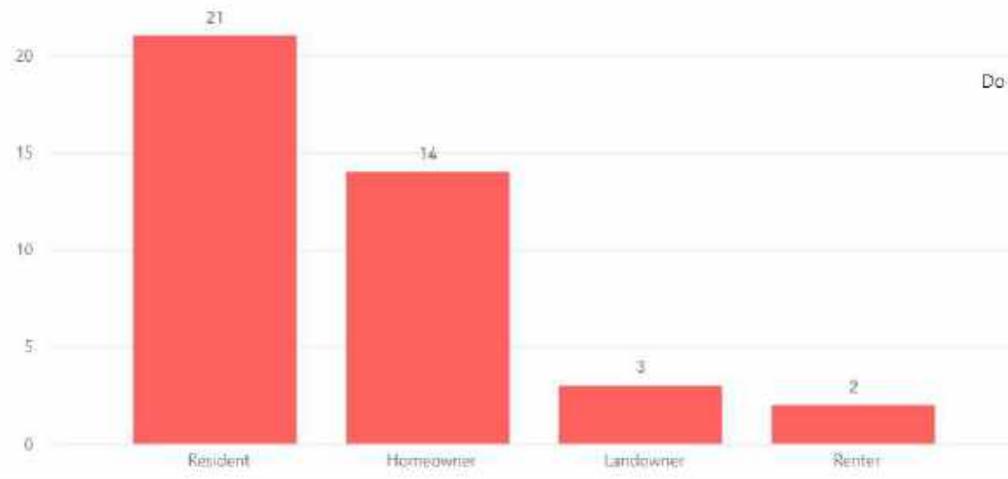
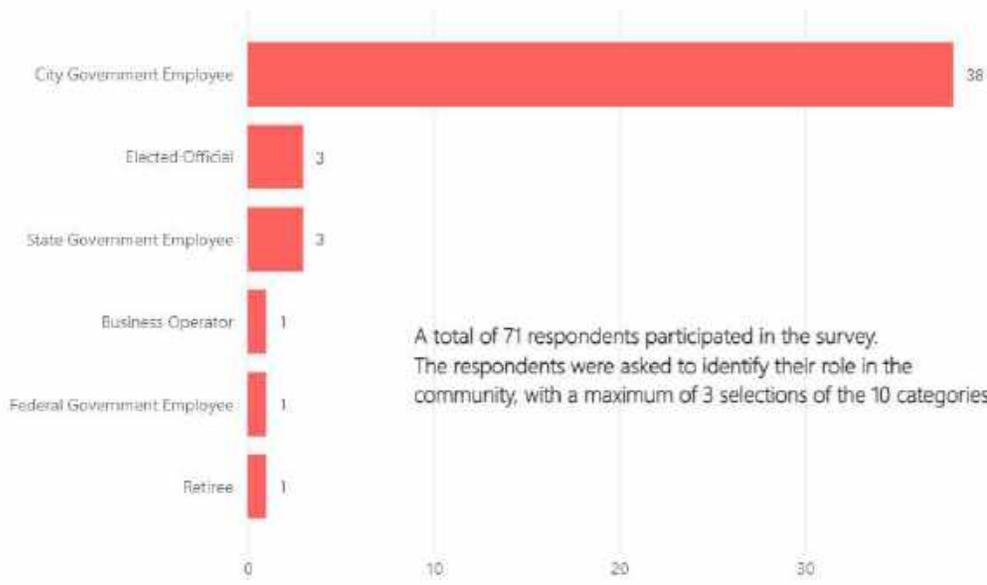
The City utilized various social media platforms to enlist public participation and feedback, with the maximum post reach ranging from 3,020 and the minimum of 653 over the cumulative of 18 postings. For inclusiveness, the HMP webpage featured an ADA component, enabling different modes for specific needs. The HMP workshop recording had 138 viewers and featured a Closed Captioning option. The mobile friendly survey had 298 views with the 71 submissions and was hosted between May 2, 2021 and May 21, 2021. The landing site page, carson.org/hazardplan, had 905 site visitors recorded May through June.

Appendix B: Public Outreach

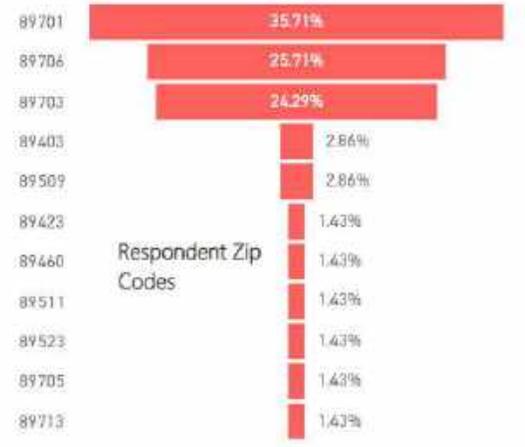
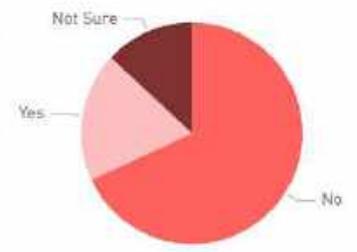
- Survey Results

Carson City 2021 HMP Update Survey

<https://app.powerbigov.us/view?r=eyJrIjoiZmlwNmM3MTYtZjcxYS00MGU0LWJiMDctY2VlODExZjVvOGM4IiwidCI6IjdlM2Q0MDE5LTJhNGEtNDVINi1iODc4LTBhOWFiOTU5MTAxNiJ9&embedImagePlaceholder=true&pageName=ReportSection>

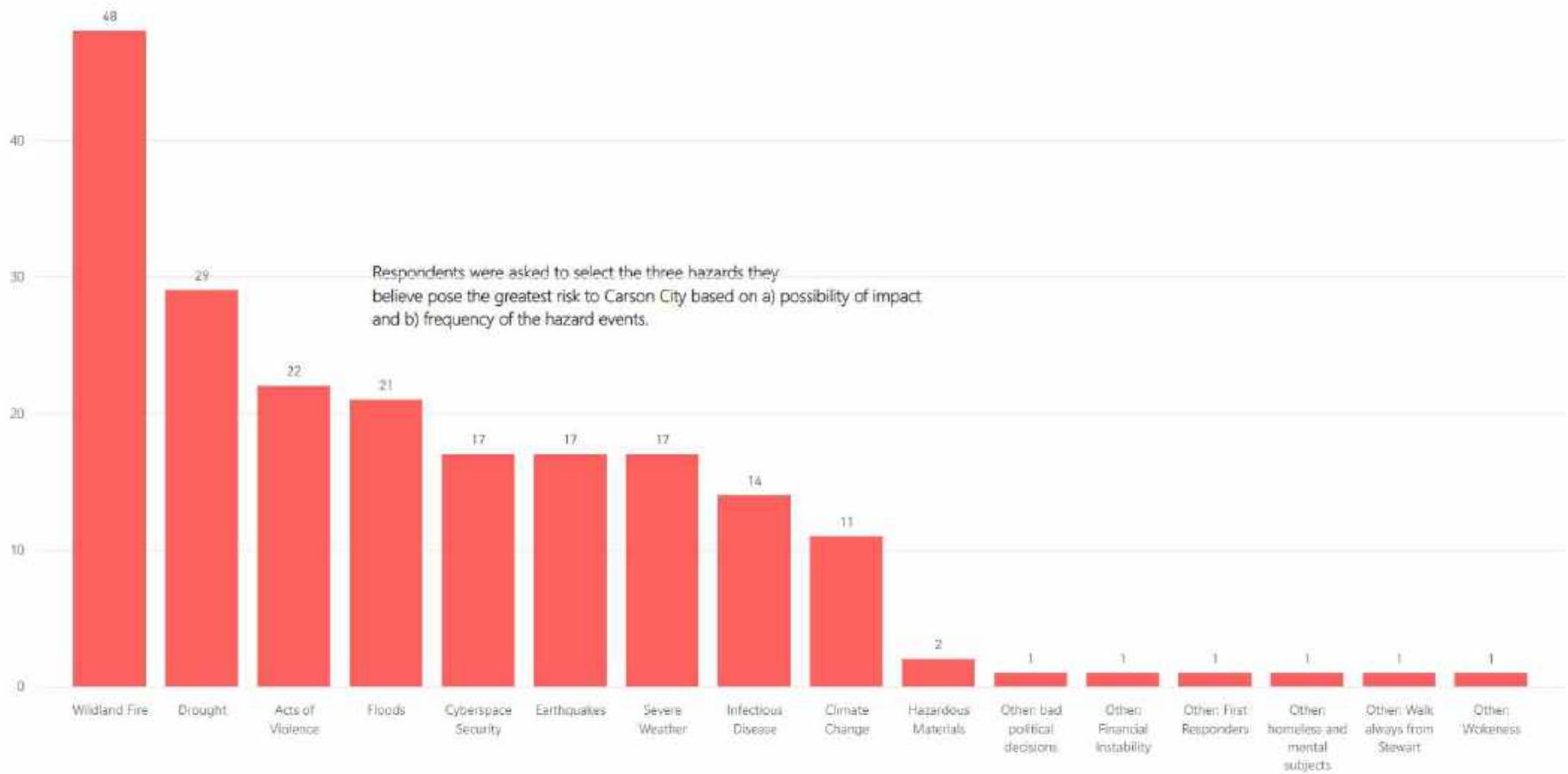


Do you currently have flood insurance for your home?



Carson City 2021 HMP Update Survey

<https://app.powerbigov.us/view?r=eyJrIjoizmlwNmM3MTYtZjcxYS00MGU0LWJiMDctY2VlODExZjVhOGM4IiwidCI6IjdlM2Q0MDE5LTJhNGEtNDVINi1iODc4LTBhOWFiOTU5MTAxNiJ9&embedImagePlaceholder=true&pageName=ReportSection>



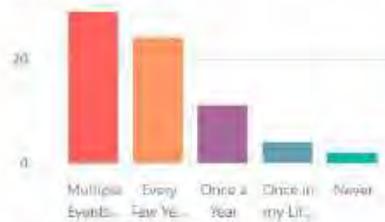
Carson City 2021 HMP Update Survey

https://app.powerbigov.us/view?r=eyJrIjoiZmlwNmM3MTYtZjcxYS00MGU0LWJiMDctY2VIODExZjVhOGM4IiwidCI6IjdlM2Q0MDE5LTJhNGEtNDVINi1iODc4LTBhOWFiOTU5MTAxNiJ9&embedImagePlaceholder=true&pageName=ReportSection

The options were:
 a.) Multiple Events in One Year
 b.) Once a Year
 c.) Every Few Years
 d.) Once in my Lifetime
 e.) Never

Respondents were asked to check a box for each hazard to reflect their experience with the frequency of the hazards listed.

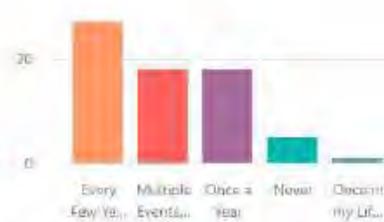
Wildland Fire



Earthquakes



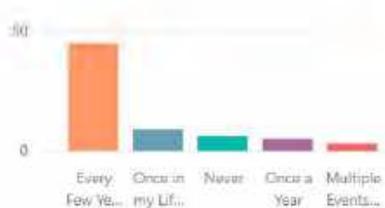
Severe Weather



Cyberspace Security



Floods



Drought



Infectious Disease



Acts of Violence



Hazardous Materials



Landslides



Avalanche



Volcanic Activity

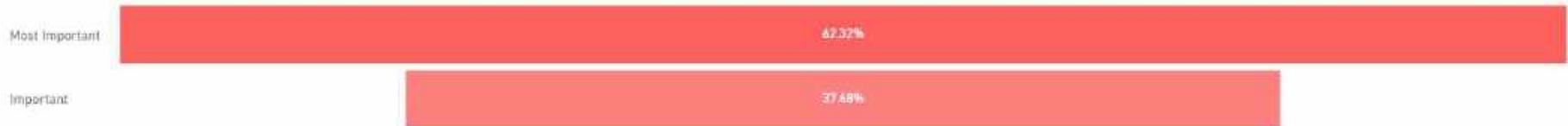


Carson City 2021 HMP Update Survey

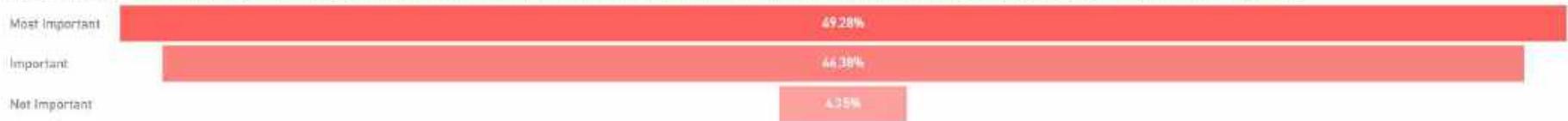
<https://app.powerbigov.us/view?r=eyJrIjoizmlwNmM3MTYtZjcxYS00MGU0LWJiMDctY2VlODExZjVkbG4iOiwiM2Q0MDE5LTJhNGEtNDVINi1iODc4LTBhOWFiOTU5MTAxNiJ9&embedImagePlaceholder=true&pageName=ReportSection>

Five types of hazard mitigation activities reduce risk of natural hazards in a community. Respondents were asked to rate the importance of each activity for Carson City's Hazard Mitigation Plan Team to pursue.

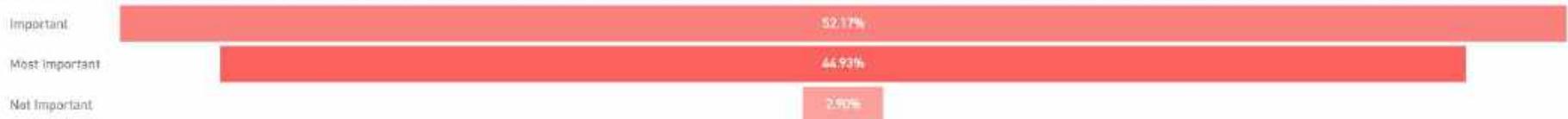
Preparedness and Response Actions: Emergency response or operational preparedness actions such as mutual aid agreements, communications, procedures for notifying citizens of shelter locations).



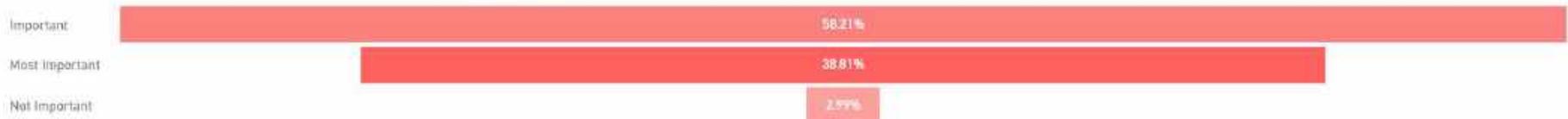
Natural Systems Protection: These actions minimize damage and losses while preserving or restoring the functions of natural systems (for example: sediment and erosion control, forest management).



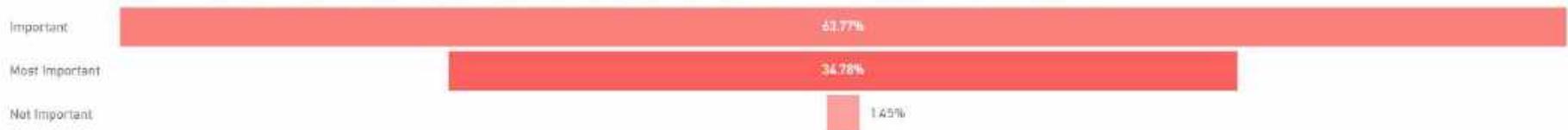
Local Plans and Regulations: Local plans, ordinances, and review processes influence the way land and buildings are developed and built. Coordination among plans, policies, and regulations leads to sustainable and resilient communities.



Education Programs: Actions that inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them.



Structure and Infrastructure Projects: These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area.



Carson City 2021 HMP Update Survey

<https://app.powerbigov.us/view?r=eyJrIjoizmlwNmM3MTYtZjc5S00MGU0LWJiMDctY2VlODExZjVhOGM4IiwidCI6IjM2Q0MDE5LTJhNGEtNDVlNi1iODc4LTBhOWFiOTU5MTAxNiJ9&embedImagePlaceholder=true&pageName=ReportSection>

How have the hazards listed in the table above impacted you in the last five years?

I keep an emergency preparedness kit on hand. I pay attention to the placement of certain items in my house to ensure they don't harm anybody should they fall. I have adjusted my landscaping accordingly to be more drought tolerant and fire resistant.

Acts of violence across our nation make me feel unsafe, and make me wonder when and where we will have an outbreak of violence here in Carson City.

Acts of violence and issues with infectious disease is always upsetting.

As a City employee I understand that my private information has been stolen and I am at risk of fraud.

Armed protestors at the adjacent State Capitol and protestors against health mandates such as mask requirements have increased my perceived danger in coming in to work.

Causes me to prepare when possible and be aware that these events can really happen.

City of Carson data breach, stolen identity.

Climate change: drought and wildfires are having a big impact.

COVID BIG TIME! Dealing with drought and water rationing. With the drought comes the fires. Every summer we have had to live in a smokey environment and is hard on the lungs. Recently there have been earthquakes in the area of Tahoe.

Covid pandemic.

Change in plans or work schedule due to snow storms. Unable to bicycle due to poor air quality.

Unable to eat a Hop for several months due to remodel after mass shooting there.

Cumulatively, infectious diseases, wildfires, and drought are the worst. How have they impacted me?

Cumulatively, those things make it so I can't really leave my house much which negates living an outdoor lifestyle.

Cybersecurity is top on my list. I had my bank info stolen when from the City due to the issue with utility bills. I wish the City took cyber-security more seriously. I watched the video and found the youtube video about Baltimore and I'm worried that could happen to Carson with everything being on the computer.

Cybersecurity with critical infrastructure and business continuity infrastructures.

Severe weather causing incidental issues (property damage, power outages, floods, landslides).

Fire, wildland and non-wildland have caused incidental issues (property damage, power outages, water damage).

Other - Fuel resources - Northern Nevada only has a finite amount of fuel storage capacity and limited fuel distribution. Without onsite bulk fuel storage, an extended utility power outage would bring emergency services, law enforcement, and utilities to a halt. Look at what had happened in Texas this last year with their power grid.

Delays in city services or travel due to severe weather conditions leading to dangerous events or conditions.

Drought: Watering restrictions, increased wildfire risk, makes rare plant surveys more difficult.

Earthquakes: Several small earthquakes resulting in no damage.

Floods: minor damage at our business.

Infectious disease: Covid. Missed work due to seasonal flu.

Severe weather: damage to our home and garden due to intense thunderstorms.

Wildland Fire: poor air quality for much of the summer.

In what ways have you seen climate change impact the Carson City community? What resources does the

increase temperatures during the summer and fewer thunderstorms. When there are thunderstorms they tend to be drier and cause more explosive fires. There's also been less snow in the valley the last several years compared to when I was a kid growing up in the community. I don't know specific resources that the city has to address climate change other than looking for ways to be more efficient with the water that we do have. The city should make resources available in the wild land /urban interface areas to deal with fires that result from heat and drought.

Call it what you want...weather on a planet that is billions of years old is not always predictable.

Carson City has gotten less and less snow and rain each year. I do not know of resources that the city has to address climate change.

Climate change is impacting the Carson City community by leading to more severe weather events, especially drought and wildfire. I think Carson City will need to put significant additional money and effort into fuel reduction, landscape management and fire prevention. Additionally, more resources should be put into ensuring Carson City is a bikeable community and businesses should be rewarded for reducing emissions and making greener practices.

Drought conditions continue to get worse (it seems).

Winter weather is always different (starting sooner or later, lasting longer or shorter, etc.)

Drought: higher water prices

Drought: Carson City put water restrictions in place, which was a good thing.

Drought: I think the city has addressed the water situation with the residents by instituting restrictions.

Drought: we used to have big winters year after year, and some rain. I don't know if CC has any resources since we keep building.

Droughts and wildfires have increased. The City should do its part to reduce carbon emissions in the winter community by offering grants to homeowners for energy conservation and green energy initiatives like solar panels or electric car chargers.

Flood, regional fire and infectious disease have been the big impact the past 5 years. Hard to say what resources the City has outside of Public Works response.

floods

Hasn't affected me at all.

How do you really address climate change? It's much bigger than one city.

I am not sure that it is really climate change.

I believe these weather related changes are cycles we run through on Earth.

I feel that the water resources are and have been diminished drastically.

I have lived in Carson City my entire life (33 years) and I remember winters used to be very wet, consistently. Now we're lucky if we get any snow that sticks around more than a day or two. The ongoing drought is a threat to our livelihood, especially with the massive influx of new residents from other areas. I am not sure what specific resources we have to address climate change. I think in this part of the world we don't have the heaviest burden since we don't have anything constantly spewing pollutants into the atmosphere and our oceans.

I have not seen an impact.

I have witnessed the droughts getting worse and more prolonged.

I haven't seen much climate change other than drought.

I moved from the East Coast and we are way behind other states and communities to address climate change. We should have solar panel on every roof and business and electric car incentives. We should also have a recycling center not just a dump/landfill. Smog testing on all vehicles.

I see milder winters which play into drought!

I think the impacts of climate change can be seen through the severity of the drought and flooding. The City can implement drought

Carson City 2021 HMP Update Survey

<https://app.powerbigov.us/view?r=eyJrIjoizmlwNmM3MTYtZjcYS00MGU0LWJiMDctY2VlODExZjVhOGM4IiwidCI6IjM2Q0MDE5LTJhNGEtNDVlNi1iODc4LTBhOWFiOTU5MTAxNiJ9&embedImagePlaceholder=true&pageName=ReportSection>

How have the hazards listed in the table above impacted you in the last five years?

Wildland Fire: poor air quality for much of the summer

Earthquakes - cracked house foundation - light cleanup

Flood - Some Cleanup on a few flash floods

Infectious disease - too long to list

Fire - Comes close to the house but we keep the defensible space

Cyberspace-security - Had to replace credit cards multiple times and had a fraudulent unemployment claim

Financial insecurity - Abnormal inflation and widespread unemployment

Earthquakes and severe weather have caused spikes in anxiety for the most part, but they also pose a threat in that the weather has created poor driving conditions. Earthquakes are frequent in this area due to where we are settled with fault lines, and though they usually aren't too severe, I fear they may increase in severity with more seismic activity. I have lived through some severe floods in the area that also caused my house to flood as well as dangerous driving conditions.

Elevated awareness

Except for the current pandemic most of these have been minor inconveniences.

Floods have impacted my ability to travel freely, get home, gasoline, and getting fresh food in the past. The impact can last days or even months depending on the severity. Drought is something that comes and goes, but is always with us, it has impacted the availability of water and can result in increased wildfire risk. Wildfire are another risk we live with constantly, every year there is a wildfire, it has impacted travel and getting resources.

Losses of credit card info, fraudulent unemployment claim have had minor impact, natural disasters have impacted with smoke, access due to flood and fire, etc. And COVID of course.

Have had to take measures to secure my identity when someone was using my name and social security number to ask for unemployment benefits. Drought affects us and our ability to use water and irrigation systems.

I routinely get called out to work weather and community hazard events

Increase in work with little increase of resources when needed.

Limited economic activity and normal access to daily resources based on restrictions

Heightened health risks and limitations of knowledge of healthcare providers

Increased violence in Carson City, Too many bums on the street.

My job is to deal with acts of violence. In my positions I'm required to respond to hazardous weather situations and hazardous material spills as well as the occasional wild land fire. They don't personally affect me as its what I do for a living. However, dealing with poor political decisions by local and federal government over the last year in regards to "health and safety" guidelines as well as the political climate that allowed protestors to commit criminal activity in the name of free speech and other similar situations has played a significant role in my personal life as well as employment.

NA

No major impact

No personal damage or injury.

NONE

not a lot. I had some breathing issues with wildfire smoke, but that's it.

Not more than being a moderate inconvenience.

other than COVID-19, very little.

In what ways have you seen climate change impact the Carson City community? What resources does the

I see milder winters which play into drought

I think the impacts of climate change can be seen through the severity of the droughts and flooding. The City can implement drought measures such as reducing when people can water their lawns or even replacing their grass with drought tolerant vegetation. The City can reduce the impacts of flooding by not allowing residential or commercial buildings to be in the flood plain.

I would have no idea.

I'm certain climate change has caused significant heat changes and is responsible for the more sporadic weather/climate conditions in the area. I've also noticed how much drier it has been in the area and how I do not often see certain types of wildlife or insects from when I was much younger anymore.

I'm not sure climate change has impacted Carson City

It has gotten dryer, hotter, milder winters, drought, occasional floods due to drought.

It seems like it is getting drier and snow is coming later in the season when it's warmer, affecting the snowpack.

Limit the carbon footprint by limiting building new developments.

More people are changing their front or backyards to zero-scape landscaping and ruining the picturesque quality of our town and the well maintained lawns that used to be more prevalent.

Most every year for well over a decade have seen record warm winters and record hot summers, decreasing snowpack and straining the waterways and water table of the region. The health of the forests is declining in response to the climate induced drought, even within my living memory (currently mid-30s).

The city can encourage better water management by more vigorously enforcing regulations on when people can water landscaping, work with utilities to offer incentives to install low water usage landscaping, and lobby the legislature to continue to expand incentives for solar and geothermal power generation for both private and commercial use.

no changes observed

No impact

None

NONE (Climate change is a ridiculous political hoax. It is absurd to think that in this incredibly small window of time (this one generation) compared to the millions and millions of years that planet Earth has existed that climate change is an actual thing. The climate of this planet has always changed and will continue to change in many ways.

Not enough snow to bring tourists to the Lake Tahoe/Carson City area. I do not know what resources the City has to address climate change.

Not relevant

One of the highest percentage change in average temperatures in the nation.

Drought conditions. More flies last summer in neighbor.

More trouble with poor air quality due to wildfires.

Have seen grocery supply shortages due to severe storms impeding travel over Hwy 80.

Over the past 16 years, I've watched good people work on our recycling streams, our trails, and sustainable gardening and that's all been great to see. Unfortunately, I've also seen bad people throw trash everywhere, refuse to recycle, dump chemicals in the desert and think that climate change is a hoax...and a few of them are on the board right now...to this day I still don't know how we can effectively change anything when over half our city refuses to be decent human beings.

What resources does the city have to change to address climate change? I don't know, I don't work for the city and I have no idea what we do and do not actually have in the way of resources.

Pine tree line is receding uphill.

Carson City 2021 HMP Update Survey

<https://app.powerbigov.us/view?r=eyJrIjoizmlwNmM3MTYtZjcxYS00MGU0LWJiMDctY2VlODExZjVhOGM4IiwidCI6IjM0MDE5LTJhNGEtNDVlNi1iODc4LTBhOWFiOTU5MTAxNiJ9&embedImagePlaceholder=true&pageName=ReportSection>

How have the hazards listed in the table above impacted you in the last five years?

other than COVID-19: very little.

Our office serves the needs of those under legal guardianship. The Covid-19 pandemic (infectious disease) impacted our ability to maintain regular in-person contact with protected persons and altered how we function in a professional setting as well as our interactions within communities.

Severe weather has caused some places to close down and that makes their services unavailable. Severe weather can also be dangerous to be outside in.

Severe Weather impact driving conditions and power availability. Extreme heat have lead to dangerous health conditions. Wildfire not only destroy the environment, it can displace an entire population. Wildfires also lead to dangerous health and breathing conditions. They affect more than the area of which they burn. Infectious Disease have lead to the overwhelming amount of deaths and many can be prevented through vaccines and simple mitigation efforts. Additional, they have lead to pandemics acting as wildfire. Not only do they cause death, they have increased the amount of people unemployed, closure of businesses, and increased the gap of the affluent and poor, it has highlighted and lead to great racial disparities.

Severe weather, drought and wildfire have the potential to impact our communities the most. While I have never been the victim of a wildfire, I have watched the devastating impact it has had to our landscape and have had to deal with significant air quality concerns during wildfires as well. The COVID-19 pandemic has also presented unprecedented challenges for all of society, and particularly has impacted mental health of our communities.

The City had a cyberspace attack and the unemployment fraud during the COVID-19 pandemic -- leads to a lot of mistrust.

The damage caused to me personally through windstorm damage & cybersecurity have cost me in damage to my home & recovery/payment of services to protect my identity. Locally, wildland fire damage has cost my neighbors significantly, along with flooding - which used to be an annual event, but seems to have tapered off. However, the cost in insurance premiums in both cases is a factor that the City under-utilizes when promoting new measures to the community, that would otherwise not be accepted easily. As far as Volcanic Activity...not sure if that was thrown in for laughs, but I guess you never know. And infectious disease...I love living in Carson City and have always considered this to be a friendly, help-thy neighbor type town, but find the last year to be an eye-opener & extreme disappointment. From statements made by public officials spreading rumors or personal political views in Board meetings downplaying the threat from Covid-19, to the general disrespect of the community shown from one citizen to another while attempting to stay safe, I just don't see that small town help-thy neighbor atmosphere anymore. While we addressed the issue much better than our surrounding communities (i.e. Douglas County Sheriff and airport authority), we could have done a better job of confronting it earlier - instead of Board members accusing the media of hype & the Health Dept. publishing confusing statistics. Despite their work in developing co-operation within the Quad County (which is great!), the Health Dept., as well as other City Departments seemed to be caught off guard, creating confusion from the start. They got it together quickly & did their best to work with what they had, but it should have been prepared for. After all, the possibility of an epidemic/pandemic is not a novel concept - especially for the Health Dept.

The most impactful hazards have been wildland fires which impact seemingly every summer and cyber security. I was a victim of the DETR unemployment fraud problem and my account on the Carson City utilities bill pay site was compromised a few years ago.

The pandemic stolen personal information from cyber security breaches.

The repairs of flood damage takes a few years to complete.

The wildland fires have been the most significant disruptions in terms of disrupted life (travel, etc).

In what ways have you seen climate change impact the Carson City community? What resources does the

City have that do not currently have in the way of resources?

Piné tree line is receding uphill.

Relying on the narrative of climate change is a mistake. That said, it is obvious to life long residents that our local weather is different. There is nothing the City can do to alter changing weather patterns and allocating resources to this false narrative is a waste.

The biggest issue with climate change I believe has been the lack of rain/snow and the issues that can arise due to drought. I am not sure what resources the city has to address the climate change issues.

The lack of snow has impacted both the economy and the water supply. I moved from Phoenix where there were water restrictions. They were easy to accommodate and there wasn't much push back from residents. Carson City could start similar restrictions if the water supply is in danger long-term. I'm also concerned about building on wetlands, etc which act as natural flood plains, because diverting flood waters can be dangerous to people and property.

The man made climate change narrative is a classic example of the Wokeness that is corrupting the country. There is little or no real evidence of man made climate change, extreme events have occurred all through history. The biggest factor always has, and always will be the sun. There will always be hot and cold periods. In fact the risk of a cold period is significantly greater than global warming. Many proper climate scientists are more concerned about global cooling than global warming. Even if man made global warming was true (it's not) the real problem would be India & China. The city cannot do anything about global warming, it can and should do something about preparing for global cooling (more power generation - nuclear and fossil fuels). The lunacy of solar and EV will be a disaster and serious embarrassment in the not too distant future.

The other serious 'Woke' issue is female firefighters. We must stop pretending that women are physically fit and strong enough. Your Wokeness is putting male firefighters and residents at significantly increased risk. This should be on your risk register so that there is evidence for when you face litigation for the failures and cover-ups in relation to female firefighter.

The unpredictability, both positive and negative, of the weather is problematic.

There have been more extreme weather patterns, such as drought and fires resulting from a lack of precipitation. Unsure about the city resources available to address climate change.

We appear to be in a drought. Not sure the city has much affect on that, but they are doing a good job monitoring for water waste.

While we have been lucky (or unlucky) enough to only experience significant Wildland Fires events in Carson City approximately once every decade, the potential for a large scale fire is present every year - all the time now - due to increased incidents of droughts, heat waves, etc due to climate change. Additionally, it is difficult to separate Drought, Wildland Fire, Floods, and Severe Weather Events as this survey does, since they go hand-in-hand. The same could be said for Severe Weather, which especially affects the Westside where I live when the wind storms move through. Last year was the first time I witnessed a tornado come down the street straight for my home, causing significant damage to my neighbor's homes. However, these wind events are occurring more often & seem stronger each year. As for resources, CCFD has done a great job of attempting to address the increased threat of Wildland Fires through their fuels reduction programs and Public Works does a great job of keeping roadside trees trimmed & removed if a hazard, as well as flood mitigation efforts.

Maybe increase Open Space acquisition, implement more energy saving programs that promote walking, biking (rent-a-bike locations around the down-town corridor?), encourage ride-sharing or shuttle bus use that helps to cut back on the use of fossil fuels. I believe Carson City is on the right track, as Open Space, Parks, & Trails have increased in the last 30 yrs since I moved here, but little is seen on the (and the service is limited) shuttle bus front that can (or should) take you to significant stops in the City. And, are these shuttle buses energy saving(?). These would be steps in the right direction.

Winters are getting shorter and the pollen season is starting earlier and lasting longer. We can do a better job with emissions with city vehicles. Better PIO encouraging folks to walk or ride bikes to and from work when available, and also make Carson City a more bike friendly city.

Eliminate all grass on city properties that are not public use areas like parks.

Winters warmer and dryer. The City can address it through water conservation/water contingency plans.

Carson City 2021 HMP Update Survey

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How have the hazards listed in the table above impacted you in the last five years?

The damage caused to me personally through windstorm damage & cybersecurity have cost me in damage to my home & recovery/payment of services to protect my identity. Locally, wildland fire damage has cost my neighbors significantly, along with flooding - which used to be an annual event, but seems to have tapered off. However, the cost in insurance premiums in both cases is a factor that the City under-utilizes when promoting new measures to the community, that would otherwise not be accepted easily. As far as Volcanic Activity, not sure if that was thrown in for laughs, but I guess you never know. And infectious disease... I love living in Carson City and have always considered this to be a friendly, help-thy neighbor type town, but find the last year to be an eye-opener & extreme disappointment. From statements made by public officials spreading rumors or personal political views in Board meetings downplaying the threat from Covid-19, to the general disrespect of the community shown from one citizen to another while attempting to stay safe, I just don't see that small town help-thy neighbor atmosphere anymore. While we addressed the issue much better than our surrounding communities (i.e. Douglas County Sheriff and airport authority), we could have done a better job of confronting it earlier - instead of Board members accusing the media of hype & the Health Dept. publishing confusing statistics. Despite their work in developing co-operation within the Quad County (which is great!), the Health Dept., as well as other City Departments seemed to be caught off guard, creating confusion from the start. They got it together quickly & did their best to work with what they had, but it should have been prepared for. After all, the possibility of an epidemic/pandemic is not a novel concept - especially for the Health Dept.

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The wildland fires have been the most significant disruption in terms of day-to-day life (air quality, preventing outdoor activities, halting travel plans), it seems that we have a "bad" season every couple years now. Flooding a couple times that closed the highway and impacted travel.

They have not.

Very little and we work through it.

Violence, quakes, cyber, but mostly Wokeness.

Walk aways from Stewart...2 in last month...one escaped and murdered in Sacramento.

Water restrictions due to drought conditions, felt an earthquake but overall not really greatly impacted by any of the above.

we are in drought quite often, water rates and restrictions stop building so much, where is the water and sewer going to come from?

We have had floods and droughts that have effected our home and the way we landscape. The fires around the area have also impacted our health due to the severe amount of smoke. We have also been impacted by the amount of acts of violence in our neighborhood. There have been constant issues from homeless encampments to officer involved shootings in the neighborhood. This impacts our home a lot because we have had to pay for additional security for our home due to these constant dangers in the neighborhood.

Wildfires continue to threaten our homes and businesses and our ongoing drought isn't helping.

Wildland fires had the propensity to threaten my property, as did the prospect of earthquakes.

Wildland fires have cause multiple evacuations in the last five years.

workload

In what ways have you seen climate change impact the Carson City community? What resources does the City have and do you actually have in the way of resources?

Pine tree line is receding uphill.

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Please share activities, actions, and resources you see as having potential to help reduce the impact.

A strong police force. An active community leaders not focused on their political future but focused on the future of Carson City.

As an example, currently a home up for sale is overgrown by weeds and trees that impact the neighboring properties. The front door is barely visible because of overgrown bushes. I would hope a call to the local fire department would provide an immediate response in getting either the seller or the realtor in charge of the property to clean up the property.

Build fuel storage, redundant or even tertiary power sources on critical emergency services, utility, and public safety infrastructure.

CCFD Fuels Management Program, Flood control mitigation, use Open Space acquisition & increased parks/trail use to promote awareness of natural hazards. UNR Cooperative has potential for increasing public awareness - under utilized/funded.

Communication of hazard, plan forward if there is one/action requested by public, communication of hazard and status, plan refinement/continued actions requested of public and communication...

Don't think Carson City really has a problem.

Educate the public about what is happening to our environment and what the public can do to help improve conditions.

Education of the public - what to do if/when something happens and WHY you should do it.

Continual preparedness and response activities.

Education of whatever the issue is might be the way to mitigate possible hazards however, many have different views as to what a hazard is or which ones might or might not be important.

Fire prepared community education

Flammable fuel removal in wildland interface

Water utility credits could be given for xeriscape (low water use) landscaping.

Volunteer Emergency response training

Flood control, wildland fire control (the sheep are a great resource) and network security

Focus on codes and regulations to make what we build more sustainable and more resistant to extreme conditions. Channels and roads/ditches should convey an adequate amount of water. Building codes to address and require fire resistant materials. A sustainable and comprehensive roadway network to get people from the point of the hazard evacuated to a safe location.

Fuel reduction work throughout the City, educating the public about defensible space and fuel reduction, requiring low impact development standards for developers to increase water efficiency.

Get rid of female firefighters and restate proper physical standards. Medics are a different matter

I think limiting the ability to target shoot in the rural areas around town would help. It seems every year we have numerous wildland fires caused by target shooting. I also think the city needs to address the horrible timing of our stoplights (College Parkway comes to mind). Having to constantly stop and start 50 feet later is harder on our vehicles. It's harder on our environment and it's harder on our patience! I have seen several annoyed motorists run yellow and red lights on College Parkway, because if you miss one light you tend to miss them all, and it shouldn't take 10 minutes to travel a mile. Carson City is an historically small town, but we are growing in population and size and our infrastructure is not keeping pace with this growth.

Listed above.

More patrolling and patrolling in certain neighborhoods to minimize criminal activity. I feel more outreach or management of blight situations and homeless encampments would also be beneficial. The City could use extensive clean up in certain neighborhoods where trash, old cars, overgrown weeds, and abandoned homes are accumulating hazardous fire dangers and other dangers as well.

NONE

none come to mind

Red Cross and other public safety activities

Reliable information sources provided in accessible formats for all. Not just social media or websites that are stale dated. Make sense of data provided.

Relying on science, engineering, and history to determine preventative projects and activities.

RESOURCES:

Public health dept, Medical Reserve Corps, Nursing program at WNC.

Volunteer Sheriffs, Public schools and WNC, Churches.

EDUCATION:

Direct mailings to residential addresses and presentations to business organizations: ie Rotary, Chamber of Commerce, NNDAA, Retail and Manufacturers' Associations, etc.

Table top exercises are great. Updating emergency plans is very important.

That depends on the hazard; for fire, fuel reduction; for drought, conservation and native landscaping; for floods/severe weather, infrastructure improvements; for cyber security, education/awareness.

The City needs to upgrade their emergency response capabilities with a new station, a real viable EOC, and new equipment.

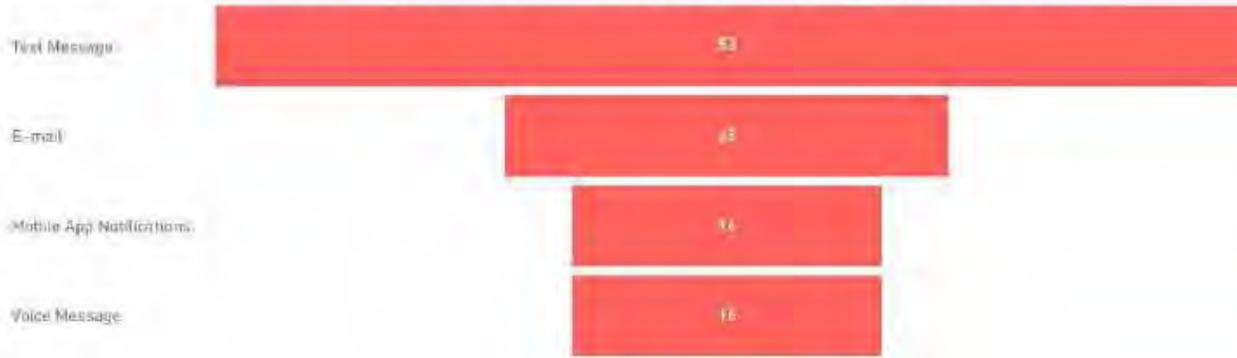
The continued networking and training within city Departments and adjacent agencies I believe is the most beneficial.

This question just sounds like you guys are looking for the community to come up with ideas for you...I'm not an environmental scientist, perhaps the city should ask an expert or look at how other cities have implemented change to reduce the impact of hazards.

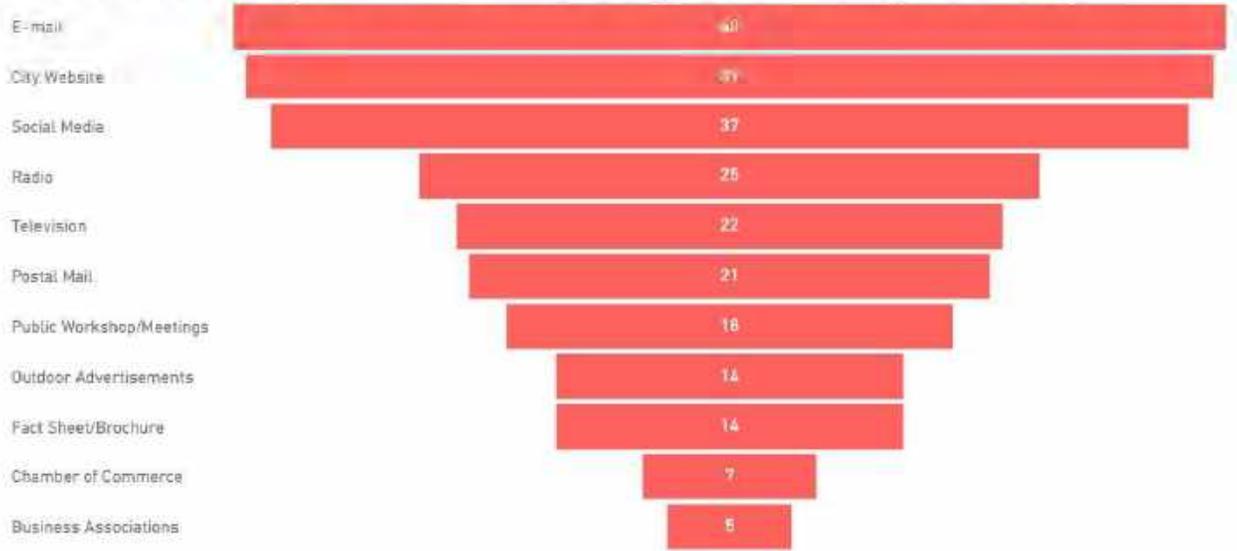
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How would you want to receive information or updates during severe weather, floods, wildfire, or other emergency response events?



What is the most effective way for you to receive information about hazard mitigation activities in Carson City? (check all that apply).



In the event of an emergency where do you go for information?

- Carson City Dispatch Center
- Carson Now
- Carson Now / City Website
- Carson Now and the cities social media
- Carson website
- Carson.org
- CarsonNow website
- Carsonnow.org
- carsonnow.org / carson.org
- Carsonnow.org / News Channel / City website
- CarsonNow.org or KOLO 8 news
- carsonnow.org, or kolotv.com
- City website
- City website.
- Eyes and ears, assuming phones and internet are down
- Google
- Google, Carson.org
- Hopefully I get a text or voicemail telling me there is an emergency and where to go for details before I go searching.
- If I know of a website with emergency information, I go there first.
- internet
- Internet and news media
- internet and TV news
- Internet, TV news
- local nes
- local news
- local news sites, city website
- local news websites
- Local news.
- Multiple places as mentioned in question 10.
- NDOT
- news
- News Website
- News Websites

- On line
- online
- Phone
- Public broadcasting radio
- radio
- Radio, TV
- Radio, work
- scanner app, websites
- Social media
- Social media.
- Television
- The internet
- The news, the internet
- TV
- Twitter
- work
- www.Carson.org

Carson City HMP Update 2021

Addressing Survey -1 Public Comments

Question #	Question / How addressed in the Plan	
1	Zip Code (no restriction)	Not Applicable to HMP
2	<p>Community Role (max selection of 3 roles allowed)</p> <ul style="list-style-type: none"> a. Resident b. Renter c. Business Operator d. Business Owner/operator e. Landowner f. Elected Official g. State Government Employee h. Federal Government Employee i. Other (Please Explain) <ul style="list-style-type: none"> City Employee Retiree Homeowner 	Addressed in Section 1.3 Planning Area. Demonstrates the respondents are active stakeholders in the City's safety and betterment.
3	<p>Currently have flood insurance</p> <ul style="list-style-type: none"> a. Yes b. No c. Not sure 	Needed education and outreach about flood insurance is addressed in Section 7.2.2 Education & Outreach Capabilities and in Section 7.3 NFIP. Also, mitigation actions numbers 1.E, 2.D, 2.F, 8.E .
4	<p>Choose 3 Hazards with greatest risk</p> <ul style="list-style-type: none"> Acts of Violence Avalanche Climate Change Cybersecurity Drought Earthquakes Floods Hazardous Materials Infectious Disease Landslides Severe Weather Volcanic Activity Wildland Fire 	Section 5 Hazard Analysis addresses the respondents' comments for all hazards but cybersecurity. This manmade hazard was not approached in this iteration due to low staffing levels in the IT Division.

Other:

Bad Political Decisions These hazards were not
Financial Stability considered by the PT to pose a
Homeless & Mental Subjects threat to the City. The Financial
First Responders Capabilities found in Section
Wokeness 7.2.3, and Section 1.3 Economy
Walk from Stewart address Financial Stability
concerns.

5 Experience with Frequency of Hazard Events

Acts of Violence
Avalanche
Climate Change
Cybersecurity
Drought
Earthquakes
Floods
Hazardous Materials
Infectious Disease
Landslides
Severe Weather
Volcanic Activity
Wildland Fire
Other:

Section 5 Hazard Analysis, specifically previous occurrences for each hazard addresses the comments received in the survey.

6 Importance of Hazard Mitigation Activity Type

Several actions fall under more than one category

Type of Mitigation Action

Local Plans and Regulations: Local plans ordinances and review processes influence the way land and buildings are developed and built. Coordination among plans, policies, and regulations leads to sustainable and resilient communities.

Fourth in importance. Addressed in 22 of the 60 mitigation actions, 37%. See Section 8, Table 8-4 Mitigation Strategy.

Structure and Infrastructure Projects: These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area.

First in importance. Addressed in 11 of the 60 mitigation actions, 18%. See Section 8, Table 8-4 Mitigation Strategy.

Natural Systems Protection: These actions minimize damage and losses while preserving or restoring the functions of natural systems (for example: sediment and erosion control, forest management)

Fifth in importance. Addressed in 5 of the 60 mitigation actions, 8%. See Section 8, Table 8-4 Mitigation Strategy.

Education Programs: Actions that inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them.

Third in importance. Addressed in 11 of the 60 mitigation actions, 18%. See Section 8, Table 8-4 Mitigation Strategy.

Preparedness and Response Actions: Emergency response or operational preparedness actions such as mutual aid agreements, communications, procedures for notifying citizens of shelter locations).

Second in importance. Addressed in 14 of the 60 mitigation actions, 23%. See Section 8, Table 8-4 Mitigation Strategy.

7 Impact of Identified Hazards in the last 5 years

The high ranked hazards wildfire, earthquake, severe weather, drought, and infectious disease are the a concern for most respondents. Acts of violence is also mentioned. Cybersecurity is also discussed amply as the City had a breach recently- this manmade hazard is not addressed in this iteration of the HMP. Comments are addressed as follows. The remaining hazards mentioned above are profiled individually in Section 5, and Section 6 provides the vulnerability analysis for each hazard.

8 Climate Change Impact and Identify City's Resources

Appropriate comments are addressed in Section 5 Hazard Analysis, Cascading Hazard section for the identified hazards. Drought, snowpack and the availability of water were the major impacts identified. Not many respondents know about the City's resources. Education and outreach regarding resources for the City is addressed in the mitigation strategy by activities under the E&O category. Water saving activities and growth are addressed in Section 6.4 Future Development and Section 8.5 Changes in Development.

9 Share activities, actions, and resources to reduce risk

Appropriate comments are addressed with the goals and actions identified in the mitigation strategy, Tables 8-1 and 8-4.

10 How to receive information about hazards

The City will use the communication method most likely to be effective.

11 Best method to get information about HM in the community

To support current and increase education and outreach activities. Table 8-4 Mitigation Strategy. Section 7.2.2 Education & Outreach Capabiliites

Appendix C: Previous Plan Actions

Carson City

Hazard Mitigation Plan 202

Appendix C – Previous Plan Actions

Education & Outreach: E&O Local Plans & Regulations: LPR Natural Systems Protection: NSP Preparedness & Response: P&R Structure & Infrastructure: S&I					
Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Primary Reviewer for the City	Disposition Explanation	Status Not Started, Continuing, Completed, No longer relevant
1.A - e LPR	ALL	Review and update the Master Plan to be consistent with the hazard area maps and implementation strategies developed in the HMP. Review & update ordinances & code every three years.	Community Development	Keep as continuing and ongoing action the City takes at least every three years. Dates were removed to reflect the ongoing characteristics of this action. Keep	Continuing
1.B - e E&O	ALL	Identify & educate Carson City personnel on high hazard areas.	Emergency Management & Digital Media Coordinator	Not started but relevant, work with HR to include in curriculum. Keep	Continuing
1.C - e P&R	ALL	Coordinate existing Geographic Information Systems (GIS) capabilities to identify hazards through the City.	Public Works	City's GIS will continue to work with departments to gather, maintain and provide hazard mitigation related data. Keep	Continuing

Carson City

Hazard Mitigation Plan 202

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1.D – e P&R	ALL	Develop the data sets that are necessary to test hazard scenarios and mitigation tools, including HAZUS MH.	Assessor's Office/GIS	This action item was not started, discussion with the City's project lead concluded the action is valid for the City's current priorities. Keep	Continuing
1.E – e E&O + P&R	ALL	Continue to utilize the Internet as a communication tool, as well as an education tool.	Emergency Management and Digital Media Coordinator	Modified to show a continuation of its implementation. Schools drill for earthquake events. Plans to add al hazards existing video. Keep.	Continuing
1.F – e LPR	Drought, Earthquake, Flood, Landslide, Severe Weather, & Wildfire	Continue to adopt and implement city building codes and ordinances that protect people and structures from drought, earthquake, flood, landslide, severe weather, and wildfire.	Community Development	Updated codes have been adopted and enforced. The same codes and ordinances were used used in the development of Capacity Study completed by GIS of all new development planned This action will continue to be implemented. Language modified to reflect its ongoing nature. Keep	Continuing

Carson City

Hazard Mitigation Plan 202

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1.G – e LPR	Wildfire	Collaborate and support the continued update of the Community Wildfire Plan.	Emergency Management	Though not completed during the 2016 Plan's life. It is on the planned for 2022. The Fire Department determined this plan is essential in the development of localized risk assessment for wildland fire. Keep	Continuing
2.A – e P&R	Flood and Wildfire	Maintain and update emergency evacuation programs for neighborhoods in flood prone and wildland areas.	Storm Water & Floodplain Mgr.	Evacuation routes established – maintenance is required for continued mitigation of risk. Still valid and representative of the City's flood reduction strategy. Keep	Continuing
2.B – e LPR	ALL	Annually review the City's Emergency Operations Plan and update and integrate w/local Hazard Mitigation Plan.	Emergency Management	Completed for the 2016 HMP cycle. The activity is still valid with important integration needs between the EOP and the HMP. Keep (integration)	Continuing

Carson City

Hazard Mitigation Plan 202

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2.C – e P&R	ALL	Continue to conduct a minimum of one disaster exercise per year.	Emergency Management	City participates with State and/or Quad County in disaster exercise at minimum every year. The exercise provides validation for current HMP strategy and provides possible information for future updates. Keep	Continuing
2.D – e E&O	ALL	Establish a budget and identify funding sources for mitigation outreach.	Emergency Management & Digital Media Coordinator	Public outreach funding supported by establishing the position of Digital Media Coordinator which supports the organization. Still a valid action – Keep	Continuing
2.E – e E&O	ALL	Continue to work with school district to promote education on the Standard Response Plan, a public outreach campaign that teaches children, staff, and families how to avoid danger and behave during an emergency.	Emergency Management, Ann Cyr, Digital Media Coordinator	School District Risk Manager, and Emergency Management Division determined the appropriate video to promote this action item. Keep as ongoing.	Continuing

Carson City

Hazard Mitigation Plan 202

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Education & Outreach: E&O Local Plans & Regulations: LPR Natural Systems Protection: NSP Preparedness & Response: P&R Structure & Infrastructure: S&I					
Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Primary Reviewer for the City	Disposition Explanation	Status Not Started, Continuing, Completed, No longer relevant
				<p>Standard Response Protocol for K-12 The "I Love U Guys" Foundation</p> <p>2021 Updates to the Standard Response Protocol (SRP) for School Safety Video. The "I Love U Guys" Foundation's Standard Response Protocol (SRP) is used in over 30,000 schools nationwide to guide their school safety programs, helping train for and respond to a variety of school crises.</p>	
2.F – e E&O	ALL	Continue to prepare, develop, and distribute appropriate public information about hazard mitigation programs and projects at Carson City-sponsored events and on the Carson City and Fire Department websites.	Emergency Management and Digital Media Coordinator	COVID 19 prevented some of this work However, the public information outreach is ongoing through other methods such as social media, City's website, and video conferencing. Keep	Continuing

Carson City

Hazard Mitigation Plan 202

Appendix C – Previous Plan Actions

Education & Outreach: E&O Local Plans & Regulations: LPR Natural Systems Protection: NSP Preparedness & Response: P&R Structure & Infrastructure: S&I					
Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Primary Reviewer for the City	Disposition Explanation	Status Not Started, Continuing, Completed, No longer relevant
2.G – n	All	Plan and construct an Emergency Operations Center (EOC), including a fire station and backup emergency dispatch center	Public Works	Necessary to support the full cycle for emergency management activities. Will serve the Quad County as well. This action continues to be valid. Keep.	Not Started (Starting design of facility in 2021)
3.A – e LPR	Earthquake	Continue to develop, adopt, and enforce policies and regulations pertaining to grading and related construction relative to seismic hazards.	Public Works & Community Development	The IBC code adoption is the foundation for the enforcement of local ordinances requiring appropriate construction of structures. This action is relevant in the current strategy. Keep	Continuing
3.C – e P&R	Earthquake, Wildfire, Flood, Severe Weather, Landslides	Continue to maintain a structure database using GIS.	Public Works	This is an ongoing mitigation activity. With coordination among departments and the Assessor's Office GIS Division Considered important to growth, and planning activities. Keep	Continuing
3.D – e	Fire	Acquire and install clean-agent systems for the City Hall and Public Safety	Assessor's Office/GIS	Not started, but GIS division considers al valid action. Keep	Not Started

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Appendix C – Previous Plan Actions

Education & Outreach: E&O Local Plans & Regulations: LPR Natural Systems Protection: NSP Preparedness & Response: P&R Structure & Infrastructure: S&I					
Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Primary Reviewer for the City	Disposition Explanation	Status Not Started, Continuing, Completed, No longer relevant
S&I		computer rooms to reduce damage to computer equipment due to fire.			
4.A – e LPR	Infectious Disease	Continue to update Mass Illness Plan and integrate with local Hazard Mitigation Plan.	Health & Human Services	The Health & Human Services Department discussed the ongoing updates to the plan which continues to be valid for the 2021 HMP strategy. Keep	Continuing
4.B – e P&R	Infectious Disease	Continuation of training and exercise program relative to infectious disease.	Health & Human Services	The Health and Human Services Director explained the Department has a continuous schedule for exercises related to infectious diseases and vaccinations. Keep	Continuing
4.C – e P&R	Infectious Disease	Prepare by acquiring and storing needed medical PPE to help support medical response due to infectious disease and managing the rotation of stock.	Health & Human Services	This action was implemented prior to COVID 19. New gaps were identified making this an ongoing and relevant mitigation action. Keep.	Continuing

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Appendix C – Previous Plan Actions

Education & Outreach: E&O Local Plans & Regulations: LPR Natural Systems Protection: NSP Preparedness & Response: P&R Structure & Infrastructure: S&I					
Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Primary Reviewer for the City	Disposition Explanation	Status Not Started, Continuing, Completed, No longer relevant
4.D – e E&O & P&R	Infectious Disease	Maintain a public program for information and education.	Health & Human Services	The Department maintains the established program and considers relevant for the 2021 HMP strategy. Keep	Continuing
5.A – e <i>revised</i> LPR	Severe Weather, Flood	Provide a consolidated storm water system Master Plan including development of project proposals to improve storm water facilities.	Storm Water & Floodplain Mgr.	The City implemented several projects related to this action. More are planned to complete this mitigation objective. Keep.	Continuing
5.B – e LPR	Severe Weather, Flood	Continue to update policies that discourage growth in flood-prone areas.	Storm Water & Floodplain Mgr.	Policies are in place, the updates are necessary to comply with building code and regulations. Keep.	Continuing
5.C – e LPR	Severe Weather, Flood	Continue to review and update flood plans for coordination w/adjacent counties, cities, and special districts supporting a regional approach to flood mitigation.	Storm Water & Floodplain Mgr.	The City's participation with the Carson River Subconservancy District and the Quad County support this action item.	Continuing

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Appendix C – Previous Plan Actions

Education & Outreach: E&O Local Plans & Regulations: LPR Natural Systems Protection: NSP Preparedness & Response: P&R Structure & Infrastructure: S&I					
Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Primary Reviewer for the City	Disposition Explanation	Status Not Started, Continuing, Completed, No longer relevant
				Collaboration in mitigation activities with these two partners is ongoing. Keep.	
5.D – e LPR	Severe Weather, Flood	Update and expand Sandbagging Plan.	Storm Water & Floodplain Mgr.	Carson City has developed site-specific sandbagging plans. These will be updated and new developed for pending locations. Keep.	Continuing
5.E – e S&I	Severe Weather, Flood	Continue to install new flood facilities through the City's CIP program to improve the overall effectiveness of the storm drain system.	Storm Water & Floodplain Mgr.	The Storm Water and Floodplain Management program will continue to use the City's CIP process to implement storm drains to complete a drain system protecting the City. The implementation of this action is ongoing.	Continuing
5.F – e NSP	Flood, Landslide	Upon completion of land transfers associated with the Lands Bill which includes land trading with Carson City, BLM, US Forestry, and Washoe Tribe; identify/implement projects within transferred lands and other areas within	Storm Water & Floodplain Mgr.	The Storm Water and Floodplain Management program for the City purchased land located in the floodplain. The land is used as open space. More land transfer transactions	Continuing

Carson City

Hazard Mitigation Plan 202

Appendix C – Previous Plan Actions

Education & Outreach: E&O Local Plans & Regulations: LPR Natural Systems Protection: NSP Preparedness & Response: P&R Structure & Infrastructure: S&I					
Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Primary Reviewer for the City	Disposition Explanation	Status Not Started, Continuing, Completed, No longer relevant
		Carson City that need slope stabilization for flood and landslide mitigation.		are expected. The City will continue to implement this action. Keep.	
5.G – e NSP	Flood, Landslide	Design and install facilities to capture debris and sediment within Eagle Valley.	Storm Water & Floodplain Mgr.	Several facilities are in place. Additional facilities are necessary to finalize the action throughout the valley. Keep.	Continuing
5.H – e S&I + NSP	Flood	Develop a Flood Management Plan for the New Empire Area and install a new flood control facility for the area.	Storm Water & Floodplain Mgr.	This is an area located in the floodplain. The development of the plan started. Additional work is necessary to install the facility. Ongoing, keep.	Continuing
5.I – e NSP + S&I	ALL	Protect and enhance existing municipal water conveyance structures, storage and treatment facilities.	Storm Water & Floodplain Mgr.	It is critical to protect the municipal water system from all identified hazards. This action is ongoing – wildfire and flood mitigation activities have been implemented but considered ongoing. Keep.	Continuing

Carson City

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Appendix C – Previous Plan Actions

Education & Outreach: E&O Local Plans & Regulations: LPR Natural Systems Protection: NSP Preparedness & Response: P&R Structure & Infrastructure: S&I					
Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Primary Reviewer for the City	Disposition Explanation	Status Not Started, Continuing, Completed, No longer relevant
5.J – e S&I + NSP	Severe Weather, Flood	Install a storm water retention / detention facility in Goni Canyon Watershed and storm drain system at Goni Creek.	Storm Water & Floodplain Mgr.	Specific locations with flood related concerns. The City requested BRIC funding during the 2020 cycle and a result is pending. In process of implementation. Keep.	Continuing (Grant for a portion of Specproject is in progress)
5.K – e NSP + LPR	Flood, Severe Weather	Continue land acquisition of buildings with recurring loss or of land which could be used as retention and detention basins for flood control projects.	Storm Water & Floodplain Mgr.	This is an ongoing activity until the flood projects for the City are completed. Keep.	Continuing
5.L – n	LPR	Install a storm water retention / detention facility in Ash and Kings Canyon Watersheds	Storm Water & Floodplain Mgr.	Establishment of the plan will ensure the proper design of these facilities. Keep.	Not Started (Area Drainage Plan is underway for these watersheds)
6.A – e	Severe Weather	In areas at risk to severe weather, retrofit public buildings to withstand snow loads	Public Works	As buildings are updated, Public Works improves the snow loads and wind	Continuing

Carson City

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Appendix C – Previous Plan Actions

Education & Outreach: E&O Local Plans & Regulations: LPR Natural Systems Protection: NSP Preparedness & Response: P&R Structure & Infrastructure: S&I					
Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Primary Reviewer for the City	Disposition Explanation	Status Not Started, Continuing, Completed, No longer relevant
S&I		and severe winds to prevent roof collapse/damage.		resistance of roofing for municipal structures. Keep.	
6.B – e LPR	Severe Weather	Continue the Storm Water Management Plan for snow melt and debris storage.	Public Works	The plan is established and will continue to be updated regularly to mitigate this hazard. Keep.	Continuing
7.A – e LPR	Acts of Violence	Develop mitigation standards for public and high-risk buildings and associated grounds.	Sheriff's Office	The Sheriff's office continues to collaborate with Public Works in updating the established standards. Keep	Continuing
7.B – e LPR	Acts of Violence	Continue following planning procedures to mitigate acts of violence.	Sheriff's Office	Procedures for mitigation of acts of violence in the City are established but need to be updated regularly. Ongoing keep.	Continuing

Carson City

Hazard Mitigation Plan 202

Appendix C – Previous Plan Actions

Education & Outreach: E&O Local Plans & Regulations: LPR Natural Systems Protection: NSP Preparedness & Response: P&R Structure & Infrastructure: S&I					
Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Primary Reviewer for the City	Disposition Explanation	Status Not Started, Continuing, Completed, No longer relevant
7.C – e S&I	Acts of Violence	Retrofit public and high-risk buildings to increase safety and reduce risk associated with acts of violence.	Public Works	Work started with protection projects completed for the Sheriff's office and the City's Public Works office. The action is ongoing with consideration to implementation as other buildings are renovated or upgraded. Keep.	Continuing
8.A – e LPR	Wildfire	Continue to adopt and enforce new versions of the Wildland Urban-Interface code and International Fire Code.	Fire Marshall	This action was implemented through the adoption of this important standard. It is an ongoing task with new updates taking place every five years.	Continuing
8.B – e NSP	Wildfire	Continue to conduct current fuel management programs and investigate and apply new and emerging fuel management techniques.	Fire Marshall	This action items continues to be implemented. Due to the nature of the hazard, maintenance of fuel management efforts is ongoing and relevant to the current mitigation strategy. Keep	Continuing

Carson City

Hazard Mitigation Plan 202

Appendix C – Previous Plan Actions

Education & Outreach: E&O Local Plans & Regulations: LPR Natural Systems Protection: NSP Preparedness & Response: P&R Structure & Infrastructure: S&I					
Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Primary Reviewer for the City	Disposition Explanation	Status Not Started, Continuing, Completed, No longer relevant
8.C – e E&O	Wildfire	Continue public outreach campaign on extreme wildland fire dangers and steps that can be taken to reduce these dangers.	Fire Marshall & Digital Media Coordinator	The Fire department conducts outreach with individual residents in the WUI, new homes developed in the medium- and high-risk areas for wildfire and across the City regarding mitigation activities for this hazard. It is relevant to the current mitigation goal 8. Keep.	Continuing
8.D – e NSP + E&O	Wildfire	Expand the community-based vegetation management program.	Fire Marshall	The program is very successful. The Fire Department is probing the possibility of expanding the program based on demand. Keep.	Continuing
8.E – e E&O	Wildfire	Continue to utilize GIS and the internet as information tools.	Fire Marshall	Information about fuels reduction projects, acreage of wildfires, and growth are coordinated between the Fire Department and the GIS Division. Relevant for the 2021 HMP strategy of reduction in wildfire risk. Keep.	Continuing

Carson City

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Appendix C – Previous Plan Actions

Education & Outreach: E&O Local Plans & Regulations: LPR Natural Systems Protection: NSP Preparedness & Response: P&R Structure & Infrastructure: S&I					
Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Primary Reviewer for the City	Disposition Explanation	Status Not Started, Continuing, Completed, No longer relevant
8.F – e P&R	Wildfire	Maintain the continuing wildland fire technical working group.	Fire Marshall	The group meets regularly to discuss wildfire mitigation activities within the City's jurisdiction and collaborates with private homeowners, and businesses, as well as state agencies in this effort. Relevant to the current HMP strategy for wildfire. Keep	Continuing
8.G – e NSP + S&I	Flood, Wildfire	Continue to protect municipal water recharge zones from wildfires and flooding.	Fire Marshall, Storm Water & Floodplain Mgr.	Hazardous fuels reduction in the locations where recharge of water takes place is completed. The maintenance of these activities is ongoing at most every 4 years. Keep.	Continuing
9.A – e NSP + S&I	Drought	Maintain water supply stabilization and recharge programs to maximize the use of surface sources when available and preserve the groundwater sources for system peaking needs and times of drought	Public Works	The recharge program is in place and this action will be ongoing and remains relevant to the current HMP strategy. Keep.	Continuing

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Appendix C – Previous Plan Actions

Education & Outreach: E&O Local Plans & Regulations: LPR Natural Systems Protection: NSP Preparedness & Response: P&R Structure & Infrastructure: S&I					
Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Primary Reviewer for the City	Disposition Explanation	Status Not Started, Continuing, Completed, No longer relevant
9.B – e E&O + LPR	Drought	Continue to encourage public participation in drought strategies through public information programs on water conservation and drought resistant landscaping and through building code ordinances.	Public Works, Digital Media Coordinator	The Water Division has continuous efforts in public outreach to encourage water conservation. Flyers in billing envelopes and watering day enforcement are in place. Keep	Continuing
9.C – n	Drought	Rehabilitate and upgrade the Quill Water Treatment Plant to maximize the use of available surface water resources and increase water supply.	Public Works	This project in the design stage for implementation. Keep.	Project design underway
10.A – e NSP	Landslide	Evaluate natural slopes to determine whether there are slope stabilization treatments that would be appropriate to prevent landslides.	Public Works, Storm Water & Floodplain Mgr.	Although not started, the action remains valid. However, several flood projects were prioritized higher for implementation. Keep.	Not started

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Appendix C – Previous Plan Actions

Education & Outreach: E&O Local Plans & Regulations: LPR Natural Systems Protection: NSP Preparedness & Response: P&R Structure & Infrastructure: S&I					
Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Primary Reviewer for the City	Disposition Explanation	Status Not Started, Continuing, Completed, No longer relevant
10.B – e S&I	Landslide	Conduct slope stabilization projects to prevent landslides.	Public Works, Storm Water & Floodplain Mgr.	This project has not started. The Manager for the Storm water & Floodplain Management Program states this is important in the west side of the City where the slope is conducive to landslides. This action item is still a valid strategy. Keep.	Not started
11.A – e LPR	Hazardous Materials	Consider and as appropriate, adopt building codes and zoning ordinances to reduce public health risks from hazardous materials releases.	Building Department	Discussion with the Community Development Director determined this action item is still important to the City's development. Although not started, it is a valid strategy for HazMat mitigation. Keep.	Not started

Appendix D: Maintenance Documents

- Tracking Public Involvement Conversations & Outreach Awareness
- Mitigation Action Progress Report Form
- Mitigation Action Progress Report Tracking Sheet
- Planning Team Evaluation Group Members
- Tracking Impacts of a Hazard Event
- Plan Update Evaluation Worksheet

Appendix D: Maintenance Documents

- Tracking Public Involvement Conversations & Outreach Awareness

Tracking Public Involvement Conversations and Outreach & Awareness

Complete one "CONVERSATION" (page 1) form each time a conversation takes place.

OR

Complete one "Other METHODS of OUTREACH/AWARENESS" (page 2) form each time outreach/awareness is done. *(Copy the forms as needed)*

CONVERSATION (FACE TO FACE PUBLIC INVOLVEMENT)	
Who is documenting?	
Name(s):	
Title:	
Conversation with:	
Name:	
Occupation:	
Date:	
What was discussed?	
Feedback? Yes <input type="checkbox"/> No <input type="checkbox"/>	Summarize the input from the public here.

Tracking Public Involvement Conversations and Outreach & Awareness

Other METHODS of OUTREACH/AWARENESS	
Who is documenting?	
Name:	
Title:	
Outreach /Awareness	Frequency: Monthly <input type="checkbox"/> Quarterly <input type="checkbox"/> Semi-annually <input type="checkbox"/> Annually <input type="checkbox"/>
	Method used: eMail <input type="checkbox"/> Event <input type="checkbox"/> Name of Event: _____ Facebook posting <input type="checkbox"/> Flyer <input type="checkbox"/> Meeting <input type="checkbox"/> Press Release <input type="checkbox"/> Survey <input type="checkbox"/> Public Safety Announcement <input type="checkbox"/> Other: _____
	Date of Event/posting:
	Attach copy of announcement/screen shot/photo: <input type="checkbox"/>
Feedback? Yes <input type="checkbox"/> No <input type="checkbox"/>	If Yes, attach a copy of document received:(email, survey, etc.)

Appendix D: Maintenance Documents

- Mitigation Action Progress Report Form

Mitigation Action Progress Report Form

Progress Report Period	From Date:	To Date:
Action/Project Title		
Responsible Agency		
Contact Name		
Contact Phone/Email		
Project Status	<input type="checkbox"/> Project completed <input type="checkbox"/> Project canceled <input type="checkbox"/> Project on schedule <input type="checkbox"/> Anticipated completion date: _____ <input type="checkbox"/> Project delayed Explain _____	

Summary of Project Progress for this Report Period

1. What was accomplished for this project during this reporting period?

2. What obstacles, problems, or delays did the project encounter?

3. If uncompleted, is the project still relevant? Should the project be changed or revised?

4. Other comments

Appendix D: Maintenance Documents

- Mitigation Action Progress Report Tracking Sheet

Carson City Hazard Mitigation Plan – 2021 Update

Mitigation Action Progress Report Tracking Sheet

Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Lead Dept. Division Timeline	or -- Estimated Cost (\$)	Potential Funding Source	Primary Reviewer for the City	Status Not Started, Continuing, Completed, No longer relevant	Progress Report Sent DATE	Progress Report Received DATE
<i>Goal 1: Promote increased and ongoing Carson City involvement in hazard mitigation planning and projects.</i>									
1.A - e LPR	ALL	Review and update the Master Plan to be consistent with the hazard area maps and implementation strategies developed in the HMP in 2022 and 2023. Review & update ordinances & code every three years.	Planning — 2 Years	Staff Time \$5,000	Local Gen. Fund	Hope Sullivan			
1.B - e E&O	ALL	Identify & educate Carson City personnel on high hazard areas.	LEPC Planning Committee / Emergency Mgmt. — Annually	Staff time \$16,000	Local Gen. Fund, BRIC	Jason Danen & Rachael Schneider	Continuing		
1.C - e P&R	ALL	Coordinate existing Geographic Information Systems (GIS) capabilities to identify hazards through the City.	Public Works — Ongoing	Staff Time \$5,000	Local Gen. Fund	Dan Stucky	Continuing		

Carson City Hazard Mitigation Plan – 2021 Update

Mitigation Action Progress Report Tracking Sheet

Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Lead Dept. Division Timeline	or --	Estimated Cost (\$)	Potential Funding Source	Primary Reviewer for the City	Status Not Started, Continuing, Completed, No longer relevant	Progress Report Sent DATE	Progress Report Received DATE
1.D – e P&R	ALL	Develop the data sets that are necessary to test hazard scenarios and mitigation tools, including HAZUS MH.	Emergency Management — Ongoing		Staff Time \$29,000	UNR, HMGP	Stephanie Hicks	Continuing		
1.E – e E&O + P&R	ALL	Continue to utilize the Internet as a communication tool, as well as an education tool.	City Public Relations Coordinator, Emergency Management — Ongoing		Staff time for six weeks \$24,000 yearly	Local Gen. Funds	Jason Danen and Rachael Schneider	Continuing		
1.F – e LPR	Drought, Earthquake, Flood, Landslide, Severe Weather, & Wildfire	Continue to adopt and implement city building codes and ordinances that protect people and structures from drought, earthquake, flood, landslide, severe weather, and wildfire.	Building Dept. — Ongoing		Staff Time \$5,000	Local Gen. Fund	Hope Sullivan	Ongoing		
1.G – e LPR	Wildfire	Collaborate and support the continued update of the Community Wildfire Plan.	Fire Dept. — Ongoing		Staff time \$20,000 yearly	National Fire monies, USFS, BLM, NDF	Jason Danen	Continuing		

Carson City Hazard Mitigation Plan – 2021 Update

Mitigation Action Progress Report Tracking Sheet

Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Lead Dept. Division Timeline	or -- Estimated Cost (\$)	Potential Funding Source	Primary Reviewer for the City	Status Not Started, Continuing, Completed, No longer relevant	Progress Report Sent DATE	Progress Report Received DATE
1.H – n LPR	Earthquake, Flood, Severe Weather, Wildfire	Design and construct a City-owned fuel facility, including emergency fuel storage to support critical infrastructure during an extended power outage.	Public Works — 36-48 months	\$900,000	BRIC, Local Gen. Fund, CC PW	Dan Stucky	Not Started (Feasibility study completed 2020)		
1.I -n LPR	Severe Weather	Reduce the risk of power outages by collaborating with NV Energy to determine areas where disruption is most likely and the feasibility of underground power lines.	Emergency Management 18-24 months	Staff Time (2 people for 3 months) & Travel \$129,500	BRIC, HMGP, Local Gen Fund, US Department of Energy Governor's Office of Energy	Dave Ruben	New / Not started		
Goal 2: Build and support local capacity to enable the community to prepare for, respond to, and recover from disasters.									
2.A – e P&R	Flood and Wildfire	Maintain and update emergency evacuation programs for neighborhoods in flood prone and wildland areas.	Public Works Flood Plain Manager, Fire Dept.	Staff Time \$5,000	EMPG, SERC, USEPA, NDEP,	Robb Fellows	Continuing		

Carson City Hazard Mitigation Plan – 2021 Update

Mitigation Action Progress Report Tracking Sheet

Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Lead Dept. Division Timeline	or --	Estimated Cost (\$)	Potential Funding Source	Primary Reviewer for the City	Status Not Started, Continuing, Completed, No longer relevant	Progress Report Sent DATE	Progress Report Received DATE
			— 18-24 months			NCNR, Utility Service Charge				
2.B – e LPR	ALL	Annually review the City's Emergency Operations Plan and update and integrate w/local Hazard Mitigation Plan.	Emergency Management Dept. — Ongoing	Fire	Staff time \$18,000 yearly	HMGP, BRIC, SERC, EMPG, USEPA, NDEP, NDCNR, DHS, Local Gen. Fund	Jason Danen	Continuing		
2.C – e P&R	ALL	Conduct a minimum of one disaster exercise per year.	Emergency Management Dept. — Ongoing	Fire	Staff time \$18,000 yearly	EMPG, SERC, USEPA, NDEP, NDCNR, Local Gen Fund	Jason Danen	Continuing		
2.D – e E&O	ALL	Establish a budget and identify funding sources for mitigation outreach.	Emergency Management — 18-24 months		Staff time \$12,000 yearly	EMPG, BRIC, HMGP, NV Health & Human	Jason Danen & Rachael	Continuing		

Carson City Hazard Mitigation Plan – 2021 Update

Mitigation Action Progress Report Tracking Sheet

Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Lead Dept. Division Timeline	or -- Estimated Cost (\$)	Potential Funding Source	Primary Reviewer for the City	Status Not Started, Continuing, Completed, No longer relevant	Progress Report Sent DATE	Progress Report Received DATE
					Services, CDC, USFS				
2.E – e E&O	ALL	Continue to work with school district to promote education on the Standard Response Plan, a public outreach campaign that teaches children, staff, and families how to avoid danger and behave during an emergency.	Emergency Management — 6-24 months	Materials available at no cost \$25,000 Staff time yearly	EMPG, HMGP, NV Health & Human Services, CDC, USFS	Jason Danen, Ann Cyr, Rachael Schneider	Continuing		
2.F – e E&O	ALL	Continue to prepare, develop, and distribute appropriate public information about hazard mitigation programs and projects at Carson City-sponsored events and on the Carson City and Fire Department websites.	Emergency Management — Ongoing	Staff time \$6,000	EMPG, HMGP, NV Health & Human Services, CDC, USFS	Jason Danen and Rachael Schneider	Continuing		
2.G – n	All	Plan and construct an Emergency Operations Center (EOC), including a fire station and backup emergency dispatch center	Emergency Management, Fire Dept., Sheriff Dept. Public Works — 36-48 months	\$12.5M	Local Gen Fund/Grants	Dan Stucky	Not Started (Starting design of facility in 2021)		

Carson City Hazard Mitigation Plan – 2021 Update

Mitigation Action Progress Report Tracking Sheet

Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Lead Dept. Division Timeline	or -- Estimated Cost (\$)	Potential Funding Source	Primary Reviewer for the City	Status Not Started, Continuing, Completed, No longer relevant	Progress Report Sent DATE	Progress Report Received DATE
<i>Goal 3: Reduce the possibility of damage and losses due to earthquakes.</i>									
3.A – e LPR	Earthquake	Continue to develop, adopt, and enforce policies and regulations pertaining to grading and related construction relative to seismic hazards.	Planning & Building Dept. — Ongoing	Staff Time \$5000	Local Gen. Fund	Dan Stucky & Hope Sullivan	Continuing		
3.B – n S&I	Earthquake	Evaluate unreinforced masonry structure inventory; using benefit-cost analysis, identify priorities for retrofitting buildings; and complete the necessary upgrades.	Building Maintenance, Building Dept. — 24-48 months	Staff Time Tasks 1 & 2 only \$178,000	Local Gen. Fund, HMGP, BRIC		New		
3.C – e P&R	Earthquake, Wildfire, Flood, Severe Weather, Landslides	Maintain a structure database using GIS.	Public Works — Ongoing	Staff Time \$5,000	Local Gen. Fund, BRIC	Dan Stucky	Continuing		

Carson City Hazard Mitigation Plan – 2021 Update

Mitigation Action Progress Report Tracking Sheet

Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Lead Dept. Division Timeline	or --	Estimated Cost (\$)	Potential Funding Source	Primary Reviewer for the City	Status Not Started, Continuing, Completed, No longer relevant	Progress Report Sent DATE	Progress Report Received DATE
3.D – e S&I	Fire	Acquire and install clean-agent systems for the City Hall and Public Safety computer rooms to reduce damage to computer equipment due to fire.	Building Maintenance 2 months	—	One time cost \$50,000	Local Gen. Fund	Stephanie Hicks	Not Started		
Goal 4: Reduce the possibility of threat to life and losses due to Infectious Disease.										
4.A – e LPR	Infectious Disease	Update Mass Illness Plan and integrate with local Hazard Mitigation Plan.	Health Dept. 12-15 months	—	One time cost \$35,000	State of Nevada, Div. of Public and Behavioral Health; Public Health Preparednes s	Nicki Aaker	Continuing, but needs updating		
4.B – e P&R	Infectious Disease	Continuation of training and exercise program relative to infectious disease.	Health Dept. Ongoing	—	Yearly \$42,000	State of Nevada, Div. of Public and Behavioral Health; Public Health Preparednes s	Nicki Aaker	Continuing		

Carson City Hazard Mitigation Plan – 2021 Update

Mitigation Action Progress Report Tracking Sheet

Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Lead Dept. Division Timeline	Estimated Cost (\$)	Potential Funding Source	Primary Reviewer for the City	Status Not Started, Continuing, Completed, No longer relevant	Progress Report Sent DATE	Progress Report Received DATE
4.C – e P&R	Infectious Disease	Prepare by acquiring and storing needed medical PPE to help support medical response due to infectious disease and managing the rotation of stock.	Health Dept. Ongoing	Yearly \$25,000	State of Nevada, Div. of Public and Behavioral Health; Public Health Preparedness	Nicki Aaker	Continuing		
4.D – e E&O & P&R	Infectious Disease	Maintain a public program for information and education.	Health Dept. Ongoing	Yearly \$12,000	State of Nevada, Div. of Public and Behavioral Health; Public Health Preparedness	Nicki Aaker	Continuing		
4.E – n E&O P&R	Infectious Disease	Reduce disparities and inequities in the distribution of infectious disease information during and prior to outbreaks.	CC H&HS — 12-24 months for implementation then, ongoing	\$50,000 for implementation Yearly Personnel & Operating Budget \$116,000	State of Nevada, Div. of Public and Behavioral Health; Public Health Preparedness	Nicki Aaker	New Once implem ented, continuing		

Carson City Hazard Mitigation Plan – 2021 Update

Mitigation Action Progress Report Tracking Sheet

Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Lead Dept. Division Timeline	or -- Estimated Cost (\$)	Potential Funding Source	Primary Reviewer for the City	Status Not Started, Continuing, Completed, No longer relevant	Progress Report Sent DATE	Progress Report Received DATE
4.F – n LPR P&R	Infectious Disease	Establish a plan that addresses the development, protection, retention, and resilience of the public health workforce and identifies options for expanding the workforce quickly for a health-related emergency that extends beyond 30 days.	CC H&HS — 18-24 months	Consultant Estimate \$65,000	State of Nevada, Div. of Public and Behavioral Health; Public Health Preparednes s	Nicki Aaker	New		
Goal 5: Reduce the possibility of damage and losses due to floods.									
5.A – e <i>revised</i> LPR	Severe Weather, Flood	Provide a consolidated storm water system Master Plan including development of project proposals to improve storm water facilities.	Public Works — 24-36 months	\$75,000	BRIC, HMGP, FMA, RFC, USDA, NDEP, USEPA, NDCNR, 319(h) grants (Clean Water Act), USGS, CC PW	Robb Fellows	Continuing		
5.B – e LPR	Severe Weather, Flood	Continue to update policies that discourage growth in flood-prone areas.	Public Works — Ongoing	Staff Time \$5,000	Local Gen Fund	Robb Fellows	Continuing		

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5.C – e LPR	Severe Weather, Flood	Continue to review and update flood plans for coordination w/adjacent counties, cities, and special districts supporting a regional approach to flood mitigation.	Public Works — Ongoing	Staff Time \$5,000	BRIC, HMGP, FMA, RFC, USDA, NDEP, USEPA, NDRCS, Local, CC PW	Robb Fellows	Continuing		
5.D – e LPR	Severe Weather, Flood	Update and expand Sandbagging Plan.	Public Works — 24 months	Staff Time \$5,000	Local Gen. Fund, EMGP	Robb Fellows	Continuing		
5.E – e S&I	Severe Weather, Flood	Continue to install new flood facilities through the City's CIP program to improve the overall effectiveness of the storm drain system.	Public Works — Ongoing	\$950,000	BRIC, HMGP, FMA, RFC, USDA, NDEP, USEPA, NRCS, Local, CC PW	Robb Fellows	Continuing		
5.F – e NSP	Flood, Landslide	Upon completion of land transfers associated with the Lands Bill which includes land trading with Carson City, BLM, US Forestry, and Washoe Tribe;	Public Works — 36-48 months	Staff Time \$5,000	BRIC, HMGP, USFS, BLM,	Robb Fellows	Continuing		

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Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Lead Dept. Division Timeline	or -- Estimated Cost (\$)	Potential Funding Source	Primary Reviewer for the City	Status Not Started, Continuing, Completed, No longer relevant	Progress Report Sent DATE	Progress Report Received DATE
		identify/implement projects within transferred lands and other areas within Carson City that need slope stabilization for flood and landslide mitigation.			Local Gen. Fund				
5.G – e NSP	Flood, Landslide	Design and install facilities to capture debris and sediment within Eagle Valley.	Public Works — Ongoing	\$120,000	BRIC, HMGP, FMA, RFC, USDA, NDEP, USEPA, NRCS, Local, CC PW	Robb Fellows	Continuing		
5.H – e S&I + NSP	Flood	Develop a Flood Management Plan for the New Empire Area and install a new flood control facility for the area.	Public Works — 24-48 months	\$5.8M	BRIC, HMGP, FMA, RFC, USDA, NDEP, USEPA, NRCS, Local, CC PW	Robb Fellows	Continuing		
5.I – e NSP + S&I	ALL	Protect and enhance existing municipal water conveyance structures, storage and treatment facilities.	Public Works — 24-36 months	\$50,000	BRIC, HMGP, FMA, RFC, USDA, NDEP, USEPA, NRCS, FEMA, 319(h) grants	Robb Fellows	Continuing		

Carson City Hazard Mitigation Plan – 2021 Update

Mitigation Action Progress Report Tracking Sheet

Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Lead Dept. Division Timeline	or -- Estimated Cost (\$)	Potential Funding Source	Primary Reviewer for the City	Status Not Started, Continuing, Completed, No longer relevant	Progress Report Sent DATE	Progress Report Received DATE
					(Clean Water Act), CC PW				
5.J – e S&I + NSP	Severe Weather, Flood	Install a storm water retention / detention facility in Goni Canyon Watershed and storm drain system at Goni Creek.	Public Works — 24-36 months	\$8.6M	BRIC, HMGP, FMA, RFC, USDA, NDEP, USEPA, NRCS, FEMA, 319(h) grants (Clean Water Act), CC PW	Robb Fellows	Continuing (Grant for a portion of project is in progress)		
5.K – e NSP + LPR	Flood, Severe Weather	Continue land acquisition of buildings with recurring loss or of land which could be used as retention and detention basins for flood control projects.	Public Works — Ongoing	\$1M	BRIC, HMGP, FMA, RFC, USDA, NDEP, USEPA, NRCS, FEMA, 319(h) grants (Clean Water Act), USGS, CC PW	Robb Fellows	Continuing		

Carson City Hazard Mitigation Plan – 2021 Update

Mitigation Action Progress Report Tracking Sheet

Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Lead Dept. Division Timeline	or -- Estimated Cost (\$)	Potential Funding Source	Primary Reviewer for the City	Status Not Started, Continuing, Completed, No longer relevant	Progress Report Sent DATE	Progress Report Received DATE
5.L – n	LPR	Install a storm water retention / detention facility in Ash and Kings Canyon Watersheds	Public Works — 48 months	\$2M	BRIC, HMGP, FMA, RFC, USDA, NDEP, USEPA, NRCS, FEMA, 319(h) grants (Clean Water Act), CC PW	Robb Fellows	Not Started (Area Drainage Plan is underway for these watersheds)		
Goal 6: Reduce the possibility of damage and losses due to Severe Weather.									
6.A – e S&I	Severe Weather	In areas at risk to severe weather, retrofit public buildings to withstand snow loads and severe winds to prevent roof collapse/damage.	Public Works — Ongoing	\$1M	BRIC, HMGP, Local Gen. Fund	Dan Stucky	Continuing		
6.B – e LPR	Severe Weather	Continue the Storm Water Management Plan for snow melt and debris storage.	Public Works — 36-48 months	Training & Staff Time \$10,000	BRIC, HMGP, FMA, RFC, USDA, NDEP, USEPA, NRCS, FEMA, 319(h) grants	Dan Stucky	Continuing		

**Carson City Hazard Mitigation Plan – 2021 Update
Mitigation Action Progress Report Tracking Sheet**

Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Lead Dept. Division Timeline	or -- Estimated Cost (\$)	Potential Funding Source	Primary Reviewer for the City	Status Not Started, Continuing, Completed, No longer relevant	Progress Report Sent DATE	Progress Report Received DATE
					(Clean Water Act), USGS, CC PW				
Goal 7: Reduce the possibility of damage and losses due to terrorist events.									
7.A – e LPR	Acts of Violence	Develop mitigation standards for public and high-risk buildings and associated grounds.	Planning, Building Dept. — 6-12 months	Staff Time \$148,000	Local Gen. Fund	Jerome Tushbant	To Hope Sullivan per JT		
7.B – e LPR	Acts of Violence	Continue following planning procedures to mitigate acts of violence.	Emergency Management / Sheriff Dept. — Ongoing	\$500 Staff Time	EMPG, Local Gen Fund	Jerome Tushbant	Continuing		
7.C – e S&I	Acts of Violence	Retrofit public and high-risk buildings to increase safety and reduce risk associated with acts of violence.	Public Works, Building Maintenance — Ongoing	Please provide es cost \$500k	EMPG, Local Gen Fund	Dan Stucky	Continuing		
Goal 8: Reduce the possibility of damage and losses due to wildland fires.									

Carson City Hazard Mitigation Plan – 2021 Update

Mitigation Action Progress Report Tracking Sheet

Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Lead Dept. Division Timeline	or -- Estimated Cost (\$)	Potential Funding Source	Primary Reviewer for the City	Status Not Started, Continuing, Completed, No longer relevant	Progress Report Sent DATE	Progress Report Received DATE
8.A – e LPR	Wildfire	Continue to adopt and enforce new versions of the Wildland Urban-Interface code and International Fire Code.	CC Fire Dept. — Ongoing	Staff time, outreach meetings books \$8,000 (Due 2024) every six years	Local Gen Fund	Dave Ruben	Continuing		
8.B – e NSP	Wildfire	Continue to conduct current fuel management programs and investigate and apply new and emerging fuel management techniques.	NV Div. of Forestry CC Fire Dept. — Ongoing	\$325,000	HMGP, NDF, BLM, National Fire Monies, Stimulus funds, USFS, Local General Fund	Dave Ruben	Continuing		
8.C – e E&O	Wildfire	Continue public outreach campaign on extreme wildland fire dangers and steps that can be taken to reduce these dangers.	CC Fire Dept. — Ongoing	\$2500	HMGP, Local General Fund, National Fire Monies	Dave Ruben & Rachael Schneider	Continuing		

Carson City Hazard Mitigation Plan – 2021 Update

Mitigation Action Progress Report Tracking Sheet

Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Lead Dept. Division Timeline	or --	Estimated Cost (\$)	Potential Funding Source	Primary Reviewer for the City	Status Not Started, Continuing, Completed, No longer relevant	Progress Report Sent DATE	Progress Report Received DATE
8.D – e NSP + E&O	Wildfire	Expand the community-based vegetation management program.	CC Fire Dept. — Ongoing		\$5000	HMGP, Local General Fund, National Fire Monies	Dave Ruben	Continuing		
8.E – e E&O	Wildfire	Continue to utilize GIS and the internet as information tools.	CC Fire Dept. — Ongoing		\$2500	HMGP, Local General Fund, National Fire Monies	Dave Ruben	Continuing		
8.F – e P&R	Wildfire	Maintain the continuing wildland fire technical working group.	CC Fire Dept. — Ongoing		\$1000	HMGP, Local General Fund, National Fire Monies	Dave Ruben	Continuing		
8.G – e NSP + S&I	Flood, Wildfire	Continue to protect municipal water recharge zones from wildfires and flooding.	CC Fire Dept. — Ongoing		\$25,000	HMGP, BRIC, Local General Fund, National Fire Monies	Dave Ruben, Robb Fellows	Continuing		

Carson City Hazard Mitigation Plan – 2021 Update

Mitigation Action Progress Report Tracking Sheet

Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Lead Dept. Division Timeline	or -- Estimated Cost (\$)	Potential Funding Source	Primary Reviewer for the City	Status Not Started, Continuing, Completed, No longer relevant	Progress Report Sent DATE	Progress Report Received DATE
Goal 9: Reduce the possibility of damage and losses due to drought.									
9.A – e NSP + S&I	Drought	Maintain water supply stabilization and recharge programs to maximize the use of surface sources when available and preserve the groundwater sources for system peaking needs and times of drought	Public Works — Ongoing	Please provide es cost \$2M	NDEP, USEPA, NRCS, FEMA, 319(h) grants (Clean Water Act), USGS, CC PW	Dan Stucky	Continuing		
9.B – e E&O + LPR	Drought	Continue to encourage public participation in drought strategies through public information programs on water conservation and drought resistant landscaping and through building code ordinances.	Public Works — Ongoing	Staff Time \$5,000	NDEP, USEPA, NRCS, FEMA, 319(h), grants (Clean Water Act), USGS, CC PW	Dan Stucky, Rachael Schneider	Continuing		
9.C – n	Drought	Rehabilitate and upgrade the Quill Water Treatment Plant to maximize the use of available surface water resources and increase water supply.	Public Works — 36-48 months	\$15M	NDEP, USEPA, NRCS, FEMA, 319(h) grants (Clean Water	Dan Stucky	Not Started (Project design underway)		

**Carson City Hazard Mitigation Plan – 2021 Update
Mitigation Action Progress Report Tracking Sheet**

Goal #. Action Letter Existing = e or New = n	Hazard Description	Action Description	Lead Dept. Division Timeline	or -- Estimated Cost (\$)	Potential Funding Source	Primary Reviewer for the City	Status Not Started, Continuing, Completed, No longer relevant	Progress Report Sent DATE	Progress Report Received DATE
					Act), USGS, CC PW				
<i>Goal 10: Reduce the possibility of damage and losses due to landslide.</i>									
10.A – e NSP	Landslide	Evaluate natural slopes to determine whether there are slope stabilization treatments that would be appropriate to prevent landslides.	Public Works — 36-48 months	\$50k	BRIC, HMGP, BLM, USFS, Local Gen Fund	Dan Stucky, Robb Fellows	Not started		
10.B – e S&I	Landslide	Conduct slope stabilization projects to prevent landslides.	Public Works — 36-48 months	\$500k	BRIC, HMGP, BLM, USFS, Local Gen Fund	Dan Stucky, Robb Fellows	Not started		
<i>Goal 11: Reduce the possibility of damage and losses due to hazardous materials.</i>									
11.A – e LPR	Hazardous Materials	Consider and as appropriate, adopt building codes and zoning ordinances to reduce public health risks from hazardous materials releases.	Planning, Building Dept. —	Staff Time \$75,000	Local Gen. Fund	Building Department	Not started		

Carson City Hazard Mitigation Plan – 2021 Update

Mitigation Action Progress Report Tracking Sheet

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			24 to 48 months						

Appendix D: Maintenance Documents

- Planning Team Evaluation Group Members

Carson City Hazard Mitigation Plan Update - 2021
 Planning Team Evaluation Group Members

Name		Department/Organization	Title	Email	Phone
Nicki	Aaker	Health Department	Director	naaker@carson.org	775-283-7704
Jason	Danen	Carson City Fire Department	Alternate Chair	jdanen@carson.org	775-283-7668
Robb	Fellows	Carson City Public Works	Senior Project Manager - Stormwater	rfellows@carson.org	775.283.7370
Stephanie	Hicks	Carson City, City Manager's Office	Deputy City Manager	shicks@carson.org	775-283-7904
Andy	Hummel	Carson City Public Works	Wastewater Utility Manager	ahummel@carson.org	775-283-7357
Tyler	Jesse	Carson City	Asset Manager	tjesse@carson.org	775-283-7392
Nancy	Merritt	Carson City Fire Department	Assistant to Deputy Emergency Manager	nmerritt@carson.org	775-283-7947
Dave	Ruben	Carson City Fire Department	Fire Marshall	druben@carson.org	775-283-7153
Rodd	Rummel	Carson City Fire Department	Wildland Fuels Management Officer	rrummel@carson.org	775-283-7161
Lisa	Schuetz	CC Board of Supervisors		lschuetz@carson.org	775.671.2413
Darren	Schulz	Carson City	Public Works Director	dschulz@carson.org	775-283-7391
Sean	Slamon	Carson City Fire Department	Fire Chief, LEPC Chair	sslamon@carson.org	775-283-7722
Chris	Smallcomb	NOAA	Warning Coordination Meteorologist	chris.smallcomb@noaa.gov	775-673-8100
Dan	Stucky	Carson City	Deputy Public Works Director	DStucky@carson.org	775.283-7084
Hope	Sullivan	Carson City Community Development	Director	HSullivan@carson.org	775.283.7922
Jerome	Tushbant	Carson City Sheriff's Office	Assistant Sheriff	jtushbant@carson.org	775-283-7802
Vacant	Vacant	Carson City	Chief Information Officer	junderwood@carson.org	775.283.7006

Appendix D: Maintenance Documents

- Tracking Impacts of a Hazard Event

Tracking Hazard Events

Tracking Impacts of a Hazard Event

Complete fields/cells in this color:



Carson City	Start Date of Event	End Date of Event	# of People Displaced
-------------	---------------------	-------------------	-----------------------

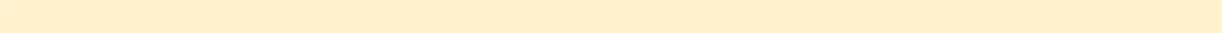


HAZARD EVENT (For Example: Wildland fire):

Structures affected



Infrastructure affected (roads, bridges, utilities, etc.)



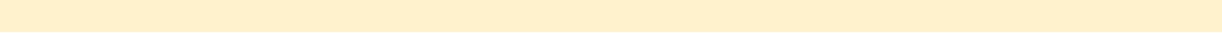
Cultural Impacts



Loss of life? #

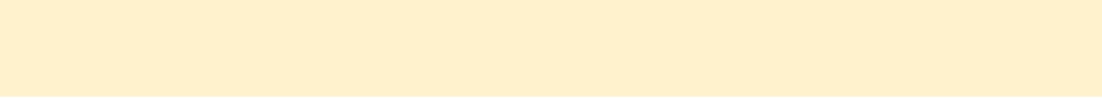


Injuries? #



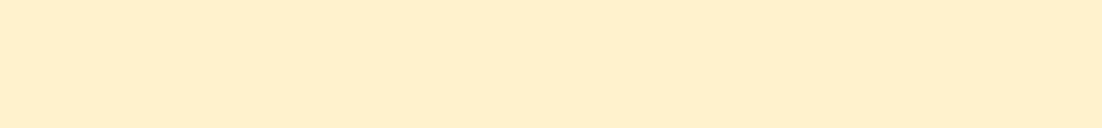
Name of Municipal Structures Affected (for example: Public Works Yard South Carson)

- 1
- 2
- 3



Name of Businesses Affected (For example: Gas Station)

- 1
- 2
- 3



Tracking Hazard Events

City Government Expenses

Reimbursement Funding Source:
(Example: FEMA)

Description	Quantity	Unit Cost	Total Cost	Tribal Account Used	Date of Expense	Amount Received	Date Received
(for Example: Trucking of potable water)	2	\$ 190.00	\$ 380.00	General Fund	9/4/2022		
1			\$ -				
2			\$ -				
3			\$ -				
4			\$ -				
5			\$ -				

Photographs Taken: (Yes/No)

Location of photo files:

Corroborating Individual(s):

Name

Title

Date

Prepared by:

Date:

Appendix D: Maintenance Documents

- Plan Update Evaluation Worksheet

Plan Update Evaluation Worksheet

Plan Section	Considerations	Explanation
Planning Process	Should new jurisdictions and/or districts be invited to participate in future plan updates?	
	Have any internal or external agencies been invaluable to the mitigation strategy?	
	Can any procedures (e.g., meeting announcements, plan updates) be done differently or more efficiently?	
	Has the Planning Team undertaken any public outreach activities?	
	How can public participation be improved?	
	Have there been any changes in public support and/or decision-maker priorities related to hazard mitigation?	
Capability Assessment	Have jurisdictions adopted new policies, plans, regulations, or reports that could be incorporated into this plan?	
	Are there different or additional administrative, human, technical, and financial resources available for mitigation planning?	
	Are there different or new education and outreach programs and resources available for mitigation activities?	
	Has NFIP participation changed in the participating jurisdictions?	
Risk Assessment	Has a natural and/or technical or human-caused disaster occurred?	
	Should the list of hazards addressed in the plan be modified?	
	Are there new data sources and/or additional maps and studies available? If so, what are they and what have they revealed? Should the information be incorporated into future plan updates?	
	Do any new critical facilities or infrastructure need to be added to the asset lists?	
	Have any changes in development trends occurred that could create additional risks?	
	Are there repetitive losses and/or severe repetitive losses to document?	

Worksheet 7.2

Plan Update Evaluation Worksheet

Plan Section	Considerations	Explanation
Mitigation Strategy	Is the mitigation strategy being implemented as anticipated? Were the cost and timeline estimates accurate?	
	Should new mitigation actions be added to the Action Plan? Should existing mitigation actions be revised or eliminated from the plan?	
	Are there new obstacles that were not anticipated in the plan that will need to be considered in the next plan update?	
	Are there new funding sources to consider?	
	Have elements of the plan been incorporated into other planning mechanisms?	
Plan Maintenance Procedures	Was the plan monitored and evaluated as anticipated?	
	What are needed improvements to the procedures?	

Appendix E: FEMA Review Tool

REGION IX LOCAL HAZARD MITIGATION PLAN REVIEW TOOL

Updated 12/4/2019

The *Local Hazard Mitigation Plan Review Tool* demonstrates how the Local Hazard Mitigation Plan meets the regulation in 44 CFR §201.6 and offers State and FEMA Mitigation Planners an opportunity to provide feedback to the community.

- The **Regulation Checklist** provides a summary of FEMA’s evaluation of whether the plan has addressed all requirements.
- The **Plan Assessment** identifies the plan’s strengths as well as documents areas for future improvement. This section also includes a list of resources for implementation of the plan.
- The **Multi-Jurisdiction Summary Sheet** is a mandatory worksheet for multi-jurisdictional plans that is used to document which jurisdictions are eligible to adopt the plan.
- The **Hazard Identification and Risk Assessment Matrix** is a tool for plan reviewers to identify if all components of Element B are met.

Jurisdiction: Carson City	Title of Plan: Carson City Hazard Mitigation Plan 2021	Date of Plan:
Local Point of Contact: Jason Danen	Address: 777 S Stewart St. Carson City NV 89701	
Title: Deputy Emergency Manager		
Agency: Carson City Fire Department		
Phone Number: 775-283-7668	E-Mail: jdanen@carson.org	

State Reviewer: Janell Woodward	Title: State Hazard Mitigation Officer	Date:
Date Received at State Agency		
Date Sent to FEMA		

FEMA Reviewer:	Title:	Date:
Date Received in FEMA Region IX		
Date Not Approved		
Date Approvable Pending Adoption		
Date 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 the *Local 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))	a. Does the plan provide documentation of how the plan was prepared? This documentation must include the schedule or timeframe and activities that made up the plan’s development as well as who was involved.	Section 4.2 Pages 4-1 to 4-11		
	b. Does the plan list the jurisdiction(s) participating in the plan that are seeking approval?	Section 4.2 Pages 4-2 to 4-3		
	c. Does the plan identify who represented each jurisdiction? (At a minimum, it must identify the jurisdiction represented and the person’s position or title and agency within the jurisdiction.)	Section 4.2 Page 4-3		
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))	a. 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 interested parties to be involved in the planning process?	Section 4.3 Pages 4-4 to 4-17		
	b. Does the plan identify how the stakeholders were invited to participate in the process?	Section 4.2 Page 4-3 Section 4.3 Pages 4-12 to 17 See also invitations in Appendix A.		
A3. Does the plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	a. Does the plan document how the public was given the opportunity to be involved in the planning process?	Section 4.4 Pages 4-14 to 4-17		
	b. Does the plan document how the public’s feedback was incorporated into the plan?	Section 4.4 Page 4-17		

REGION IX LOCAL HAZARD MITIGATION PLAN REVIEW TOOL

Updated 12/4/2019

1. REGULATION CHECKLIST Regulation (44 CFR 201.6 Local Mitigation Plans)		Location in Plan (section and/or page number)	Met	Not Met
A4. Does the plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))		Section 4.5 Page 4-18		
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 4.6.1 Pages 4-20 to 4-23		
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))	a. Does the plan identify how, when, and by whom the plan will be monitored (how will implementation be tracked) over time?	Section 4.6.2.1 Page 4-22		
	b. Does the plan identify how, when, and by whom the plan will be evaluated (assessing the effectiveness of the plan at achieving stated purpose and goals) over time?	Section 4.6.2.2 Page 4-22		
	c. Does the plan identify how, when, and by whom the plan will be updated during the 5-year cycle?	Section 4.6.2.3 Pages 4-23 to 4-24		
ELEMENT A: REQUIRED REVISIONS				
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT (Reviewer: See Section 4 for assistance with Element B)				
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))	a. Does the plan include a general description of all natural hazards that can affect each jurisdiction?	Section Page		
		Section 5.2.2 Pages 5-8 to 5-9		
		Section 5.2.3 Pages 5-15 to 5-16		
		Section 5.2.4 Pages 5-19 to 5-20		
		Section 5.2.5 Pages 5-24 to 5-25		
		Section 5.2.6 Page 5-33		
		Section 5.2.7 Pages 5-50 to 5-51		
		Section 5.2.8 Pages 5-57 to 5-58		
		Section 5.2.9 Pages 5-66 to 5-70		
		Section 5.2.10 Pages 5-80 to 5-82		
		Section 5.2.11 Pages 5-86 to 5-88		

1. REGULATION CHECKLIST Regulation (44 CFR 201.6 Local Mitigation Plans)		Location in Plan (section and/or page number)	Met	Not Met
		Section 5.2.12 Pages 5-102 to 104		
		Section 5.2.13 Pages 5-110 to 5-111		
	b. Does the plan provide rationale for the omission of any natural hazards that are commonly recognized to affect the jurisdiction(s) in the planning area?	Section 5.2 Page 5-3		
	c. Does the plan include a description of the type of all natural hazards that can affect each jurisdiction?	Section Page		
		Section 5.2.2.2 Pages 5-8 to 5-10		
		Section 5.2.3.2 Page 5-15		
		Section 5.2.4.3 Pages 5-20 to 5-22		
		Section 5.2.5.2 Pages 5-24 to 5-25		
		Section 5.2.6.2 Page 5-33		
		Section 5.2.7.2 Pages 5-50 to 5-51		
		Section 5.2.8.2 Pages 5-57 to 5-58 & 5-61 to 5-62		
		Section 5.2.9.2 Page 5-66		
		Section 5.2.10.2 Pages 5-80 to 5-82		
		Section 5.2.11.2 Pages 5-86 to 5-88		
		Section 5.2.12.2 Pages 5-102 to 5-103		
		Section 5.2.13.2 Pages 5-110 to 5-111		
		d. Does the plan include a description of the location for all natural hazards that can affect each jurisdiction?	Section Page	
	Section 5.2.2.3 Pages 5-10 to 5-11			
	Section 5.2.3.3 Page 5-16			
	Section 5.2.4.3 Page 5-20			
	Section 5.2.5.3 Page 5-25			
	Section 5.2.6.3 Page 5-34			
	Section 5.2.7.3 Page 5-51			

REGION IX LOCAL HAZARD MITIGATION PLAN REVIEW TOOL

Updated 12/4/2019

1. REGULATION CHECKLIST Regulation (44 CFR 201.6 Local Mitigation Plans)		Location in Plan (section and/or page number)	Met	Not Met
		Section 5.2.8.3 Pages 5-58 to 5-60		
		Section 5.2.9.3 Page 5-70		
		Section 5.2.10.3 Pages 5-82 to 5-84		
		Section 5.2.11.3 Pages 5-88 to 5-90		
		Section 5.2.12.3 Pages 5-104 to 106		
		Section 5.2.13.3 Page 5-111		
		e. Does the plan include a description of the extent for all natural hazards that can affect each jurisdiction?	Section Page	
		Section 5.2.2.3 Pages 5-10 to 5-11		
		Section 5.2.3.3 Page 5-16		
		Section 5.2.4.3 Pages 5-20 to 5-22		
		Section 5.2.5.3 Pages 5-25 to 5-27		
		Section 5.2.6.3 Pages 5-34 to 5-36		
		Section 5.2.7.3 Page 5-52		
		Section 5.2.8.3 Pages 5-61 to 5-62		
		Section 5.2.9.3 Pages 5-70 to 5-71		
		Section 5.2.10.3 Pages 5-84 to 5-85		
		Section 5.2.11.3 Pages 5-88 to 5-90		
	Section 5.2.12.3 Page 5-106			
	Section 5.2.13.3 Page 5-111			
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))	a. Does the plan include information on previous occurrences of hazard events for each jurisdiction?	Section Page		
		Section 5.2.2.4 Pages 5-11 to 5-13		
		Section 5.2.3.4 Pages 5-17 to 5-18		

1. REGULATION CHECKLIST Regulation (44 CFR 201.6 Local Mitigation Plans)		Location in Plan (section and/or page number)	Met	Not Met	
		Section 5.2.4.4 Page 5-22			
		Section 5.2.5.4 Pages 5-28 to 5-29			
		Section 5.2.6.4 Pages 5-36 to 5-44			
		Section 5.2.7.4 Pages 5-54 to 5-56			
		Section 5.2.8.4 Pages 5-62 to 5-65			
		Section 5.2.9.4 Pages 5-71 to 5-78			
		Section 5.2.10.4 Page 5-85			
		Section 5.2.11.4 Pages 5-90 to 5-100			
		Section 5.2.12.4 Pages 5-108 to 5-109			
		Section 5.2.13.4 Pages 5-112 to 5-114			
		b. Does the plan include information on the probability of future hazard events for each jurisdiction?	Section Page		
			Section 5.2.2.5 Pages 5-13 to 5-14		
			Section 5.2.3.5 Page 5-18		
	Section 5.2.4.5 Page 5-22				
	Section 5.2.5.5 Pages 5-29 to 5-31				
	Section 5.2.6.5 Pages 5-44 to 5-46				
	Section 5.2.7.5 Page 5-56				
	Section 5.2.8.5 Page 5-65				
	Section 5.2.9.5 Pages 5-78 to 5-79				
	Section 5.2.10.5 Pages 5-85 to 5-86				
Section 5.2.11.5 Page 5-100					
Section 5.2.12.5 Page 5-109					
Section 5.2.13.5 Pages 5-114 to 5-115					
	Section Page				

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Updated 12/4/2019

1. REGULATION CHECKLIST Regulation (44 CFR 201.6 Local Mitigation Plans)		Location in Plan (section and/or page number)	Met	Not Met
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))	a. Is there a description of each hazard's impacts on each jurisdiction (what happens to structures, infrastructure, people, environment, etc.)?	Section 5.2.2.7 and 5.2.2.8. Page 5-15. See also B2.a above.		
		Section 5.2.3.7 and 5.2.3.8. Page 5-19. See also B2.a above.		
		Section 5.2.4.7 and 5.2.4.8. Pages 5-22 to 5-24. See also B2.a above.		
		Section 5.2.5.7 and 5.2.5.8. Page 5-32. See also B2.a above.		
		Section 5.2.6.7 and 5.2.6.8. Pages 5-47 to 5-49. See also B2.a above.		
		Section 5.2.7.7 and 5.2.7.8. Page 5-57. See also B2.a above.		
		Section 5.2.8.7 and 5.2.8.8. Page 5-66. See also B2.a above.		
		Section 5.2.9.7 and 5.2.9.8. Page 5-80. See also B2.a above.		
		Section 5.2.10.7 and 5.2.10.8. Page 5-86. See also B2.a above.		
		Section 5.2.11.7 and 5.2.11.8. Page 5-102. See also B2.a above.		
		Section 5.2.12.7 and 5.2.12.8. Pages 5-109 to 5-110. See also B2.a above.		
		Section 5.2.13.7 and 5.2.13.8. Pages 5-115 to 5-117. See also B2.a above.		
		b. Is there a description of each identified hazard's overall vulnerability (structures, systems, populations, or other community assets defined by the community that are identified as being susceptible to damage and loss from hazard events) for each jurisdiction?	Section Page	
	Section 6.3.1 Pages 6-8 to 6-11			
Section 6.3.2 Pages 6-11 to 6-13				

1. REGULATION CHECKLIST Regulation (44 CFR 201.6 Local Mitigation Plans)		Location in Plan (section and/or page number)	Met	Not Met
		Section 6.3.3 Pages 6-13 to 6-15		
		Section 6.3.4 Pages 6-16 to 6-17		
		Section 6.3.5 Page 6-18		
		Section 6.3.6 Page 6-18 to 6-19		
		Section 6.3.7 Page 6-20		
		Section 6.3.8 Pages 6-20 to 6-21		
		Section 6.3.9 Pages 6-21 to 6-22		
		Section 6.3.10 Pages 6-22 to 6-23		
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 6.3.2 Page 6-11		
ELEMENT B: REQUIRED REVISIONS				
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))	a. Does the plan document each jurisdiction's existing authorities, policies, programs, and resources?	Sections Page		
		Section 7.2.1 Page 7-2 to 7-9		
		Section 7.2.2 Page 7-9 to 7-11		
		Section 7.2.3 Page 7-11 to 7-23		
		Section 7.2.4 Page 7-23 to 7-28		
	b. Does the plan document each jurisdiction's ability to expand on and improve these existing policies and programs?	Sections Page		
		Section 7.2.1 Page 7-9		
		Section 7.2.2 Page 7-11		
		Section 7.2.3 Page 7-13		
		Section 7.2.4 Pages 7-28 to 7-29		

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1. REGULATION CHECKLIST Regulation (44 CFR 201.6 Local Mitigation Plans)		Location in Plan (section and/or page number)	Met	Not Met
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 7.3 Pages 7-29 to 7-32		
C3. Does the plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))		Section 8.2 Pages 8-2 to 8-3		
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))	a. Does the plan identify and analyze a comprehensive range of specific mitigation actions and projects to reduce the impacts from hazards?	Section 8.3 Pages 8-4 to 8-6		
	b. Does the plan identify mitigation actions for every hazard posing a threat to each participating jurisdiction?	Section 8.3 Pages 8-8 to 8-25 Table 8-4		
	c. Do the identified mitigation actions and projects have an emphasis on new and existing buildings and infrastructure?	Section 8.3 Page 8.5		
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))	a. Does the plan explain how the mitigation actions will be prioritized (including cost benefit review)?	Section 8.3 Pages 8-6 to 8-7		
	b. Does the plan identify the position, office, department, or agency responsible for implementing and administering the action, potential funding sources and expected timeframes for completion?	Section 8.3 Pages 8-8 to 8-27		
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))	a. Does the plan identify the local planning mechanisms where hazard mitigation information and/or actions may be incorporated?	Section 8.4 Pages 8-26 to 8-29		
	b. Does the plan describe each community's process to integrate the data, information, and hazard mitigation goals and actions into other planning mechanisms?	Section 8.4 Pages 8-26 to 8-29		
	c. The updated plan must explain how the jurisdiction(s) incorporated the mitigation plan, when appropriate, into other planning mechanisms as a demonstration of progress in local hazard mitigation efforts.	Section 7.2.4 Pages 7-23 to 7-29 Section 8.4 Pages 8-30 to 8-31		
ELEMENT C: REQUIRED REVISIONS				
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 8.5 Pages 8-29 to 8-32		

1. REGULATION CHECKLIST Regulation (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	Section 8.6. Page 8-33. Appendix C		
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	Section 8.2 Page 8-2 and Section 8.6 Page 8-33		
<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))	Sections 1.4 & 1.5. Page 1-2 to 1-3		
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	Not Applicable		
<u>ELEMENT E: REQUIRED REVISIONS</u>			
OPTIONAL: HIGH HAZARD POTENTIAL DAM RISKS (Applicable to jurisdictions interested in becoming sub applicants to FEMA's Rehabilitation of High Hazard Potential Dams (HHPD) Grant Program only)			
HHPD1. Did Element A4 (planning process) describe the incorporation of existing plans, studies, reports, and technical information for high hazard potential dams?	Not Applicable		
HHPD2. Did Element B3 (risk assessment) address HHPDs?	Not Applicable		
HHPD3. Did Element C3 (mitigation goals) include mitigation goals to reduce long-term vulnerabilities from high hazard potential dams that pose an unacceptable risk to the public?	Not Applicable		
HHPD4. Did Element C4-C5 (mitigation actions) address HHPDs prioritize mitigation actions to reduce vulnerabilities from high hazard potential dams that pose an unacceptable risk to the public?	Not Applicable		
<u>REQUIRED REVISIONS</u>			
ELEMENT F. ADDITIONAL STATE REQUIREMENTS (Optional for State Reviewers only; not to be completed by FEMA)			

REGION IX LOCAL HAZARD MITIGATION PLAN REVIEW TOOL

Updated 12/4/2019

1. REGULATION CHECKLIST Regulation (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
<u>ELEMENT F: REQUIRED REVISIONS</u>			

SECTION 2: PLAN ASSESSMENT

INSTRUCTIONS: The purpose of the Plan Assessment is to offer the local community more comprehensive feedback to the community on the quality and utility of the plan in a narrative format. The audience for the Plan Assessment is not only the plan developer/local community planner, but also elected officials, local departments and agencies, and others involved in implementing the Local Mitigation Plan. The Plan Assessment must be completed by FEMA. The Assessment is an opportunity for FEMA to provide feedback and information to the community on: 1) suggested improvements to the Plan; 2) specific sections in the Plan where the community has gone above and beyond minimum requirements; 3) recommendations for plan implementation; and 4) ongoing partnership(s) and information on other FEMA programs, specifically RiskMAP and Hazard Mitigation Assistance programs. The Plan Assessment is divided into two sections:

1. Plan Strengths and Opportunities for Improvement
2. Resources for Implementing Your Approved Plan

Plan Strengths and Opportunities for Improvement is organized according to the plan Elements listed in the Regulation Checklist. Each Element includes a series of italicized bulleted items that are suggested topics for consideration while evaluating plans, but it is not intended to be a comprehensive list. FEMA Mitigation Planners are not required to answer each bullet item and should use them as a guide to paraphrase their own written assessment (2-3 sentences) of each Element.

The Plan Assessment must not reiterate the required revisions from the Regulation Checklist or be regulatory in nature and should be open-ended and to provide the community with suggestions for improvements or recommended revisions. The recommended revisions are suggestions for improvement and are not required to be made for the Plan to meet Federal regulatory requirements. The italicized text should be deleted once FEMA has added comments regarding strengths of the plan and potential improvements for future plan revisions. It is recommended that the Plan Assessment be a short synopsis of the overall strengths and weaknesses of the Plan (no longer than two pages), rather than a complete recap section by section.

Resources for Implementing Your Approved Plan provides a place for FEMA to offer information, data sources and general suggestions on the plan implementation and maintenance process. Information on other possible sources of assistance including, but not limited to, existing publications, grant funding or training opportunities, can be provided. States may add state and local resources, if available.

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A. Plan Strengths and Opportunities for Improvement

This section provides a discussion of the strengths of the plan document and identifies areas where these could be improved beyond minimum requirements.

Element A: Planning Process

How does the Plan go above and beyond minimum requirements to document the planning process with respect to:

- *Involvement of stakeholders (elected officials/decision makers, plan implementers, business owners, academic institutions, utility companies, water/sanitation districts, etc.);*
- *Involvement of Planning, Emergency Management, Public Works Departments or other planning agencies (i.e., regional planning councils);*
- *Diverse methods of participation (meetings, surveys, online, etc.); and*
- *Reflective of an open and inclusive public involvement process.*

Element B: Hazard Identification and Risk Assessment

In addition to the requirements listed in the Regulation Checklist, 44 CFR 201.6 Local Mitigation Plans identifies additional elements that should be included as part of a plan's risk assessment. The plan should describe vulnerability in terms of:

- 1) *A general description of land uses and future development trends within the community so that mitigation options can be considered in future land use decisions;*
- 2) *The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas; and*
- 3) *A description of potential dollar losses to vulnerable structures, and a description of the methodology used to prepare the estimate.*

How does the Plan go above and beyond minimum requirements to document the Hazard Identification and Risk Assessment with respect to:

- *Use of best available data (flood maps, HAZUS, flood studies) to describe significant hazards;*
- *Communication of risk on people, property, and infrastructure to the public (through tables, charts, maps, photos, etc.);*
- *Incorporation of techniques and methodologies to estimate dollar losses to vulnerable structures;*
- *Incorporation of Risk MAP products (i.e., depth grids, Flood Risk Report, Changes Since Last FIRM, Areas of Mitigation Interest, etc.); and*
- *Identification of any data gaps that can be filled as new data became available.*

Element C: Mitigation Strategy

How does the Plan go above and beyond minimum requirements to document the Mitigation Strategy with respect to:

- *Key problems identified in, and linkages to, the vulnerability assessment;*
- *Serving as a blueprint for reducing potential losses identified in the Hazard Identification and Risk Assessment;*
- *Plan content flow from the risk assessment (problem identification) to goal setting to mitigation action development;*
- *An understanding of mitigation principles (diversity of actions that include structural projects, preventative measures, outreach activities, property protection measures, post-disaster actions, etc);*
- *Specific mitigation actions for each participating jurisdiction that reflects their unique risks and capabilities;*
- *Integration of mitigation actions with existing local authorities, policies, programs, and resources; and*
- *Discussion of existing programs (including the NFIP), plans, and policies that could be used to implement mitigation, as well as document past projects.*

Element D: Plan Update, Evaluation, and Implementation (Plan Updates Only)

How does the Plan go above and beyond minimum requirements to document the 5-year Evaluation and Implementation measures with respect to:

- *Status of previously recommended mitigation actions;*
- *Identification of barriers or obstacles to successful implementation or completion of mitigation actions, along with possible solutions for overcoming risk;*
- *Documentation of annual reviews and committee involvement;*
- *Identification of a lead person to take ownership of, and champion the Plan;*
- *Reducing risks from natural hazards and serving as a guide for decisions makers as they commit resources to reducing the effects of natural hazards;*
- *An approach to evaluating future conditions (i.e. socio-economic, environmental, demographic, change in built environment etc.);*
- *Discussion of how changing conditions and opportunities could impact community resilience in the long term; and*
- *Discussion of how the mitigation goals and actions support the long-term community vision for increased resilience.*

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B. Resources for Implementing and Updating Your Approved Plan

This resource section is organized into three categories:

- 1) Guidance and Resources
- 2) Training Topics and Courses
- 3) Funding Sources

Guidance and Resources

Local Mitigation Planning Handbook

<https://www.fema.gov/media-library/assets/documents/31598>

Beyond the Basics

<http://mitigationguide.org/>

Mitigation Ideas

<https://www.fema.gov/media-library/assets/documents/30627>

Plan Integration: Linking Local Planning Efforts

<https://www.fema.gov/media-library/assets/documents/108893>

Integrating Disaster Data into Hazard Mitigation Planning

<https://www.fema.gov/media-library/assets/documents/103486>

Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning

<https://www.fema.gov/ar/media-library/assets/documents/4317>

Community Rating System User Manual

<https://www.fema.gov/media-library/assets/documents/8768>

U.S. Climate Resilient Toolkit

<https://toolkit.climate.gov/>

2014 National Climate Assessment

<http://nca2014.globalchange.gov/>

Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation

http://ipcc-wg2.gov/SREX/images/uploads/SREX-All_FINAL.pdf

FY15 Hazard Mitigation Assistance Unified Guidance

<https://www.fema.gov/media-library/assets/documents/103279>

Climate Resilient Mitigation Activities for Hazard Mitigation Assistance

<https://www.fema.gov/media-library/assets/documents/110202>

Training

More information at <https://training.fema.gov/emi.aspx> or through your State Training Officer

Mitigation Planning

IS-318 Mitigation Planning for Local and Tribal Communities

<https://training.fema.gov/is/courseoverview.aspx?code=is-318>

IS-393 Introduction to Hazard Mitigation

<https://training.fema.gov/is/courseoverview.aspx?code=is-393.a>

G-318 Preparing and Reviewing Local Plans

G-393 Mitigation for Emergency Managers

Hazard Mitigation Assistance (HMA) Grant Programs

IS-212.b Introduction to Unified HMA

<http://www.training.fema.gov/is/courseoverview.aspx?code=IS-212.b>

IS-277 Benefit Cost Analysis Entry Level

<http://www.training.fema.gov/is/courseoverview.aspx?code=IS-277>

E-212 HMA: Developing Quality Application Elements

E-213 HMA: Application Review and Evaluation

E-214 HMA: Project Implementation and Programmatic Closeout

E-276 Benefit-Cost Analysis Entry Level

GIS and Hazus-MH

IS-922 Application of GIS for Emergency Management

<http://www.training.fema.gov/is/courseoverview.aspx?code=IS-922>

E-190 ArcGIS for Emergency Managers

E-296 Application of Hazus-MH for Risk Assessment

E-313 Basic Hazus-MH

Floodplain Management

E-273 Managing Floodplain Development through the NFIP

E-278 National Flood Insurance Program/ Community Rating System

Potential Funding Sources

Hazard Mitigation Grant Program

POC: FEMA Region IX and State Hazard Mitigation Officer

Website: <https://www.fema.gov/hazard-mitigation-grant-program>

Pre-Disaster Mitigation Grant Program

POC: FEMA Region IX and State Hazard Mitigation Officer

Website: <https://www.fema.gov/pre-disaster-mitigation-grant-program>

Flood Mitigation Assistance Grant Program

POC: FEMA Region IX and State Hazard Mitigation Officer

Website: <https://www.fema.gov/flood-mitigation-assistance-grant-program>

Emergency Management Performance Grant Program

POC: FEMA Region IX

Website: <https://www.fema.gov/emergency-management-performance-grant-program>

**SECTION 3:
MULTI-JURISDICTIONAL SUMMARY SHEET**

INSTRUCTIONS: For multi-jurisdictional plans, this summary sheet must be completed by listing each participating jurisdiction that is eligible to adopt the plan.

MULTI-JURISDICTION SUMMARY SHEET					
#	Jurisdiction Name	Jurisdiction Type	Eligible to Adopt the Plan?	Plan POC	Email
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

Appendix F: Vulnerability Documentation

- dePolo, Craig, M. *Earthquake Hazards and Seismic Risk Mitigation in Carson City*. University of Nevada, Reno. November 2015.
- Carson City Land Use Codes

Appendix F: Vulnerability Documentation

- dePolo, Craig, M. *Earthquake Hazards and Seismic Risk Mitigation in Carson City*. University of Nevada, Reno. November 2015.

Earthquake Hazards and Seismic Risk Mitigation in Carson City

Craig M. dePolo

Nevada Bureau of Mines and Geology

University of Nevada, Reno

November, 2015

Executive Summary

Carson City has the highest earthquake hazard in Nevada. Several historical earthquakes have shaken the county, including one of the most damaging earthquakes in Nevada, the 1887 Carson City earthquake. Background earthquakes, magnitude 3 and smaller, are frequent in Carson City. Areas of persistent background seismicity include the northern part of Carson City, south of Prison Hill, and the northern Pine Nut Mountains. Several young earthquake faults exist in and surrounding Carson City. The larger faults bound the mountains, and smaller faults cross through the mountains and/or basins. There is evidence in the geologic record of paleo earthquakes with magnitudes in the upper 6 to 7 range, some of which were only 200 years apart. It is clear earthquakes are a major landscape-forming process in the Carson City area and earthquakes have occurred in the recent geologic past and historically. Maximum magnitude earthquake estimates of M6.5 to M7.2 were made for the major faults in the area. Some of these estimates were used as scenario earthquakes to understand the potential consequences of local earthquakes on Carson City.

Probability calculations indicate it is likely (78-79%) Carson City will experience Modified Mercalli Intensity (MMI) VI shaking levels within a 50-year time period. Over a 50-year time period, chances of damaging ground motion associated with MMI VII and triggering an emergency response are 55-57%, of MMI VIII and launching a community recovery effort 19-25%, and of MMI IX widespread damage 6-10%. Carson City also faces potential surface rupture, earthquake-induced liquefaction hazard, earthquake-induced landslide and rock fall hazard, and potential lake tsunami and seiche hazard in Lake Tahoe.

Twelve earthquake scenarios were modeled using HAZUS-MH to illustrate the potential impacts of these earthquakes. These are generalized estimates and should be considered to be \pm a factor of 10 of what could happen. Costs and impacts of these events to Carson City range from \$4 million for a magnitude 5 at the State Capitol to

\$690 million. These costs roughly double when the impact on the entire state is considered. Damage levels in Carson City become substantial with earthquakes of magnitude 6.5 and greater, with 48 people requiring hospitalization, 181 other injuries, and 12 fatalities. Other seismic vulnerabilities in the county include over 100 unreinforced brick buildings.

One of the largest challenges to Carson City is preparing its citizenry for the earthquake hazard. In 2015, fewer than 7% of its population participated in the Great Nevada ShakeOut, 69% fewer than in 2013. This indicates that the citizenry is not embracing the real threat from earthquakes they face and may not be adequately prepared. Substantially increasing participation in earthquake preparedness should be a major goal of the leadership in Carson City. Other goals include reducing the earthquake risk of seismically vulnerable buildings and securing the contents and nonstructural components in buildings and homes.

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Historical Earthquakes

An earthquake is a sudden motion on a fault that creates shaking and trembling of the Earth. The effects of an earthquake can be felt far beyond the site of its occurrence. Earthquakes usually occur without warning and, after just a few seconds, large events can cause massive damage and extensive injuries and casualties. The most common effect of earthquakes is ground motion, or the vibration or shaking of the ground during an earthquake. Other effects include offset of the ground and liquefying soils.

Earthquakes that have Strongly Shaken Carson City

Carson City has been strongly shaken by many earthquakes in the last 150 years (Table 1; Fig. 1). One of these events, the 1887 earthquake, caused considerable damage to the city and surrounding communities. This section briefly reviews these historical events. They are unequivocal evidence of the earthquake hazard in Carson City. Most people subscribe to the logic that “if it has happened before, it can happen again” and thus, historical earthquakes can be a powerful motivation to people that the earthquake threat is real. The earthquake effects have

been gleaned from newspapers and other accounts. This information is limited in scope and depth, however, principally because the effects and damage from earthquakes tend to be underreported. Newspapers only report damage in the first few days, when most of it is still not widely known. Additionally, earthquake damage is commonly considered to be private information and is not volunteered. Scientists and engineers didn’t begin detailed documentation of earthquakes until the mid-1900s.

The size of an earthquake can be expressed in two ways, earthquake magnitude (M) and Modified Mercalli Intensity (MMI). Earthquake magnitudes are correlated to the energy release of an earthquake and are determined by seismologists from seismic waves. Earthquake magnitudes can also be correlated with fault rupture length and maximum surface displacement and are the basis for earthquake scenario models. The Modified Mercalli Intensity scale is based on the

effects of an earthquake and considers human experience, shaking effects, and inflicted damage (Appendix). The MMI scale is reported in Roman Numerals to help distinguish the two scales.

Table 1. Historical Earthquakes That Have Produced Strong Shaking in Carson City

Date	Magnitude	Nearest Community	Effects	MMI CC*
1857, Sept. 3	6.3	Incline Village(?)	unknown	?
1860, March 15	6.5	Reno(?)	content damage	VI
1869, May 30	6.0	Virginia City	two eqs?, panic	VI
1869, Dec. 27	6.4, 6.2	Virginia City	content dam, wall cracks	VI+
1887, June 3	6.5	Carson City	build. damage, liquef.	VII-VIII
1896, Jan. 27	5+?	Carson City	cracked walls, fallen plast.	VI+
1897, May 15	5+?	Virginia City?	fallen plaster	VI+
1932, Dec. 20	7.1	Gabbs	surface rupt., chim. dam.	VI
1933, June 25	6.0	Wabuska	build. and chim. damage	VI+
1954, July 6	6.2	Fallon	build. and plaster damage	VI
1954, Dec. 16	7.1, 6.9	Fallon	build. and plaster damage	VII

* Modified Mercalli Intensity in Carson City

Table 1 indicates that 13 to 14 earthquakes have caused Modified Mercalli Intensity VI or greater intensity shaking in Carson City over the last 158 years. This is an average of once every 12 years. The 1887 earthquake caused severe damage (MMI VII-VIII) to Carson City during this 158-year time period. The locations of the largest events are shown in Figure 1, as are the seismic belts of Nevada. Carson City is in the Walker Lane seismic belt.

1860, March 15 Virginia Range Earthquake

The earliest earthquakes with reported effects in Carson City were part of a series of six to seven events with magnitude 6 or greater that occurred between 1855 and 1869. The largest of these was on March 15, 1860, but details for most of these earthquakes, including 1860, are scant and largely incomplete. The 1860 earthquake may have originated in the Virginia Range northeast of Reno. The event occurred at about 10:45 (PST) on a Thursday morning and had a magnitude of about 6.5. The effects in Carson City are summarized in the March 16, 1860 Sacramento Union and in dePolo and others (2003):

In Carson City, the earthquake was so severe that a general rush was made for the street from nearly every house in town, goods were shaken from the shelves of stores, and a general panic prevailed for a few minutes.

This description is consistent with Modified Mercalli Intensity VI in Carson City.

1868. May 29 Steamboat Springs Earthquakes

During 1868 and 1869 as many as four M6 events may have originated in the Steamboat Springs region. The first one, or possibly two events, occurred on Friday night, May 29, 1868 (PST), when it is reported that two similar-sized earthquakes occurred 10 minutes apart (dePolo and others, 2003). The magnitude of at least one of these events was M6. In Carson City, many people rushed into the streets, doors, windows, and lamps oscillated and vibrated, but no significant damage was reported (dePolo and others, 2003). These effects are consistent with a Modified Mercalli Intensity of VI.

1869, December 26 & 27 Steamboat Springs Earthquakes

Two earthquakes of magnitude 6.4 and 6.2, respectively, occurred on the evening of Sunday, December 26, 1869, again likely in the Steamboat Springs area. The first occurred at 6:00 pm (PST) and was reported to have lasted from 6 to 20 seconds. The second event occurred between 2 and 3:20 am (PST) on Monday December 27th, 8 to 9 hours after the first. In Carson City, the shocks were very

severe and it was implied that “brittle ware” (dishes and cups) was broken (Territorial Enterprise, 1/5/1870). People went out into the streets and some were seasick (dePolo and others, 2003). Brick walls were damaged to some extent and there was slight damage to other types of buildings (dePolo and others, 2003). These reports are consistent with Modified Mercalli Intensity VI+. These earthquakes also illustrate the potential to have multiple major, potentially damaging earthquakes in a short period of time.

1887, June 3 Carson City Earthquake

The June 3, 1887 Carson City earthquake (magnitude 6.5) was one of the most violent earthquakes in western Nevada’s history. The event occurred at 2:40 a.m. (PST) in the morning. Buildings were severely damaged in Carson City and Genoa, some so severely that they likely had to be partially torn down and rebuilt. In Carson City, the earthquake was preceded by a heavy rumbling sound, was strong enough to throw some people to the ground, and threw many people out of bed (dePolo and others, 2003). Shaking lasted between 3 and 30 seconds (dePolo and others, 2003). It caused general hysteria in Carson City, Genoa, and Virginia City, where people ran out of buildings wearing only their sleeping garments (The Nevada Tribune, 6/3/1887). In Carson City, “within five minutes after the shock the streets were filled with people – some badly frightened, some considerably amused, and all chattering volubly over the occurrence, with each man relating his own personal experience” (Morning Appeal, 6/3/1887). A Modified Mercalli Intensity map for the 1887 earthquake is shown in Figure 2. Many aftershocks undoubtedly occurred, but only a few were noted. The largest aftershock occurred on June 23rd at 3 a.m. and was described as a lively,

[Carson] valley-wide shake (Genoa Weekly Courier 6/24/1887). Possible aftershocks continued to shake Carson City throughout 1888 and again in the summer of 1889 (dePolo and others, 2003).

Several newspaper accounts describe the damage in Carson City from the mainshock. All stone and brick buildings had damage from the earthquake; the Capitol walls were cracked, and two to three other buildings were badly wrenched (Virginia Evening Chronicle, 6/3/1887). The Rosser Building, located opposite of the mint, sustained severe damage (dePolo and others, 2003). This building was described as violently cracked, especially the east-west walls. It was stated that, "had another shock occurred the rear part would have been laid level to the ground" (The Nevada Tribune, 6/3/1887). "The east-west walls exhibit signs of a very severe shaking, leaving crevices between the north and south walls of two inches in width" (Carson Daily Index, 6/4/1887). "The wall dividing Muller Schmitt & Co.'s store from Burlington's was cracked in many places and the chimneys of the Ormsby House are in badly shaken up condition (The Nevada Tribune, 6/4/1887). "The building occupied by Mr. Schneider, the baker, and Walter Chedic, grocer, and owned by Geo. W. Kitzmeyer, has a crack in the walls that one can run his hand through" (The Nevada Tribune, 6/4/1887). "The Rinckel building, opposite the Post Office, is badly damaged, nearly all the plaster in the second story rooms being shaken down, while the rear wall has separated at least an inch from the main building" (The Nevada Tribune, 6/4/1887). The Virginia Evening Chronicle noted that, "Shultz's stone market was most seriously damaged of all". "In the Capitol Building considerable plaster was shaken down in the Governor's and other offices, and a slight crack is noticeable in the west wall" (the Nevada Tribune, 6/4/1887). Dozens of buildings in Carson City were cracked or damaged by the 1887 earthquake, making this one of the most damaging earthquakes in Nevada's history.

There was considerable content and nonstructural damage in Carson City from the 1887 earthquake. It is noted in the Carson Daily Index (6/4/1887) that, "A considerable amount of crockery was thrown from the shelves in E.B. Rail's, M.A. Downey's and Thaxter and Company's grocery store; a case of goods was smashed in Fisher & Decker's saloon, and a similar casualty occurred in Thaxter's drug store ... and a thousand other little smash-ups happened in various stores." "Very few houses

in Carson [City] escaped without some evidence of the quake, either in the form of broken plastering, furniture, glassware, etc.” (Carson Daily Index, 6/4/1887). The MorningAppeal (6/3/1887) stated that, “every store in the city lost from \$20 to \$30 on broken crockery and glass ware”. In addition to a major amount of content damage, windows were also broken, such as at the railroad offices (Carson Daily Index 6/4/1887).

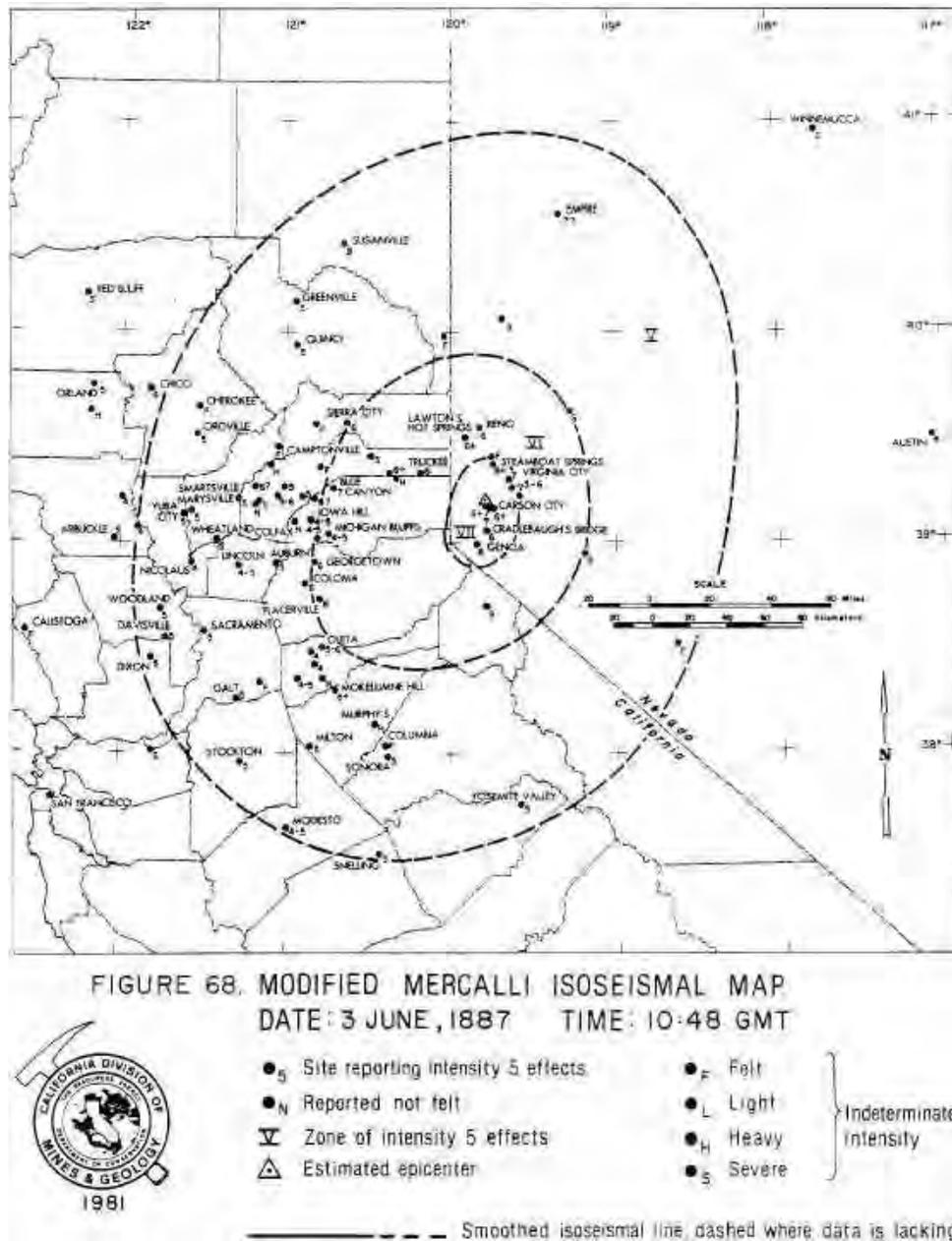


Figure 2. Modified Mercalli Intensity map for the 1887 Carson City earthquake showing the reported effects in Nevada and California. The map made by Topozada and others (1981).

Liquefaction occurs when seismic waves pass through saturated granular soil, distorting its granular structure and causing some of the granules to collapse into the empty spaces between grains. This increases the pore-water pressure and when this pressure is sufficient, soil can behave like a fluid for a brief period and flow.

Liquefaction was reported in Carson and Eagle Valleys. "Parties who were out to Cradlebaugh's Bridge report a general demoralization of the earth thereabouts, there being several fissures from one to three inches wide out of which water and dirt were thrown into the air for some time. It is also reported that the toll house has been

moved about two inches from its original foundation" (The Nevada Tribune 6/4/1887); this was likely caused by liquefaction-induced lateral spreading of the ground. At the Boyd Ranch near Genoa, "In the corral, walking across either way, the ground seems as though all was hollow underneath, and by driving a pole down two or three feet, water flows immediately to the surface, and wherever a fissure is seen, black sand several inches deep has been thrown up" ... (Nevada Tribune 6/6/1887). The well at the Boyd Ranch had dried up and filled with sand (Carson Daily Index 6/4/1887). These reports indicate that substantial liquefaction occurred in Carson Valley from this event.

Liquefaction also likely occurred in Eagle Valley although it is less documented. It is commented that a "large fissure was opened in the ground on the road to the State Prison" (Carson Daily Index 6/4/1887), which may have been caused by liquefaction. Other phenomena that may have been liquefaction occurred along the Carson River.

Earthquake-induced rock falls were noted in mountainous terrain. Along Geiger Grade, "It [the earthquake] loosened several boulders on the hill above the [Philadelphia] brewery and sent them crashing into the ravine below" (Virginia Evening Chronicle 6/3/1887).

One fire related to the 1887 earthquake was reported. This was at the Martin's hotel in Mound House, east of Carson City (Carson Daily Index 6/5/1887; Reno Evening Gazette 6/6/1887). The fire began at about a half past nine when the flames of a stove fire escaped through a separation in the stove pipe that was thought to have been caused by the earthquake and set fire to the woodwork behind (Carson Daily Index 6/5/1887). The loss was estimated to be \$1,500; \$500 of this was insured (Carson Daily Index 6/5/1887).

The 1887 earthquake was felt throughout western Nevada and eastern California. Shaking was noted in Winnemucca and Austin in Nevada (Virginia Evening Chronicle 6/7/1887; Reese River Reveille 6/4/1887) and as far west as San Francisco (Foothill Weekly Times 6/10/1887, Grass Valley, CA). In Genoa, nearly all chimneys were damaged and there was some significant building damage (dePolo, 2012). In Glenbrook, chimneys were broken off at the roof level, plaster was cracked, and lamps and dishes were broken (dePolo, 2012). In Virginia City, walls were cracked, and plaster and contents were damaged in Virginia City and Dayton (Virginia Evening Chronicle 6/3/1887 and 6/4/1887).

The Modified Mercalli Intensity from the 1887 earthquake in Carson City was VII to VIII. The strong shaking had a short duration. If the shaking had been a little longer, walls that were left standing unsupported would likely have collapsed.

1896, January 27 Carson City Earthquake

A short earthquake sequence occurred near Carson City from January 25 to January 27, 1896, just eight and a half years after the 1887 earthquake. The largest event in the sequence occurred about 1 o'clock in the afternoon on the 27th. In Carson City this earthquake created a large crack in the side of the government building, shook some plaster down from the ceiling of the county building, cracked the ceiling of the Post Office, and broke a pane of glass in a door at the newspaper office (Holden, 1898; Doten, 1975; Territorial Enterprise 2/29/1896). Professor C.W. Friend reported in Holden (1898) that, "all the shocks, including those of the 25th, were vertical and produced a very strange feeling." This may indicate that the earthquakes had normal dip-slip motion. The main shock of the 1896 earthquakes produced Modified Mercalli Intensity VI+ levels of damage in Carson City.

1897, May 15 Southern Virginia Range Earthquake

At least seven small earthquakes shook Carson City and Virginia City between May 14 and May 21, 1897. The most severe of these earthquakes occurred at 11:02

a.m. PST on May 15th. This event was strong enough to bring down “several square yards of plaster” in Carson City (The Morning Appeal 5/16/1897) and brought down plaster and a piece of a brick wall in Virginia City (Daily Territorial Enterprise 5/16/1897; Doten, 1975). The main shock of this sequence caused Modified Mercalli Intensity VI to VI+ levels of shaking in Carson City.

1932 Cedar Mountain Earthquake

In the 1930s several earthquakes shook western Nevada, beginning with the 1932 magnitude 7.1 Cedar Mountain earthquake. Six months later, the 1933 magnitude 6 Wabuska earthquake occurred. Both of these events were strongly felt in Carson City. The December 20, 1932 Cedar Mountain earthquake initiated just north of Gabbs, Nevada and ruptured 46 miles (75 km) to the south, into Monte Cristo Valley (Gianella and Callaghan, 1934; Bell and others, 1999). The earthquake occurred at 10:10 p.m. PST and was felt from Los Angeles to Salt Lake City and throughout Nevada (Fig. 3).

This earthquake was located in a remote part of Nevada, but nevertheless caused severe effects on local towns. Some miner’s cabins near the earthquake collapsed (Gianella and Callaghan, 1934) and there was damage in the town of Luning, where china was thrown across rooms and chimneys and walls collapsed (MMI IX; U.S. Coast and Geodetic Survey, 1968). There were some injuries in Mina; a man suffered a skull fracture when he fell from operating a small mining train (Nevada State Journal 12/26/1932) and two children were injured when an adobe house collapsed (Reno Evening Gazette 12/21/1932). Chimneys fell as far away as Fallon and Reese River Valley (Reno Evening Gazette 12/21/1932 and 12/22/1932).

Near Gabbs, Nevada, the earthquake produced scattered ground offsets over about 46 miles (75 km), with the most pronounced and continuous surface rupture near the southern end, where as much as 6.6 feet (2 m) of right-lateral offset occurred.

The 1932 earthquake caused some damage in Carson City. People ran out into the streets and overwhelmed the local telephone switchboards, which lit up with calls

(Carson City Daily Appeal 12/21/1932). “Several large cracks appeared in the walls of the Federal building” and books and other small items were knocked on the floor (Carson City Daily Appeal 12/21/1932). In Carson City, shaking was consistent with Modified Mercalli Intensity VI.

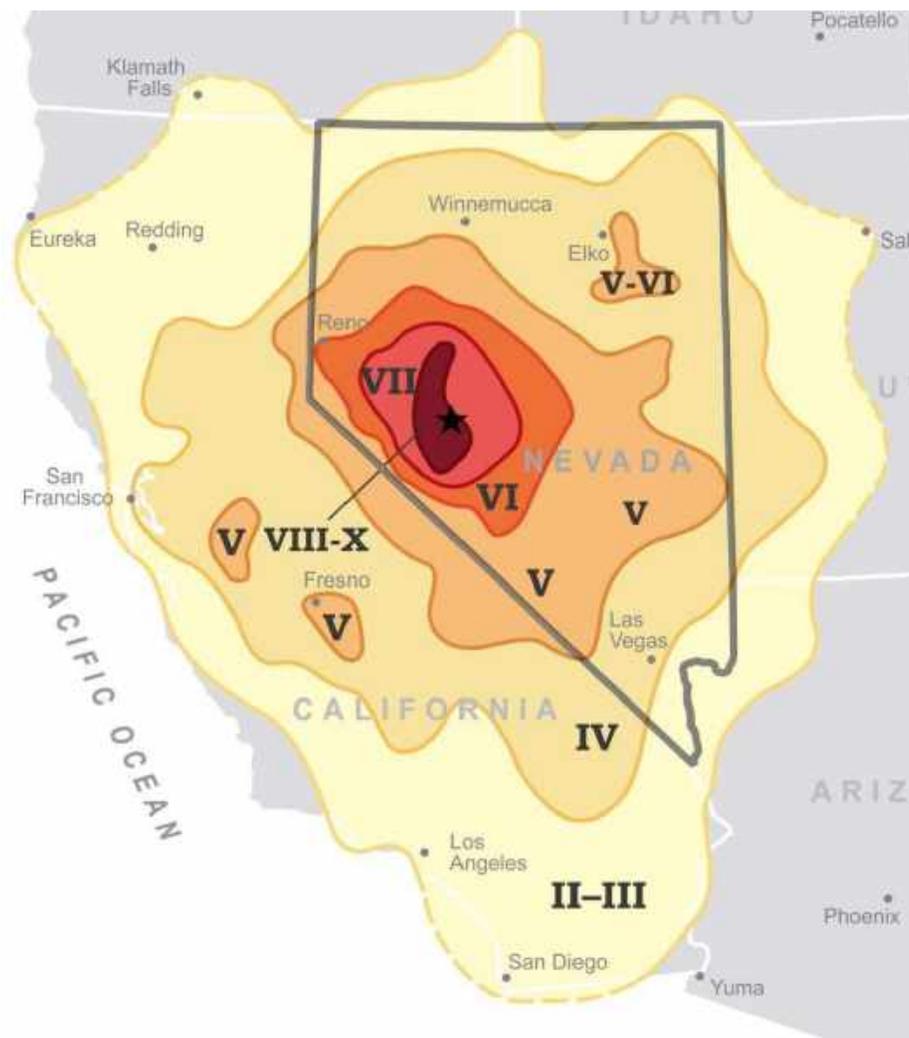


Figure 3. Modified Mercalli Intensity Map of the magnitude 7.1 1932 Cedar Mountain Earthquake, modified from Stover and Coffman (1993). For descriptions of Intensity levels please see Appendix.

As an interesting side note, earthquake lights in the direction of the earthquake area were reported by residents in Carson Valley (Gardnerville Record-Courier, 2/1/1933). Prospectors closer to the earthquake reported lightning near the peak on Pilot Mountain (Reno Evening Gazette, 2/2/1933), indicating an electrostatic discharge may have occurred in the earthquake area and been the source of lights observed in Carson Valley.

1933, June 25 Wabuska Earthquake

The 1933 Wabuska earthquake occurred on June 25, at 12:45 p.m. PST on a Sunday afternoon. It was a magnitude 6 event that strongly shook western Nevada and caused damage over 37 miles (60 km) from the epicenter. The earthquake caused some severe damage in Yerington and Wabuska and liquefaction in Mason Valley. In Yerington, the rear wall of the three-story brick Courthouse was cracked and separated from the building by 2 inches (5 cm), plaster was cracked throughout the building, and the window in the county clerk's office was broken (The Mason Valley News 6/30/1933; Reno Gazette Journal 6/27/1933). The Mason Valley News reports that "at the Parker ranch cracks running from an inch to three inches traversed the property. For some time water shot from the openings and floated the land for a distance of 200 feet [this is the dimension of the area that moved]." This is evidence of liquefaction occurring during this event.

In Carson Valley people scrambled from stores and homes (Gardnerville Record-Courier 6/30/1933) "The duration of the quake was not as long as the one in December [1932 Cedar Mountain earthquake] but was more violent while it lasted" (Gardnerville Record-Courier 6/30/1933). In Carson City, damage was limited to some plaster falling the state capitol and Federal Buildings and merchandise being thrown from shelves (Carson City Daily Appeal 6/26/1933). Two old chimneys fell in Carson City (Neumann, 1935); these may have been weakened by the 1932 earthquake. The Modified Mercalli Intensity from the 1933 earthquake in Carson City was VI to VII, identified as VI+ here.

1954, July 6 Rainbow Mountain Earthquake

The July 6, 1954 Rainbow Mountain earthquake was the first of five major earthquakes that occurred in the Fallon region over a six-month time period. The mainshock had a magnitude of 6.2 and was followed by a magnitude 6.1 aftershock about 11 hours later. Both earthquakes had surface ruptures associated with them (Tocher, 1956; Caskey and others, 2004). The earthquakes were dominantly right-lateral strike-slip movement, although surface ruptures were most notably made up of small scarps with vertical offset. This pair of earthquakes reminds us of the challenging environment emergency responders in the earthquake environment face. An earthquake nearly as strong as the original quake, or stronger for that matter, can occur during a rescue operation or the like, when people are in vulnerable positions.

In Carson City, the Rainbow Mountain earthquake was “felt by all and frightened all in the community” (Murphy and Cloud, 1956). Damage was slight, consisting of minor plaster falling (e.g., capitol building) and cracking of walls (Murphy and Cloud, 1956). The damage was consistent with Modified Mercalli Intensity VI.

1954, December 16 Fairview Peak-Dixie Valley Earthquakes

On December 16, 1954, a truly remarkable set of earthquakes occurred in Nevada. The magnitude 7.1 Fairview Peak earthquake struck west of Fallon in the early morning hours, 3:07 a.m. This was followed just four minutes and 20 seconds later by a second magnitude 6.9 earthquake that was a triggered earthquake on a separate fault, not just an aftershock from the first event. The pair of earthquakes formed surface ruptures that were in an area 62 miles long (100 km) and 9 miles wide (14 km). The quakes shook the entire state (Fig. 4). These events are a dramatic reminder of the earthquake threat Nevada faces.

In Carson City, ornamentation fell in the Assembly Chamber of the State Capitol and there were many cracks in other buildings (Murphy and Cloud, 1956). It was “felt

by all and frightened all” in the community, chimneys were cracked and damaged was considerable to brick (Murphy and Cloud, 1956). Intensity in Carson City was MMI VII.

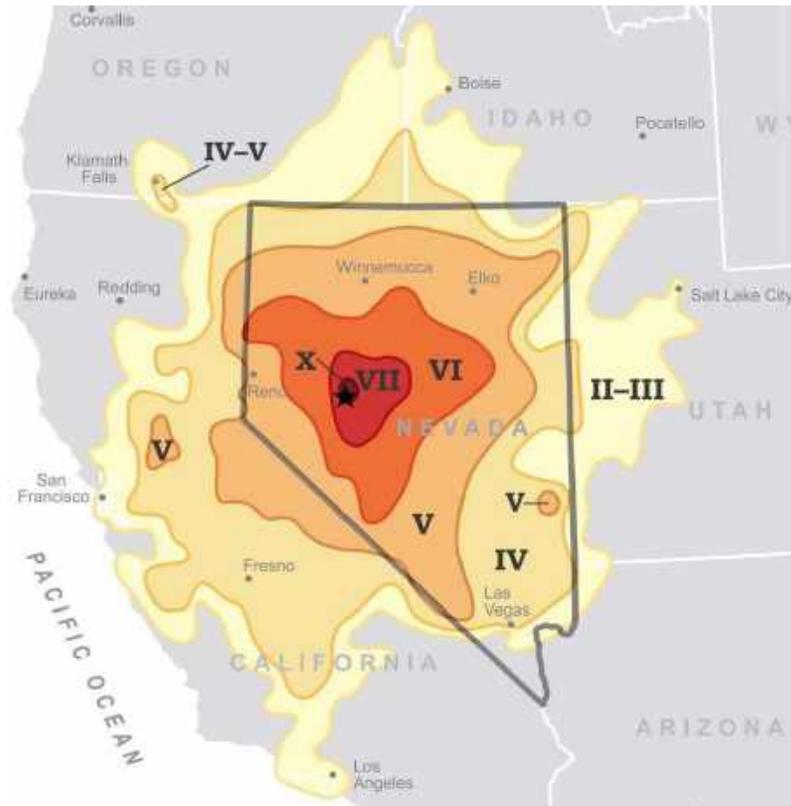


Figure 4. Modified Mercalli Intensity map for the 1954 Fairview Peak-Dixie Valley earthquakes. Modified from Stover and Coffman (1993).

Seismicity in the Carson City Region

There is a persistently high rate of background seismicity in the Carson City region. In the county, high rates of background seismicity (earthquakes of magnitude ≤ 3) occur in the northern and southern parts of the urban corridor and in the PineNut Mountains (Fig. 5). Lower rates of background activity have been recorded

throughout the county. This high rate of earthquake activity is an indication of the high-level of earthquake threat that exists in Carson City.

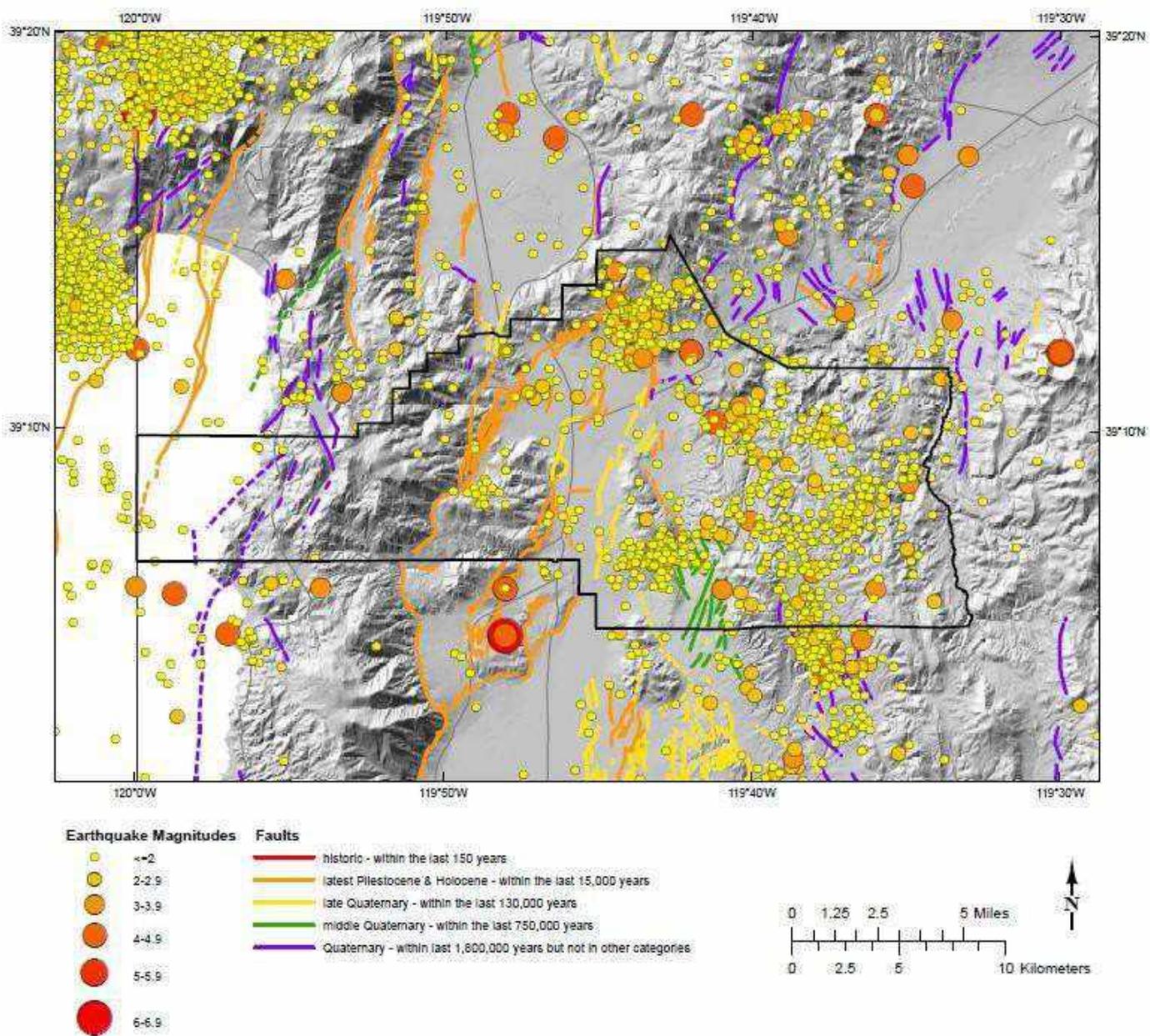


Figure 5. Earthquakes and Quaternary faults in the Carson City region.

Earthquake Faults and Potential Earthquake Magnitudes

Late Quaternary Faults in the Carson City Region

Late Quaternary faults are the sources of most earthquakes in Nevada (earthquakes can also be associated with volcanic and geothermal activity). Identifying and studying local late Quaternary faults leads to a better understanding of the earthquake and surface rupture threats faced by a community and can be used to develop useful earthquake planning scenarios.

Carson City lies in a highly active tectonic setting, near the boundary of extension associated with the Basin and Range Province and the relatively rigid Sierra Nevada Province. Some of the most active normal dip-slip faults in the provinces exist in this region. It is also in the Walker Lane belt, where one fifth of the plate motion between the Pacific Plate and the North American Plate occurs, manifested partly through strike-slip faults and strike-slip earthquakes. Thus, Carson City is being extended and wrenched, and this deformation largely occurs in the upper crust through earthquake activity. Carson City has one of the highest earthquake hazards in Nevada and the Basin and Range Province.

Quaternary faults in the Carson City region are shown in Figure 6. The largest late Quaternary faults in Carson City are shown in Figure 7 and are listed in Table 2. The faults in Table 2 are divided into normal dip-slip faults that have primarily vertical motion accommodated on moderately dipping fault planes and strike-slip faults that have primarily lateral motion, usually accommodated on steeply dipping or vertical fault planes. The focus on these faults is to identify their locations and parameters such as fault length and single-event displacement, which are used to determine the largest potential magnitude earthquakes that can occur along them. We think in terms of maximum earthquakes because these are the most demanding to prepare for; if a small earthquake occurs along a fault, the effects would be mitigated through the preparation of the larger event. These magnitude estimates have an uncertainty of about 0.3 units, so an earthquake a little larger than the estimates is possible, but these values are deemed reasonable without considering unusual circumstances.

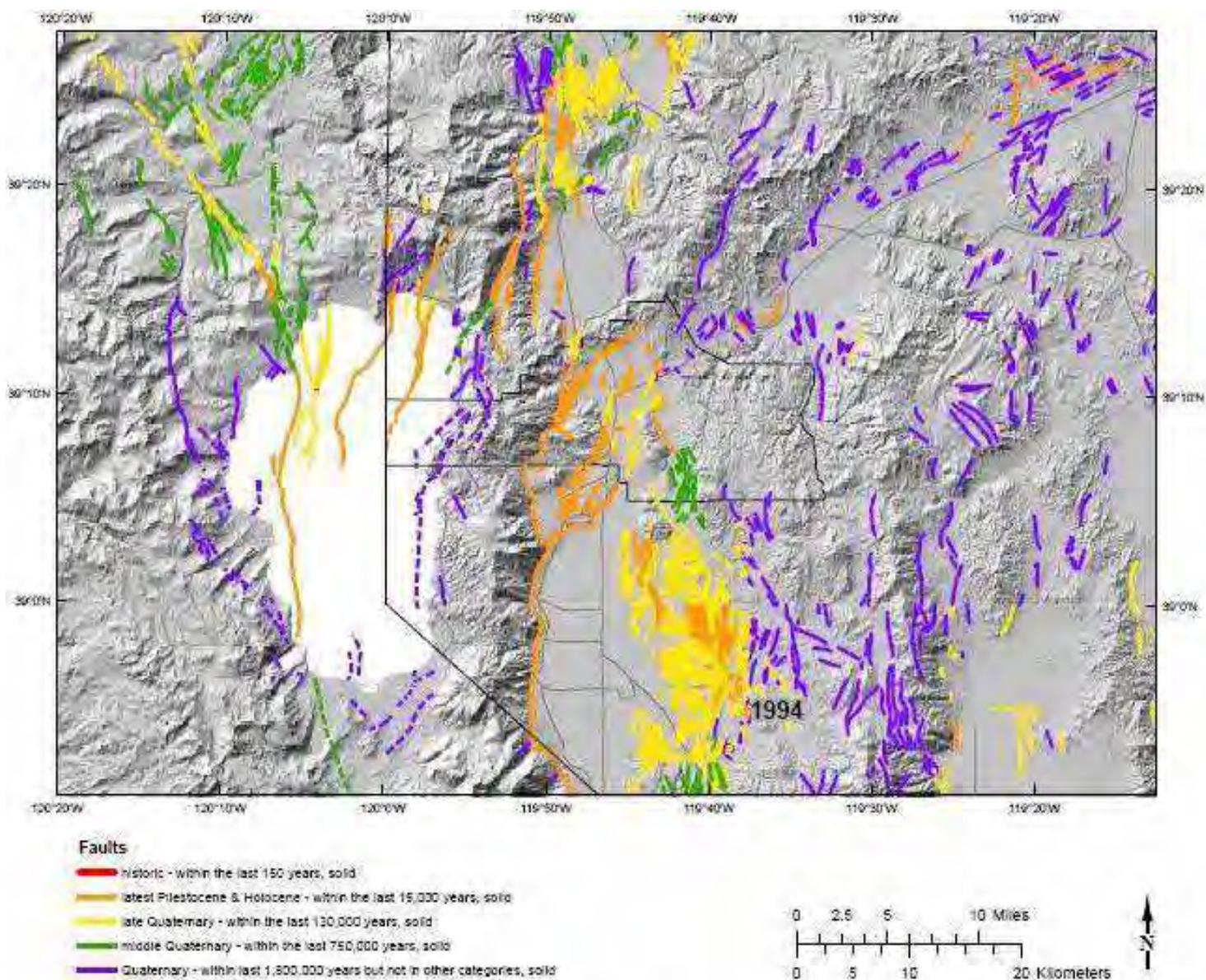


Figure 6. Quaternary faults in the Carson City region taken from dePolo (2008).

There are two scales of normal faults in the Carson City region, large, east-side-down range-bounding faults and smaller faults within the ranges or valleys. The large normal faults are northerly striking and the relative down-dropping of their eastern sides (hanging walls) create Eagle, Carson, and Tahoe Valleys. These faults appear to have large earthquakes that offset the ground vertically by 3 to 16 feet (1 to 5 m).

Offsets of this size correlate with earthquakes of magnitude 6.7 to 7.2. Smaller normal faults are located within Eagle Valley, the Carson Range, and the Pine Nut Mountains. Some of these smaller faults, such as the Carson City fault, intersect large range-bounding faults and can fail with earthquakes along the larger faults as well as fail independently with earthquakes of magnitude 6.5 to 7. All of these fault sources are capable of producing damaging earthquakes. Most faults within the Pine Nut Mountains are not well studied and recent activity on these faults has not been documented.

These faults do have expression in the landscape, however, and some are likely earthquake sources.

Faults extend a significant distance below the surface and normal faults have moderate dips as is shown in the cross section in Figure 8. Earthquakes commonly nucleate near the lower part of the seismogenic zone, so the epicenters above this point are commonly miles away from the mapped surface trace.

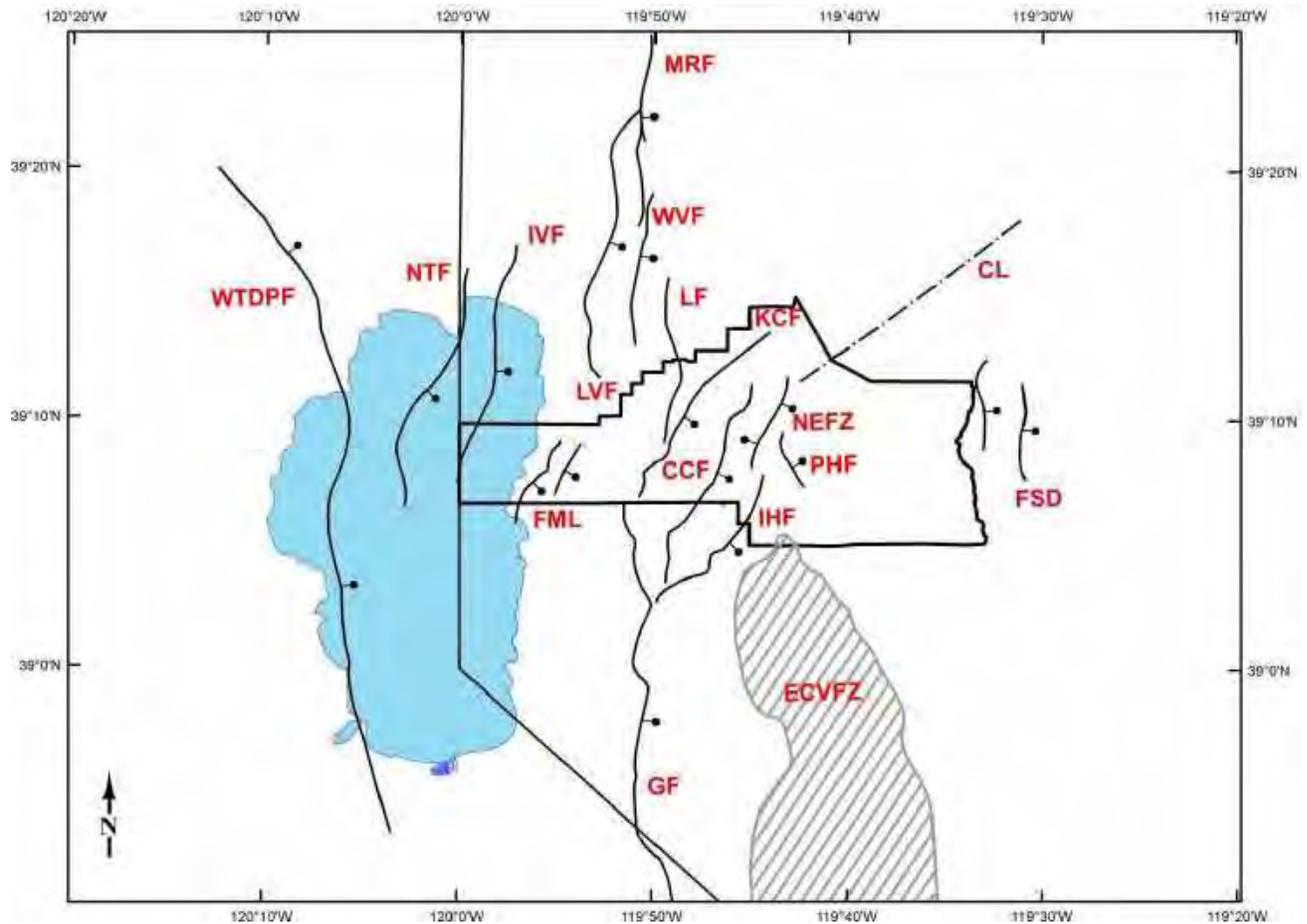


Figure 7. Schematic map of major late Quaternary faults in the Carson City region. CCF – Carson City fault, CL – Carson lineament, ECVFZ – Eastern Carson Valley fault zone (many faults in hachured area), FML – faults near Marlette Lake, FSD – faults southwest of Dayton, GF – Genoa fault, IVF – Incline Village fault, IHF – Indian Hill fault, KCF – Kings Canyon fault zone, LF – Lakeview fault, LVF – Little Valley fault, MRF – Mt. Rose fault zone, NEFZ – New Empire fault zone, NTF – North Tahoe fault, PHF – Prison Hill fault, WTDPF – West Tahoe – Dollar Point fault, WVF – Washoe Valley fault.

Table 2. Major Late Quaternary Faults in Carson City

Normal Dip-Slip Faults	Activity
Kings Canyon fault zone (KCF)	late Holocene
Carson City fault (CCF)	late Holocene
Indian Hill fault (IHF)	late Holocene
Lakeview fault (LF)	<15 ka
Prison Hill fault (PHF)	Holocene
Incline Village fault (IVF)	late Holocene
Pine Nut Range faults (?)	unknown
Genoa fault (GF)	late Holocene
Washoe Valley fault zone (WVF)	late Holocene
West Tahoe-Dollar Point fault (WTDPF)	late Holocene

Possible Strike-Slip Faults	Activity
Carson lineament (CL - left lateral?)	late Quaternary(?)
Eastern Carson Valley fault zone (ECVFZ, right-lateral oblique)	late Holocene
Northeast-striking faults near Marlette Lake (FML, left-lateral oblique?)	unknown
Faults in Pine Nut Mountains (?)	unknown

There are some local strike-slip faults in the Carson City region although the surface expression of these is less distinct than the normal faults. There are many smaller strike-slip background earthquakes. South of Carson Valley, near Double Spring Flat, a strike-slip earthquake of magnitude 5.8 occurred in 1994. Three possible strike-slip faults in the county are the Carson lineament, the Eastern Carson Valley fault zone, and short, northeast-striking faults in the Marlette Lake area. It is also possible that there are some unrecognized strike-slip faults in the Pine Nut Mountains.

In order to develop an understanding of the basin development and fault hazard in Carson City, a basin depth and late Quaternary fault map was produced (Fig. 9).

The basin depths are from work done by Abbott and Louie (2000). They report the Eagle Valley basin with a maximum depth of 1,640 feet (500 m) deep. Based on proximity, the main basin and its two deepest portions appear to be formed by movement along the Carson City fault (Fig. 9). The New Empire fault zone is along the southeastern portion of the basin, and is likely at least partly related to, or accommodating the development of, the southeast side of the basin (Fig. 9). There is a much smaller basin against the Kings Canyon fault zone with a modeled maximum

depth of 656 ft. (200 m; Abbott and Louie, 2000), and can be related to movement along that fault zone. Thus, the development of the Eagle Valley basin can largely be attributed to movement along contemporary faults. One possible exception is the northeasterly elongation of the main basin. This area extends past the New Empire fault zone and is parallel and coincident with the trend of the Carson lineament. It is possible that there is a relationship between this northern portion of the basin and the Carson lineament. If so, this may be a possible earthquake hazard.

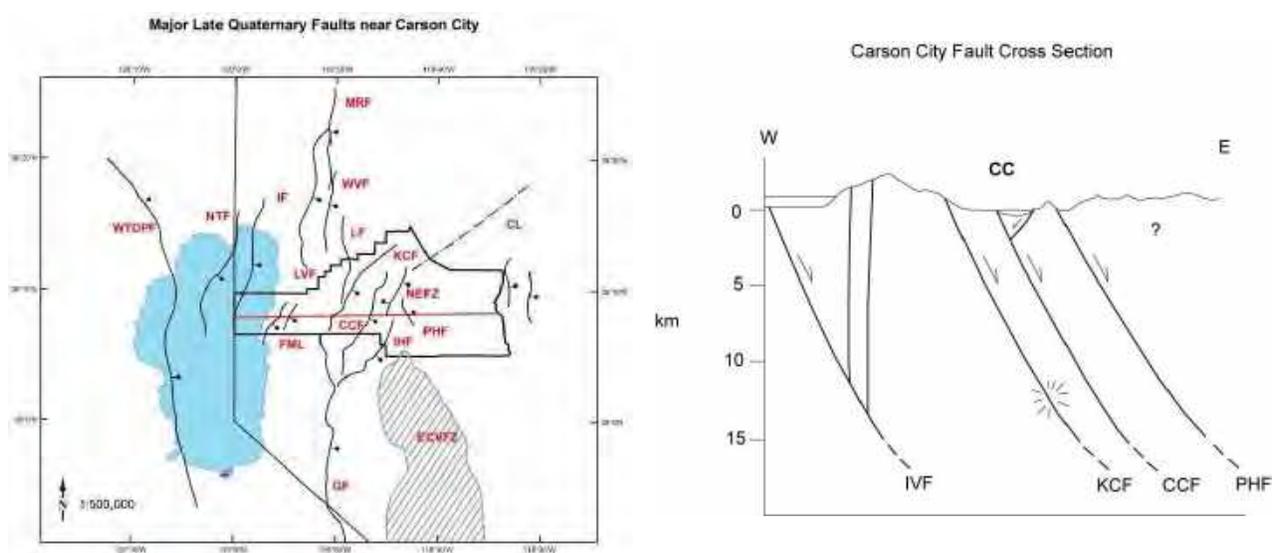
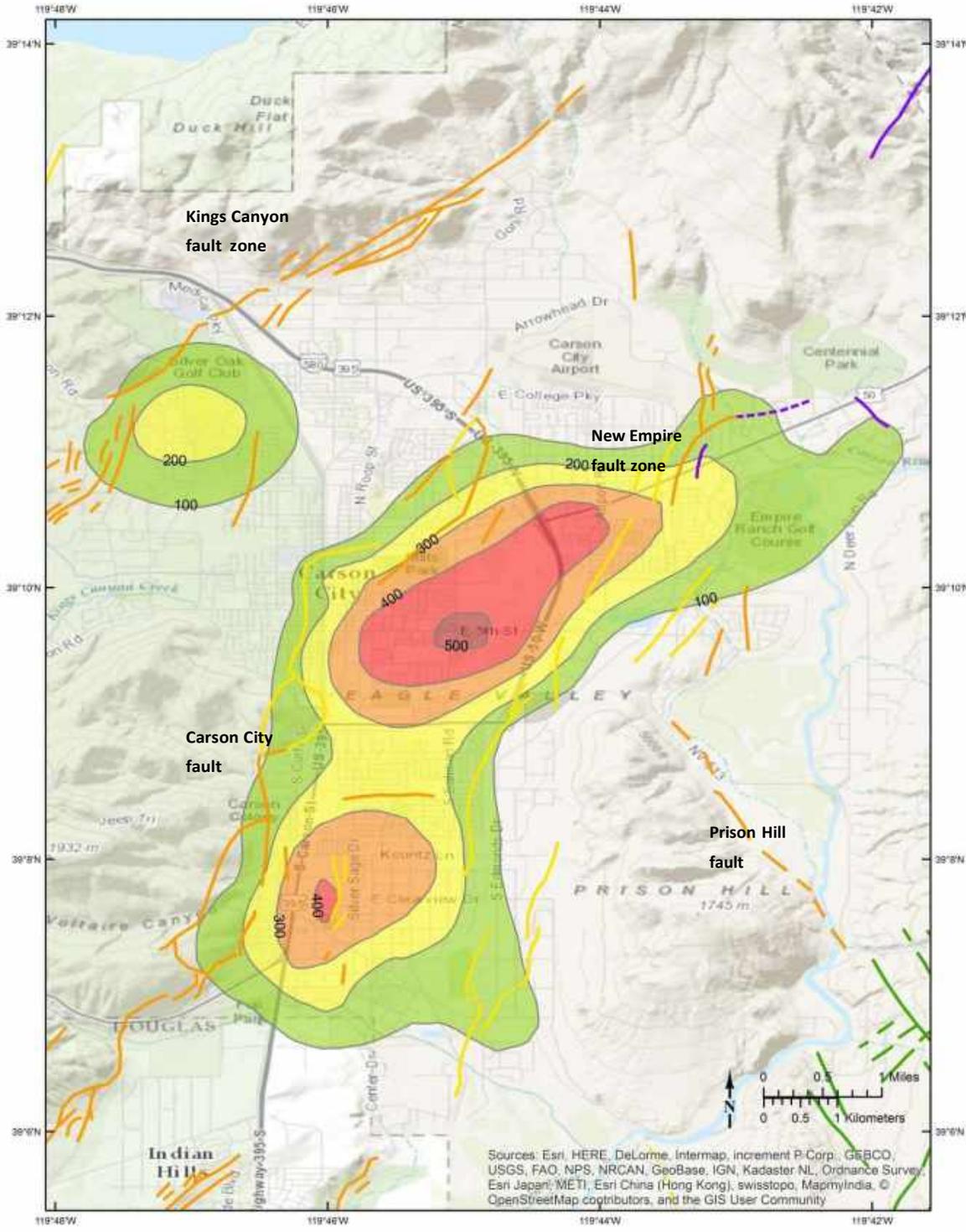


Figure 8. Major faults in the Carson City region with a red line for the cross section (left) and a cross section through the Earth (right) showing the downward projection of those faults (10 km is roughly 6 miles and 15 km is roughly 9 miles). IVF – Incline Village fault, KCF – Kings Canyon fault zone, CCF – Carson City fault, PHF – Prison Hill fault, CC – Carson City. Arrows show the motion of the faults, the asterisks is a common nucleation depth for major earthquakes along faults, and the question mark is where unknown faults might be. An earthquake on the Kings Canyon fault zone might have an epicenter on the east side of Carson City because the fault projects down and east.



Indian Hill
fault zone

Figure 9. Quaternary faults and basin fill depths in Carson City. Basin depths from Abbott and Louie (2000), are principally based on gravity measurements and are contoured in meters. The deepest part of the basin is 1640 feet (500 m) deep. Orange faults have moved within the last 15,000 years, yellow faults have moved within the last 130,000 years, green faults have moved within the last 750,000 years and blue faults have moved within the last 2,600,000 years.

There are several major faults that surround Carson City and earthquakes along these faults can cause damage in the county. The major faults that immediately surround the county are listed in Table 3, but they are not discussed further or modeled in this report. They can be viewed on geologic maps, such as Stewart (1999).

Table 3. Major Late Quaternary Faults near Carson City

Normal Dip-Slip Faults

Little Valley fault North
Tahoe fault

Faults south-southwest of Dayton

Kings Canyon Fault Zone (KCF)

The Kings Canyon fault zone is located at the base and in the lower slopes of the Carson Range and the southwestern part of the Virginia Range. It is made up of a zone of two to six parallel fault traces over most of its length. The Kings Canyon fault zone extends from near Highway 50 to the vicinity of McClellan Peak for a distance of 10 to 11 miles (16 to 18 km). The fault is an eastward-dipping normal dip-slip fault with a possible left-lateral component that likely underlies all of Carson City. A major earthquake on the Kings Canyon fault zone would undoubtedly cause major damage to Carson City. The Capitol suite of scenario earthquakes and the Kings Canyon fault zone scenario represent earthquakes that could occur on this fault.

The southern end of the Kings Canyon fault zone appears to intersect an east-west tear fault near Highway 50, which intersects the Genoa fault to the west. This is a “conservative” discontinuity in the Carson Range fault system, meaning that earthquakes can cross it without a large change in volume. This can facilitate an earthquake on the Genoa fault crossing or triggering an earthquake on the Kings Canyon fault zone, or vice versa. The northeastern end of the Kings Canyon fault

zone dies out as it approaches the volcanic centers near McClellan Peak (Trexler and Bell, 1979; Bell and Trexler, 1979). Recent activity along the fault zone is indicated by young fault scarps and grabens and uplifted late Quaternary alluvial fan deposits near Vicee Canyon. The zone has also formed several well-developed fault facets on the eastern front of the Carson Range.

The Kings Canyon fault zone was trenched between Ash and Vicee Canyons along the youngest appearing fault trace, which was also the one that was closest to urban development (dePolo, 2014). Three trenches and a soil pit were dug for this investigation. Trench 3 yielded the best paleoseismic information, with a series of stacked colluvial deposits, each thought to be related to an earthquake event. The results of this study were somewhat surprising. The preferred interpretation of the information collected is that four paleoearthquakes with vertical offsets of 6.4 feet (~2 m) each occurred between ~4000 and ~1420 years ago (dePolo, 2014). At Trench 3, a total vertical offset of 27 ± 1.6 feet (8.4 ± 0.5 m) was created by these late Holocene events. Accelerator radiocarbon and optically stimulated luminescence dates indicate that the offset alluvial fan surface was much younger than previously thought (~5 ky versus ~15 ky). Thus, a relatively high slip rate for the Basin and Range Province was calculated for this late Holocene cluster of events. OxCal modeling of the dates and event horizons yielded the following ages and uncertainties for the four-event model (ybp – years before present):

Paleoearthquake 1: 1420 ± 70 cal ybp

Paleoearthquake 2: 1630 ± 110 cal ybp

Paleoearthquake 3: 1820 ± 140 cal ybp

Paleoearthquake 4: 3960 ± 820 cal ybp

The best age for the alluvium just below the fan surface at Trench 3 was luminescence sample KC3-L2 (4420 - 5260 ybp) and taken with the vertical offset of the fan surface was 8.4 ± 0.5 m, yields a vertical fault slip rate of 1.5 to 2.0 m/ky, but this includes two open intervals at either end. Considering the four-event model, three closed intervals can be used to calculate fault slip rate. Considering uncertainties involved, the vertical slip rate of the earthquake cluster Paleoearthquake 1 –

Paleoearthquake 3 ranges from 1.7 to 3.9 m/ky (fault slip rates are always reported in metric units).

Existing evidence indicates that the Kings Canyon fault zone did not fail during the most-recent event along the Genoa fault to the south, but there are candidate events along the zone with ages that are permissive to be correlative to the prior event along the Genoa fault.

Ignoring uncertainties, the time interval between these recent events along the Kings Canyon fault zone was ~200 years to ~2400 years, and it has been 1420 years (at least 1350 years considering uncertainty) since the last event. The potential maximum earthquake magnitude estimate for this fault zone, M6.9, is weighed heavily on using the surface displacement per event.

Carson City Fault (CCF)

The Carson City fault is a normal down-to-the-east fault that is within the hanging wall of the Genoa and the Kings Canyon faults (Fig. 7). The Carson City fault splays northeast off a salient in the Genoa fault, crosses through the middle of Indian Hill, and continues north into Carson City. Movement along the Carson City fault formed the main part of the basin in Eagle Valley (Fig. 9).

The fault poses a near-field shaking hazard and surface rupture hazard to Carson City. Nevada's State Capitol and Legislative Buildings are within a quarter mile (0.4 km) of the surface trace of Carson City fault, which is beneath them. The fault goes through Carson City, which is built on its footwall and hanging wall. In Carson City, houses and other buildings are built near and on the fault, and development is approaching the southern part of the fault.

The Carson City fault is 10 to 11 miles (16 to 18 km) long, depending on whether it ends at the Indian Hill fault or continues all the way to intersect with the Genoa fault. The northernmost part of the fault is mapped as ending just south of the Carson City Airport (Bell and Trexler, 1979).

Geomorphic features along the Carson City fault are well-developed and distinct, evidence of a fairly active, late Quaternary fault. Fault scarps from the last event that can be seen within Indian Hill and the southern part of the central portion of the fault. These scarps are easily visible as shadows in the mid-afternoon lighting. Pease (1979b) commented that three bevels can be seen in fault scarps within Indian Hill, indicating a late Pleistocene and two Holocene events. Within Carson City, there is a prominent scarp just west of Bonanza Street. This northerly trending fault scarp is as high as 43 feet (13 m) and offsets early Quaternary deposits (Kirkham, 1976; Trexler, 1977). The fault along Bonanza Street is a groundwater barrier. Trees along the fault grow larger than surrounding trees. The northernmost fault expression in town is a scarp with a maximum height of 16 feet (5 m) in late Quaternary alluvium (Kirkham, 1976; Trexler, 1977). The central part of the fault bounds a short range front (C Hill) and has well-developed fault facets (360 feet (110 m) high), over steepened range bases, side-hill scarps and benches, and compound scarps. A low tectonic trim line, or small bench created by increased activity along the fault, is present just south of C Hill. There are two hot springs proximal to the Carson City fault. The Carson City Hot Springs lie about 0.4 miles (0.7 km) north-northwest of the north end of the Carson City fault and Hobo Hot Springs is near the intersection with the Genoa fault.

There have been two major paleo seismic studies along the Carson City fault, Pease (1979b) and Ramelli and others (1999). Pease did scarp morphology studies along the southern part of the fault and a trench study to confirm the most recent age of faulting (Pease, 1979a). Ramelli and others (1999) trenched a young scarp along the Carson City fault and developed timing constraints on the last two paleo earthquakes.

Pease (1979b) examined fault scarps along the Carson City fault in the Indian Hill area and noted the faults offset Holocene alluvium and that the fault scarps have three bevels indicating three late Pleistocene or Holocene events. Total offset of these three events is estimated to be 10.8 to 27.9 feet (3.3 to 8.5 m) based on surface offsets (Pease, 1979a). Pease (1979b) found that soils in deposits offset by these events are poorly developed Entisols (~4000 years old) and infers that the three most recent events along the southern Carson City fault are younger than 4,000 years.

Pease (1979 – unpublished, presented in Bell and others, 1984) had a trench excavated across a 3.3-foot-high (1-m-high) scarp in Holocene alluvium to verify the most recent activity of the Carson City fault. The displacement along the fault plane on Pease's (1979 unpublished) trench log was 5.9 ± 1.6 feet (1.8 ± 0.5 m) for a single event.

Ramelli and others (1999) trenched a small scarp on the south side of a prominent hill, just southwest of Carson City, called C Hill. Ramelli and others (1999) identified evidence for three paleo earthquakes in the C Hill trench, and were able to constrain the age of the two most recent events. The main fault zone and several extension fissures offset all but the youngest alluvial deposits, and extend to near the ground surface (Ramelli and others, 1999). Ramelli and others (1999) collected a piece of charcoal near the bottom of a fissure formed during the most recent event which yielded a radiocarbon date of 390 ± 40 ^{14}C ybp. This date closely approximates the age of the most recent event along the Carson City fault, assuming the charcoal was on the surface when the event occurred and fell into the fissure (Ramelli and others, 1999). The next oldest event offset alluvium vertically by 3.9 ± 1 feet (1.2 ± 0.3 m; Ramelli and others, 1999). This event offset alluvium that has a radiocarbon date of $2,590 \pm 130$ ^{14}C ybp, and thus, the second oldest earthquake was younger than this date.

There is only a single-earthquake interval rate and a reconnaissance rate available for the Carson City fault. A single interseismic interval between Paleo earthquake 2 and Paleoequake 1 (youngest) is available for the Carson City fault. Using the range in calendar-corrected constraining dates, the range of years for this interseismic interval is 1,840 to 2,640 years. DePolo (1998) estimated a long-term reconnaissance fault slip rate of 0.2 m/ky for the Carson City fault based on maximum basal fault facet height and an empirical relationship.

The timing of the most recent events along the Carson City fault and the Genoa fault is similar and both faults may have ruptured together during these events.

Indian Hill Fault (IHF)

The Indian Hill fault is a normal dip-slip fault zone with displacement down-to- the-southeast (Fig. 7). The fault has been mapped at a scale of 1:24,000 by Pease (1979b), Bell and Trexler (1979), and Garside and Rigby (1998). The overall trend of the fault zone is N40°E, but locally, fault strikes vary from EW to NS. Because of its northeast orientation, it is possible there is a left-lateral strike-slip component. The Indian Hill fault is relatively simple and continuous, consisting of a single fault, except in the central part of the zone where a major fault trace distributes into multiple traces in Indian Hill.

The Indian Hill fault splays off of a salient along the Genoa fault, bounds southern Indian Hill, and partly extends into these hills. The fault continues east and after crossing Clear Creek, where fault expression has been eroded away or buried by young alluvium, forms a couple back-facing, down-to-the-east fault scarps in the western flank of Prison Hill. The fault zone effectively separates Carson Valley from Jacks Valley, Indian Hills, and Eagle Valley to the north. The Indian Hill fault is 7.7 miles (12.5 km) long from its intersection with the Genoa fault to the end of its mapped trace at the base of Prison Hill. A maximum length of 8.7 miles (14 km) includes possible fault extensions into Prison Hill or along the western flank of the hill.

There has been limited fault exploration of the Indian Hill fault zone. Trexler and Bell (1979) and Pease (1979a) dug two trenches across the central part of the fault zone and Pease (1979a) logged these (Trexler and Bell, 1979; Trenches 5 and 6) and additionally logged a utility trench across the fault (Pease, 1979a; Trench 1). Trench 5 was dug across a 3.3-foot-high (1-m-high) fault scarp and exposed the main fault down-dropping a middle to late Pleistocene surface that is buried by two Holocene packages of alluvium and has a large fissure developed at the fault from the most recent event. The middle to late Pleistocene age for the surface is based on a ~12-inch-thick (~30-cm-thick), well-developed, prismatically structured, reddish-colored argillic horizon, that is generally correlated with local soils that 10s of thousands to 130,000 years old (Trexler and Bell, 1979; Bell and Pease, 1980).

Trexler and Bell (1979) indicate that both of the recent events occurred within the last 3,000 years. This time constraint is based on an Entisol, or incipient soil (A-Csoil profile), formed on the upper Holocene alluvium. No soil is mapped as formed in the alluvial package below this, indicating the two events probably occurred relatively close in time. Vertical offsets during the two most recent events are about 3.3 ft (1 m) each as measured from the trench log. Pease (1979a), Trexler and Bell (1979), and Bell and Pease (1980) all interpret a hiatus on this fault in late Pleistocene to allow the soil (B horizon) to form across the fault. The most recent event along the Indian Hill fault may have been part of the most recent event on the Genoa fault.

New Empire Fault Zone (NEFZ)

In New Empire and eastern parts of Carson City (Fig. 7), there are several late Quaternary faults that make up a complicated fault pattern that is not easily characterized (Fig. 10; dePolo 1996). These faults have been divided into two fault zones by dePolo (1996), the New Empire fault zone on the west and the Prison Hill fault on the east. The New Empire fault zone is a group of eroded fault scarps and lineaments that trend north-northeast from Prison Hill through New Empire, and northward towards the Virginia Range. Along strike, faults within the zone have different characteristics, possibly indicating a segmented nature to this zone. The New Empire fault zone bounds the eastern part of sedimentary basin under Eagle Valley and appears to have created that side of the basin (Fig. 9). The zone is made up of normal dip-slip faults (it is unknown if there is any strike-slip component). Most of the faults have northeasterly or northerly strikes, and individual faults have down-to-the-west or down-to-the-east downthrown sides. The most recent fault activity in the New Empire fault zone was indicated by Bell and Trexler (1979) to be from Holocene (11,500 years) to as much as 100,000 years old.

The New Empire fault zone is about 3 mi (5 km) long where it crosses the northern part of Eagle Valley. If the zone includes the southern extension along the northwestern part of Prison Hill, the length increases to 5 mi (8 km). DePolo (1996) measured a vertical separation of 28 ft (8.5 m) of an alluvial surface estimated to be

between 180,000 and 220,000 years old (estimated maximum age of 500,000 years) along this fault zone. Using these values, vertical fault slip rate of 0.05 m/ky (range 0.02 to 0.06 m/ky) was estimated.

Lakeview Fault (LF)

The Lakeview fault is a normal dip-slip fault, which has down-to-the-east displacement (Fig. 7). The surface trace of the Lakeview fault lies above the Kings Canyon fault zone, in the lower slope of the Carson Range. The two faults overlap for

3.7 miles (6 km). The northern half of the Lakeview fault (north of Vicee Canyon) is at the base of the range and the fault is the main range front fault in that area. A compound fault scarp in Washoe Valley with a similar strike, but across a small step and gap in surface expression, may be a northern extension of this fault. The Lakeview fault is 7.1 mi (11.5 km) long including the fault scarp in Washoe fault, and could be as long as 9.9 mi (16 km) considering possible fault extensions in Washoe Valley. Similar to the Kings Canyon fault zone, the Lakeview fault underlies much of Carson City.

The Lakeview fault is a relatively unstudied fault. There is a young, single-event side-hill bench in the range front just north of Lakeview, which is visible with shadowing in the mid-afternoon sun. This section of the Lakeview fault and fault scarp in Washoe Valley are considered to have Holocene activity (Trexler and Bell, 1979).

Prison Hill Fault (PHF)

The Prison Hill fault (Fig. 7) bounds the eastern side of Prison Hill and the eastern side of a low uplifted area that extends north of Prison Hill (this low uplifted area is bounded on the western side by the New Empire fault zone). The Prison Hill fault is a normal dip-slip fault with down-to-the-east displacement. It is a singular fault trace along the base of Prison Hill. At least three fault traces make up the central section of the fault. Evidence for additional parallel fault traces may have been eroded by flooding from the Carson River.

The main trace of the Prison Hill fault can be followed for 3.1 mi (5 km). A maximum length of 5.6 mi (9 km) considers an additional northernmost trace and fault extensions across the river to the south.

In the central part of the Prison Hill fault, a consultant's trench exposed a vertical separation of 8.2 ft (2.5 m) of an argillic horizon, thought to be of Sangamonian age (74,000 to 130,000 years before present; dePolo, 1996). The trench was across a splay off the main fault, and thus a minimum fault slip rate of 0.04 m/ky (0.02 to 0.05 m/ky) was estimated by dePolo (1996). An oversteepened portion of the compound fault scarp appeared to be a single-event offset of about 1.9 ft (60 cm). Only the central portion of the Prison Hill fault was mapped by Bell and Trexler (1979), who indicated the age of youngest fault displacement was mid to late Pleistocene (35,000 to 100,000 years before present). Trench exposures and a scarp along Prison Hill indicate the youngest activity was likely Holocene.

Incline Village fault (IVF)

The Incline Village fault (Fig. 7) is a normal, down-to-the-east, dip-slip fault, which extends from the Carson Range, southward through Incline Village and under Lake Tahoe. Movement along the fault formed fault scarps on land as much as 15.5 ft (4.75 m) high and on the floor of Lake Tahoe (Seitz and others, 2006). The well-

mapped fault trace is 8.4 mi (13.5 km) long, with a maximum length of 12.7 mi (20.5km) including an extension to the south along sub-lacustrine landform and along glacially eroded ridge to the north (Seitz and others, 2006; Hines and others, 2014).

The fault has been trenched onshore (Seitz and others, 2005) and imaged offshore (Seitz and others, 2006). Seitz and others (2005) estimate an average vertical slip of 12.1 ft (3.7 m) per event for two events exposed in the trench, and a fault slip rate of 0.11 m/ky. Three events were identified in the trench. The most recent event was about 500 years ago, the previous event was about 32,000 years ago, and the third event back was between 36,700 and 62,000 years ago (Seitz and others, 2005). Seitz(2012) noted a substantial overlap of the Incline Village fault and the North Tahoe fault, and a small step between these and the West Tahoe – Dollar Point fault. It is possible that the Incline Village fault can fail as part of a much larger, cascading earthquake, not unlike the Genoa and Carson City faults being thought to have failed together about 300 years ago (Ramelli and others, 1999; Ramelli and Bell, 2014).

Northeast-Striking Faults near Marlette Lake (FML)

The faults near Marlette Lake (Fig. 7) have not been investigated. There are general landforms along them that could have been formed by late Quaternary activity. Two, northeast-striking faults have been singled out as possible earthquake sources.

There is ~4.3 mi (~7 km) of fault-related geomorphology. A maximum length of 7.4 mi(12 km) extends the faults to Marlette Lake and south a short distance into Lake Tahoe.

Pine Nut Range faults

Not many Quaternary faults are mapped in the northern Pine Nut Range (Fig. 6). There are lineaments and possible fault-controlled slopes along some faults that may indicate recent fault activity. A maximum background earthquake scenario (M6.5) is

considered for this area to understand the potential impact of any late Quaternary faults which might exist.

Genoa fault (GF)

The Genoa fault is the largest and most spectacular late Quaternary fault in Carson Valley. It is part of the Carson Range fault system, which bounds the eastern side of the Carson Range and underlies adjacent valleys to the east, including Carson Valley. The Genoa fault is an east-side-down normal dip-slip fault (Fig. 7). Fault scarps, fault facets, and other geomorphic expressions indicate earthquake rupture lengths extended 16 to 47 mi (25 to 75 km) and coseismic ground offsets were as much as 18 ft (5.5 m; Ramelli and others, 1999a). Fault studies indicate the most recent large event occurred 300 to 400 years ago and the prior event was about 1,800 years ago (Ramelli and others, 1999a; Ramelli and Bell, 2014). The size of the ground offsets and the probable length of paleoearthquakes indicate a moment magnitude 7.2 for these events. Such an earthquake would cause severe damage to Carson City and general damage to the entire Reno-Carson City urban corridor. Figure 2, the Modified Mercalli Intensity of the 1932 Cedar Mountain earthquake, gives an idea of the area an earthquake of this magnitude could affect. Surface rupture from the Genoa fault could occur in Jacks Valley, Indian Hills, and along the Carson City, Kings Canyon, and Indian Hills fault zones.

The Genoa fault appears to have had two recent events that were clustered in time. The short-term fault slip rate appears to be about 2-3 m/ky, whereas the longer term slip rate may be closer to 0.3 to 0.8 m/ky (Ramelli and others, 1999a). If the large earthquake displacements along the Genoa fault are considered with the longer term slip rates, large events are separated by several thousand to over 10,000 years. It is not clear whether the recent activity of the Genoa fault will continue at a higher rate or at a longer-term rate. It is fortunate that a large earthquake recently occurred along the fault, presumably providing some time before the next event.

Eastern Carson Valley fault zone (ECVFZ)

The Eastern Carson Valley fault zone is 11 to 16 mi (18 to 26 km) long and over ~6 mi (~10 km) wide. It is unusual because it is made up of many fault traces spread out over an area, rather than being a narrower zone of faults (Fig. 7). There are literally hundreds of individual fault traces in this belt (dePolo and others, 2000). The fault zone is in the eastern half of Carson Valley and movement along these faults has created the foothill topography of the Pine Nut Mountains.

Earthquakes appear to occur along the Eastern Carson Valley fault zone in variable and complicated ways. It is likely there are at least two modes of earthquake faulting. These are normal dip-slip movement, possibly involving several parallel faults, and north-northwest right-lateral strike-slip movement involving multiple surface faults failing together in left stepping breaks. The normal dip-slip mode is the predominant structural makeup of the fault zone, with subparallel normal dip-slip faults. The strike-slip rupture mode is indicated by the most recent event, which occurred about 520 to 920 years ago (dePolo and Sawyer, 2005). This event created small fault scarps that were partially arranged in a left-stepping en-echelon pattern. This pattern is consistent with right-lateral faulting along northwest oriented blind fault, or a series of triggered earthquakes along the northerly striking planes, which may release of some right-lateral stresses.

Earthquake magnitude estimates for the Eastern Carson Valley fault zone were based on overall length and do not consider the possibility of significant parallel fault trace ruptures potentially increasing the fault length. The length-based magnitude estimate is 6.7. A minimum displacement of >4.6 ft (>1.4 m) was found in one trench along the Eastern Carson Valley fault zone by dePolo and Sawyer (2005). This correlates to an earthquake of magnitude of ≥ 6.8 and this value was adopted as the estimated potential magnitude. Additional paleoseismic studies are needed to understand the rupture modes of earthquakes and how often earthquakes occur along the Eastern Carson Valley fault zone.

Carson Lineament (CL)

The Carson lineament is a northeast-trending topographic lineament, which is over 30 miles (48 km) long and is difficult to characterize as a seismic hazard. The lineament appears to influence the major faults in Carson City; the northern end of the Kings Canyon fault zone and the Carson City fault both change strike crossing the lineament and become more northeasterly striking, paralleling the Carson lineament (Fig.7). The orientation of the northern part of the main basin in Eagle Valley is parallel to the lineament (Fig. 9). The Carson lineament appears to be influencing contemporary tectonics. The lineament lacks a through-going late Quaternary fault that one might identify and characterize as a potential earthquake source. There are some small Quaternary faults along the lineament, which can be characterized (c.f., Stewart, 1999) and a background earthquake threat can be considered for the lineament, but whether there is any greater hazard is not known. Within Carson City, the Carson lineament's greatest effect may be influencing the location and orientation of late Quaternary faults, and basin structure.

West Tahoe – Dollar Point fault (WTDPF)

The West Tahoe-Dollar Point fault is located on the western side of the Lake Tahoe basin (Fig. 7). The northerly striking surface and subaqueous fault trace is in California, but the fault dips to the east and is a major seismic hazard for the Tahoe basin and Carson City. The West Tahoe-Dollar Point fault is the largest fault in the Tahoe basin and is range-bounding along much of its length. The fault is 31 to 38 mi (50 to 60 km) long and has a maximum single event offset of ~12 ft (~3.7 m; Brothers and others, 2009). These parameters indicate the West Tahoe-Dollar Point fault is a substantial earthquake source. The preferred age of the most recent event is 4,100 to 4,500 years ago (Brothers and others, 2009). This fault could be the source of a tsunami in Lake Tahoe, through faulting of the lake floor, and/or from triggered collapse and sliding of subaqueous sedimentary banks around the lake, and/or from large landslides entering the lake. Brothers and others (2009) determined a Holocene

fault slip rate for the West Tahoe-Dollar Point fault of 0.4 to 0.8 m/ky based on offsetTioga-aged glacial deposits.

Most estimates of earthquake magnitude potential along the West Tahoe-Dollar Point fault are magnitude 7.1, which is adopted as the maximum magnitude. A large earthquake along the West Tahoe-Dollar Point fault would be expected to create severeshaking in the communities surrounding Lake Tahoe, including Carson City. Lake tsunami and seiche could also occur along the shores of Lake Tahoe from an earthquake along this fault.

Background Earthquakes

Although the larger faults in the county have been mapped, many other potential earthquake faults have not been individually recognized because they are inconspicuous, buried by sediments, or are structurally blind (a blind fault doesn't come to the surface). A background earthquake potential is used to account for earthquakes along these other, unrecognized faults. A background earthquake is an event that can occur anywhere, whether there is an indication of a fault at the surface or not. In 2008, the damaging, magnitude 6 Wells earthquake occurred about 5.4 mi (9 km) north of the town of Wells (Smith and others, 2011), didn't rupture the surface and was considered a background event (Ramelli and dePolo, 2011). An event similar to Wells can occur anywhere in the county.

A magnitude 6.5 earthquake is considered the general threshold of surface-rupture faulting (dePolo, 1994) and is used for the maximum background earthquake hazard. It is acknowledged, however, that higher background earthquake levels, as high as magnitude 7, can occur if multiple faults fail in sequence during an earthquake, as appears to have happened in the 1932 Cedar Mountain earthquake (Bell and others, 1999).

Maximum Magnitude Analysis of Faults

A wide range of earthquake sizes can occur along a fault, from very small earthquakes to an earthquake that extends the maximum dimension of the fault zone. The largest event that will likely occur along a fault is termed the *maximum earthquake*. Most of the earthquake-planning scenarios produced in this report are based on the maximum earthquakes. Logically, if you can handle the largest event, you can handle any smaller event as well (“plan for the worst and hope for the best”). Table 4 lists several parameters for the major faults in Carson City, including those used in the magnitude analysis, including the maximum and minimum surface lengths and single-event displacements

Two fault parameters and two studies were used to estimate maximum earthquake magnitudes. Maximum magnitudes were scaled based on fault length and maximum fault displacement. The relationships used between moment magnitude and these fault parameters were developed by Wells and Coppersmith (1984) and Wesnousky (2008) and are shown in Table 5. Wells and Coppersmith (1984) is the standard reference (e.g., National Seismic Hazard Map) and Wesnousky (2008) is a more contemporary study. These relationships are based on measured rupture lengths and surface displacements from historical earthquakes with known magnitudes. The “allfault types” relationship was used from each study because the statistics are more robust and there are multiple fault types in Carson City; in other words, a distinction is not made between normal dip-slip or strike-slip earthquakes in the magnitude estimation. The results using the two studies were within 0.2 magnitude unit of each other (Table 6).

Maximum Earthquake Magnitudes for Faults in Carson City

The lengths of the Major late Quaternary faults range from 3.1 miles (5 km) to ~47 miles (75 km), with many between 6 miles and 12 miles (10 and 20 km). Single-event displacements have been from 2 to 18 feet (0.6 to 5.5 m). These parameters correlate with magnitudes ranging from M5.9 to M7.2. The range in estimated magnitude values

for an individual fault is 0.6 units or less (Table 6). These magnitude values were then considered for determining the scenario earthquake magnitudes so that scenarios will be as realistic as possible. In general, there was more weight assigned to the single-event displacement values when determining the scenario event magnitudes. This was because they could be more precisely and confidently determined. It is commonly hard to predict exactly where an earthquake rupture will end and whether other faults could be triggered for additional slip. Whereas, single-event displacements are measured from trench exposures of offsets or scarp measurements and the offset datum can commonly be identified. The maximum earthquakes from the local and nearby faults illustrate the earthquake potential of Carson City and some are adopted as scenario earthquakes, presented in a later section.

Table 4 Faults in Carson City – Lengths, Offsets, and Age of the Most Recent Event

<u>Fault</u>	<u>Lmin¹</u>	<u>Lmax¹</u>	<u>Dmax²</u>	<u>MRE³</u>	<u>Reference</u>
Kings Canyon fz.	16	18	2.1	1420	dePolo, 2014
Carson City f.	16	18	1.5	300-400	dePolo, 2008
Indian Hill f.	12.5	14	1	300-400?	Pease, 1979
New Empire fz.	5	8	-	<15 ka	dePolo, 1996
Lakeview f.	11.5	16	-	<15 ka	Trexler & Bell, 1979
Prison Hill f.	5	9	0.6	<15 ka	dePolo, 1996
Incline Village f.	13.5	20.5	2.75	500	Seitz +, 2005
Marlette Lake fs.	7	12	-	?	Stewart, 1999
Washoe Valley-					
Mount Rose f.	25	36	2-2.5	<690-910	Ramelli +, 1999
Genoa f.	25	75	5.5	300-400	Ramelli and Bell, 2014
E. Carson V. fz.	18	26	>1.4	~520-920	dePolo and Sawyer, 2005

1 – length of the fault zone in km, expressed in minimum and maximum values to encompass uncertainty.

2 – maximum displacement during a single earthquake.

3 - years before present; these ages are greatly simplified and are uncertain. Commonly ranges of potential ages are given or the ages act as one-sided constraints. Nevertheless a simplification is done to give the general public an approximate age of the last event.

Table 5 Earthquake Magnitude Scaling Relationships Used for Estimating Maximum Earthquake Magnitudes

Wells and Coppersmith (1994) – All Fault Types

Length (L, km):	$M_w = 5.08 + 1.16 \log(L)$
Maximum Displacement (MD, m):	$M_w = 6.69 + 0.74 \log(MD)$

Wesnousky (2008) – All Fault Types

Length (L, km):	$M_w = 5.30 + 1.02 \log(L)$
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Table 6 Faults in Carson City – Maximum Magnitude Estimates

Fault	Lmin-wc	Lmin-wy	Lmax-wc	Lmax-wy	Dmax-wc	
Kings Canyon f.		6.5	6.5	6.5	6.6	6.9
Carson City f.		6.5	6.5	6.5	6.6	6.8
Indian Hill f.		(6.4)	(6.4)	(6.4)	6.5	6.7
New Empire f.		(5.9)	(6.0)	(6.1)	(6.2)	-
Lakeview f.		(6.1)	(6.3)	6.5	6.5	-
Prison Hill f.		(5.9)	(6.0)	(6.2)	(6.3)	6.5
Incline Village f.		(6.4)	6.5	6.6	6.6	7.0
Marlette Lake fs.		(6.1)	(6.2)	(6.3)	(6.4)	-
Genoa f.		6.7	6.7	7.3	7.2	7.2
Washoe Valley-						
Mount Rose f.		6.7	6.7	6.9	6.9	6.9-7.0
E. Carson V. fz.		6.5	6.6	6.7	6.7	>6.8
W. Tahoe-Dollar						
Point f.		7.1	7.0	7.1	7.1	7.1

L = fault length; D = surface displacement; wc = Wells and Coppersmith (1994); wy = Wesnousky(2008).

Location, Extent, Probability, and Hazards of Future Earthquakes

Damaging earthquakes can occur anywhere in Carson City and it is likely that a strong earthquake will strike the county in the next 50 years. Quaternary faults are mapped throughout Carson City and surrounding it (Figs. 6 and 7). The seismicity map (Fig. 5) shows that earthquakes can occur between the faults as well. The county is small enough that a strong earthquake in any location within it will affect the entire county in potentially damaging ways.

Probability of an Earthquake Occurring

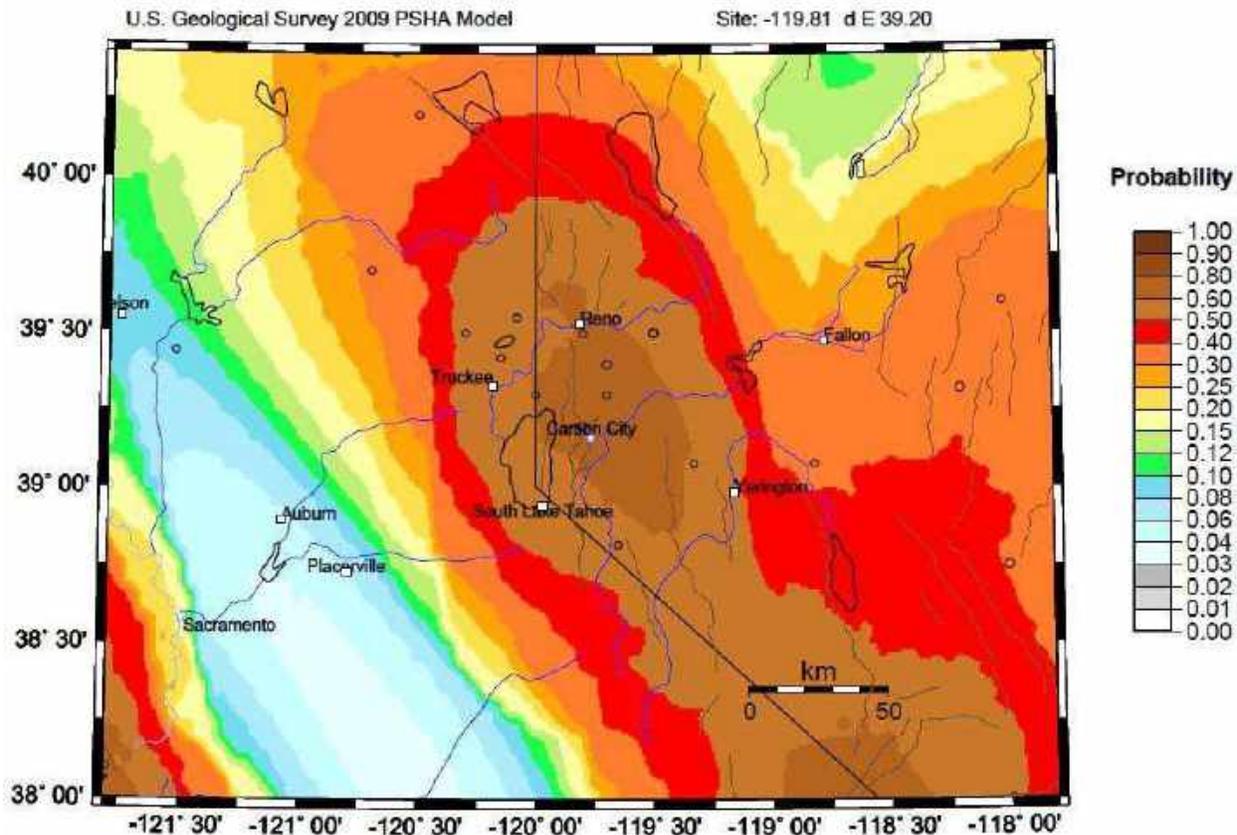
Two probability estimates are presented, a probability of the occurrence of an earthquake with a certain magnitude threshold and the probability of the occurrence of damaging levels of ground motion. The probabilities are based on the input data for the National Seismic Hazard Maps: <http://earthquake.usgs.gov/hazards/>.

The earthquake probability estimations for several communities are given in Table 7 and are illustrated for the county and state in Figures 11, 12, and 13. These were generated using the website <https://geohazards.usgs.gov/eqprob/2009/index.php>. The probabilities were estimated for earthquakes of magnitude ≥ 5.5 , ≥ 6 , ≥ 6.5 , and ≥ 7 occurring within 50 years and 31 mi (50 km) of communities in different parts of the county (Table 7). The specific locations include the State Capitol, Lakeview, East New Empire, Stewart, and Lake Tahoe. Table 7 indicates the chance of having a $M \geq 5.5$ earthquake, which can be potentially damaging if nearby, is 79-82% within a 50 year time period. Considering magnitude $M \geq 6$, a 59-63% chance of occurrence is estimated in the next 50 years within 31 miles. This is a similar sized earthquake as occurred in Wells, Nevada in 2008 and is the size of earthquake the probability maps shown in Figures 11 and 12. The probability of a $M \geq 6.5$ earthquake occurring in 50 years and within 31 miles is 43-47% and the probability for a $M \geq 7$ earthquake is 15-16%. A magnitude $M \geq 7$ event would likely have damaging effects throughout the county and is shown in Figure 13. The probabilities of having an earthquake in the Carson City region are significant and are some of the highest probabilities in the state.

Table 7. Probabilities of Potentially Damaging Earthquakes in Carson City within 50 years and 31 miles (50 km)

<u>Community</u>	<u>M≥5.5</u>	<u>M≥6</u>	<u>M≥6.5</u>	<u>M≥7</u>
State Capitol	82%	63%	46%	16%
Lakeview	82%	63%	46%	16%
East New Empire	82%	63%	47%	16%
Stewart	81%	61%	46%	16%
Lake Tahoe	79%	59%	43%	15%

Probability of earthquake with $M > 6.0$ within 50 years & 50 km



GMT 2015 Jul 17 15:21:15 EQ probabilities from USGS CFR 68-1126 PSHA, 50 km maximum horizontal distance. Site of interest: triangle. Fault traces are brown; rivers blue. Epicenters $M \geq 6.0$ circles.

Figure 11. A probability map of the chances of having a magnitude 6 or larger earthquake within 50 years and 31 miles (50 km) in the Carson City region. The probabilities can be multiplied by 100 to get percentages. Map created using the USGS website <https://geohazards.usgs.gov/eqprob/2009/index.php>.

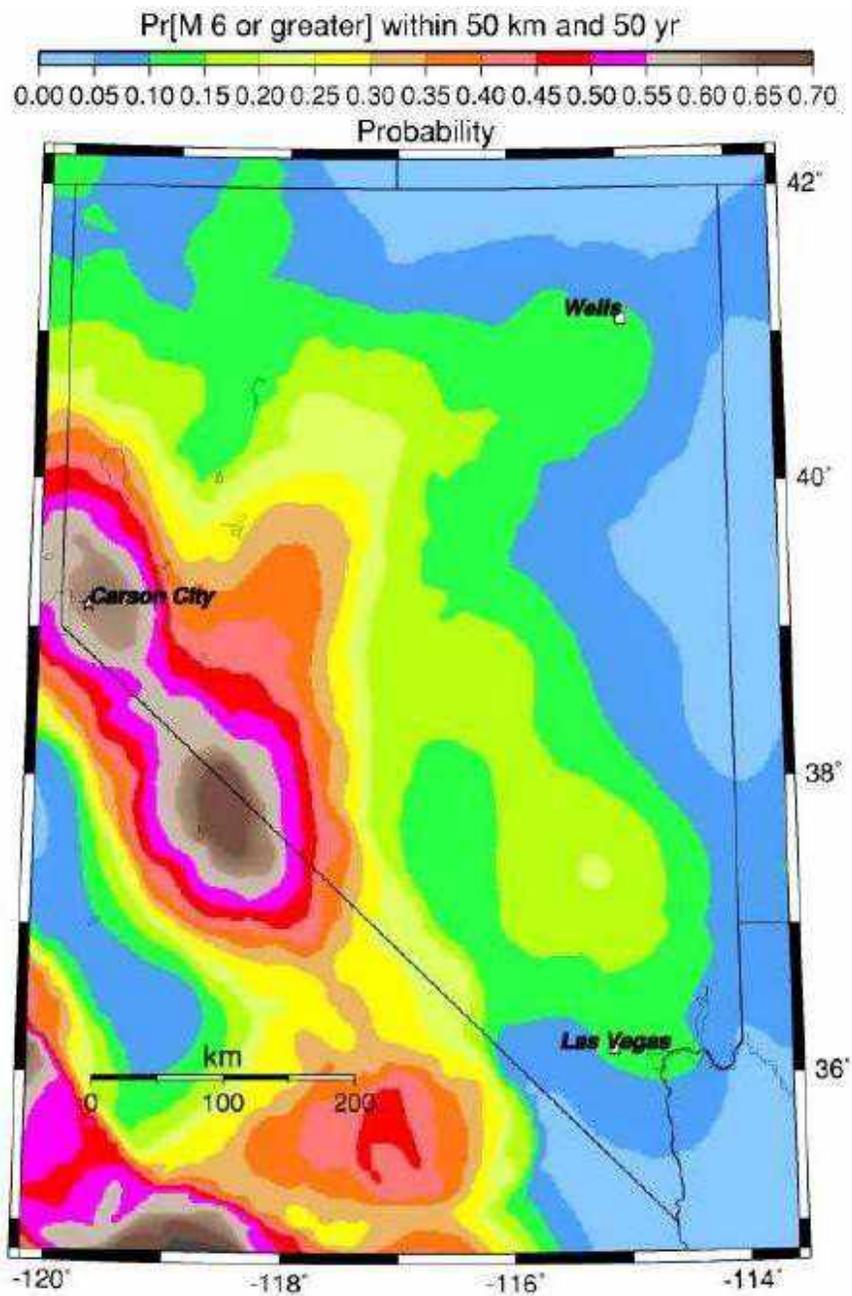


Figure 12. A probability map of the chances of having a magnitude 6 or larger earthquake within 50 years and 31 miles (50 km) for Nevada (figure courtesy of Stephen Harmsen, U.S. Geological Survey).

Probability of earthquake with $M > 7.0$ within 50 years & 50 km

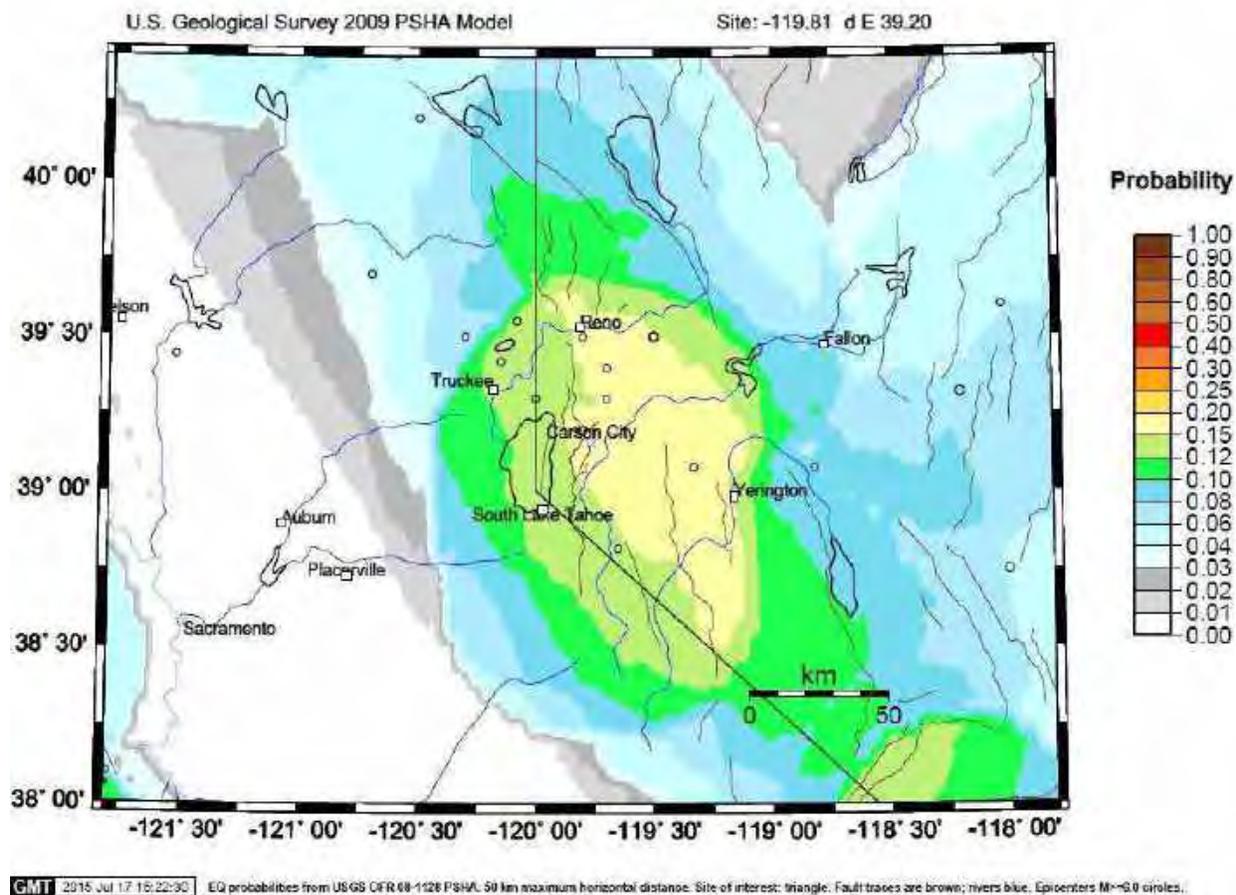


Figure 13. A probability map of the chances of having a magnitude 7 or larger earthquake within 50 years and 31 miles (50 km). The probabilities can be multiplied by 100 to get percentages. Map created using the USGS website <https://geohazards.usgs.gov/eqprob/2009/index.php>.

Probability of Modified Mercalli Intensity Occurring

A second estimate of the probability of earthquake occurrence in Carson City considers the chances of damaging ground motion occurring. This approach inherently considers how close an earthquake is to Carson City, so there is a clearer sense of damage potential. The basis for this estimate is a figure made by Dr. John Anderson of the Nevada Seismological Laboratory (fig. 14) using input from the National Seismic Hazard Map. Figure 14 shows the annual exceedance rate (which can be used to calculate a probability of occurrence) versus different strengths of ground motion, expressed as peak ground acceleration. The ground motion hazard curves for different parts of the county are shown in Figure 14. Also shown are the ranges of ground motion that correlate with Modified Mercalli Intensities (horizontal bars labeled with Roman Numerals); these intensity values are based on accelerations given in Bolt (1999). The black horizontal line across the entire graph is the annual exceedance rate that is used in the International Building Code. The graph indicates that there is substantial seismic hazard considered in the building code for Carson City (this is where the curves intersect the horizontal building code line). Building code ground motion input values are in the range of ground motions associated with Modified Mercalli Intensity IX.

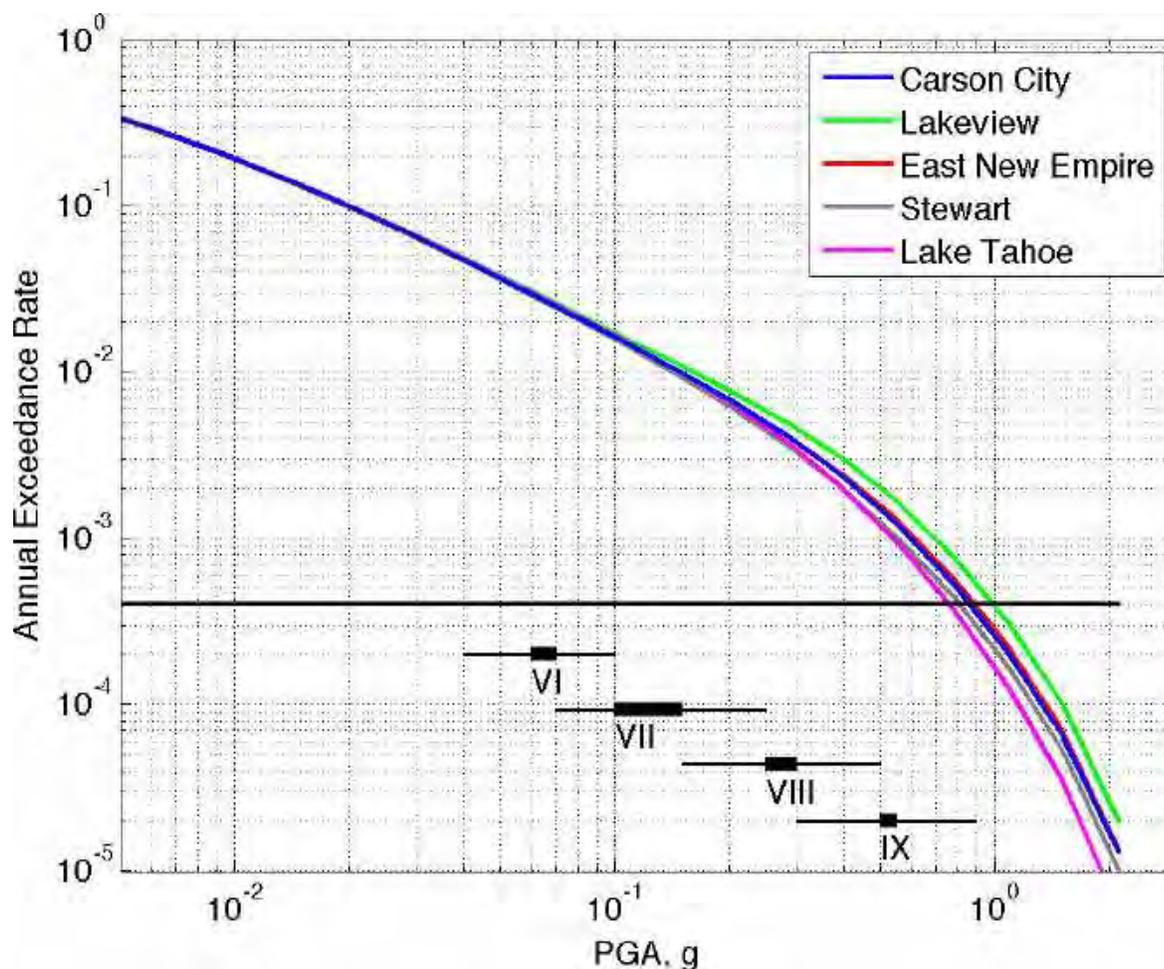


Figure 14. U.S. Geological Survey earthquake hazard curves for five parts of Carson City. Also shown are ranges of ground motion that are associated with different, indicated Modified Mercalli Intensities; these values are from Bolt (1999). The figure was courtesy of Dr. John A. Anderson, Nevada Seismological Laboratory.

Using Figure 14, an estimate of the probability of the levels of ground motion corresponding to different Modified Mercalli Intensities can be made for Carson City (Table 8). The core parts of the intensities (thicker parts of the line) were used for the probability estimates. Maximum and minimum annual exceedance rates were estimated where these ground motions intersected the hazard curves. These were used as occurrence rate estimates in a Poisson probability calculation for a 50-year time

period. The probabilities are narrow ranges, which give a false sense of precision. They should be considered generalized estimates. Fortunately, the probability of an intensity level occurring can be reduced through the mitigation of seismic risks. For example, modern built-to-code construction in Carson City should survive an earthquake well.

Table 8. Poisson Probabilities of Modified Mercalli Intensity Ground Motions Occurring in Carson City Based on U.S. Geological Survey Hazard Curves

<u>Earthquake Intensity*</u>	<u>50-Year Probability</u>
VI	78-79% 55-57% 19-25%
IX	6-10%

* Intensity VI - cracks in walls and people to be frightened; Intensity VII levels - chimneys to topple and an emergency response; Intensity VIII levels - weak buildings to partially collapse and a recovery effort to be mounted; Intensity IX levels - damage to some modern buildings.

The probabilities presented in Table 9 indicate that it is likely (78-79%) Carson City will experience Modified Mercalli Intensity VI shaking levels within a 50-year time period. The chances of damaging ground motion associated with Intensity VII and an emergency response associated with an earthquake are 55-57% in a 50-year time period. Stronger ground motion associated with Intensities VIII and IX have a 19-25% and 6-10% chance of occurring in 50 years, respectively. Communities that experience these levels of ground motion and damage (if it occurs) commonly have to mount community recovery efforts that can last over a year.

Earthquake Strong Ground Motion Hazard

Shaking of the ground is the most damaging and widespread effect from earthquakes. Estimating the potential ground motion at a site considers several factors including the magnitude of an earthquake, how far away it is, whether a site is on rock or soft sediments, and the size and shape of an underlying sedimentary basin if there is one. Many of these considerations and earthquake and fault data sets are used in making the U.S. Geological Survey's National Seismic Hazard Map (<http://earthquake.usgs.gov/hazards/products/>), which specifies these ground motion results, principally for use as ground motion estimates in the International Building Code.

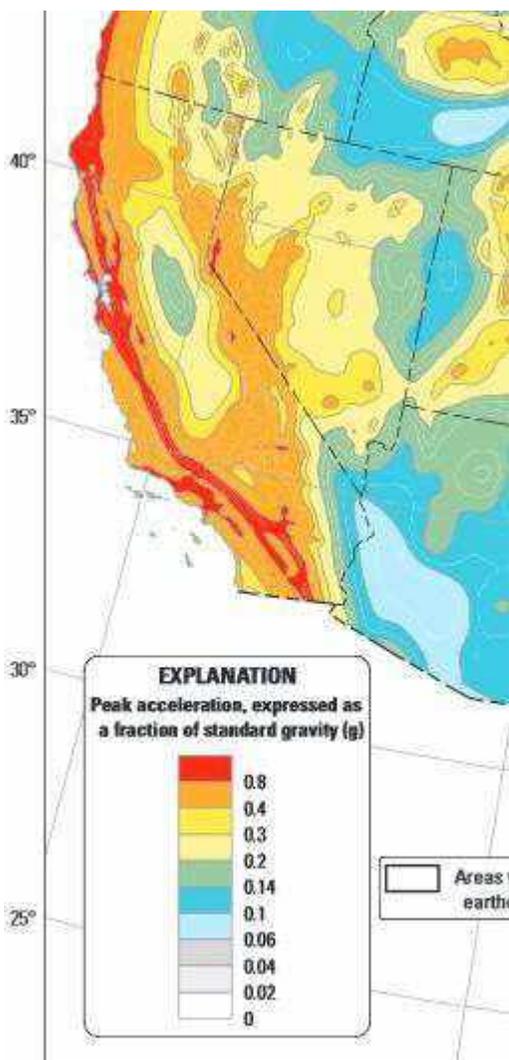


Figure 15. Portion of the 2014 National Seismic Hazard Map that covers Nevada. The map is of Peak Ground Acceleration, with an exceedance rate of 2% in 50 Years. Carson City is in the highest hazard level shown on the map (>0.8 g)

The 2014 estimate of ground motion for Carson City is the highest in Nevada and on the map, which includes California (Fig. 15). Design ground motions for the 5% chance of exceedance in 50 years are 0.4 to 0.8 g peak ground accelerations for the western and easternmost parts of the county and ≥ 0.8 g in Carson City. Ground motion values tend to mean more to engineers that design buildings to withstand them than the general public.

Earthquake Surface Rupture Hazard

When earthquakes reach magnitude 6.5 ± 0.3 , the rupture tends to offset the ground surface (c.f., dePolo, 1994). These offsets are known as earthquake surface rupture or ground rupture. In Carson City, evidence for surface rupture hazard includes paleo-earthquake ground ruptures and offset landforms that were created by repeated offset along a fault.

The potential for ground surface rupture is along and immediately adjacent to the mapped traces of late Quaternary faults (faults that have moved in the last 130,000 years). Faults within this timeframe have had major earthquakes in the Basin and Range Province (dePolo and Slemmons, 1998). For example, the 1887 magnitude 7.4 Sonoran, Mexico earthquake, the largest historical normal dip-slip earthquake in the province, ruptured a fault that hadn't moved in 100,000 years (Bull and Pearthree, 1988).

There are many late Quaternary fault traces in the county and many fault traces of unknown age. Some faults are relatively simple ruptures, such as sections of the Carson City fault, and others are broad and include many fault traces, such as the Eastern Carson Valley fault zone. Surface rupture hazard partly depends on the complexity of fault traces, so faults like the multi-trace Eastern Carson Valley fault zone pose a wide-spread surface rupture hazard.

The most straightforward way to mitigate for surface rupture hazard is to avoid construction across late Quaternary faults. In denser housing developments, areas along faults can be used for natural green belts, parks, and golf courses. Backyards can be

placed along faults to help protect streets and utility lines. Some structures, such as pipelines, cannot avoid crossing active faults in some areas. Fortunately, pipelines can be engineered and constructed to limit damage from ground offset. For example, a pipeline covered with loose sand on the down-thrown side can pull out of the ground without being broken when vertical offset occurs. The key is to know where the faults are located and how much offset can occur to plan wisely for surface rupture hazard and encourage the appropriated mitigation design of facilities that must cross faults.

Guidelines on the best exploratory and mitigation approaches for potentially hazardous faults would be useful for Carson City. Exploration techniques, like trenching, can be used by geologists to identify the specific locations of fault traces or the non-existence of a fault trace. When faults are recognized early in the planning phase of projects, it is easier to consider low-cost mitigation measures, such as fault avoidance.

Earthquake-Induced Liquefaction Hazard

A potential for liquefaction hazard exists in Eagle Valley, along the shores of Lake Tahoe, and possibly in some of the smaller basins in the Pine Nut Mountains and the Carson Range. Liquefaction occurs in places where groundwater is shallow and sediments, classically fine sands, are young and unconsolidated. When these types of saturated sediments are shaken strongly for a period of time, they can consolidate and expel the water from pore spaces, building up pore pressure. When pore pressure increases rapidly and cannot be dissipated, liquefaction can occur. During liquefaction, soil can behave as a liquid. When this happens, a sand-water mixture can be expelled out of the ground, the land surface can flow downhill or sideways, and the ground may no longer be able to support the weight of structures, like buildings. Buildings on liquefied ground can sink and break up. Other potential effects of liquefaction are violent oscillations that are potentially damaging to buildings and infrastructure.

There were reports of liquefaction in Carson Valley and probably Eagle Valley caused by the June 6, 1887 Carson City earthquake. The Nevada Tribune (6/6/1887) reported that, "In the corral, walking across either way, the ground seems as though

all was hollow underneath, and by driving a pole down two or three feet, water flows immediately to the surface, and wherever a fissure is seen, black sand several inches deep has been thrown up,” on the Boyd Property. This is a fairly clear description of liquefaction.

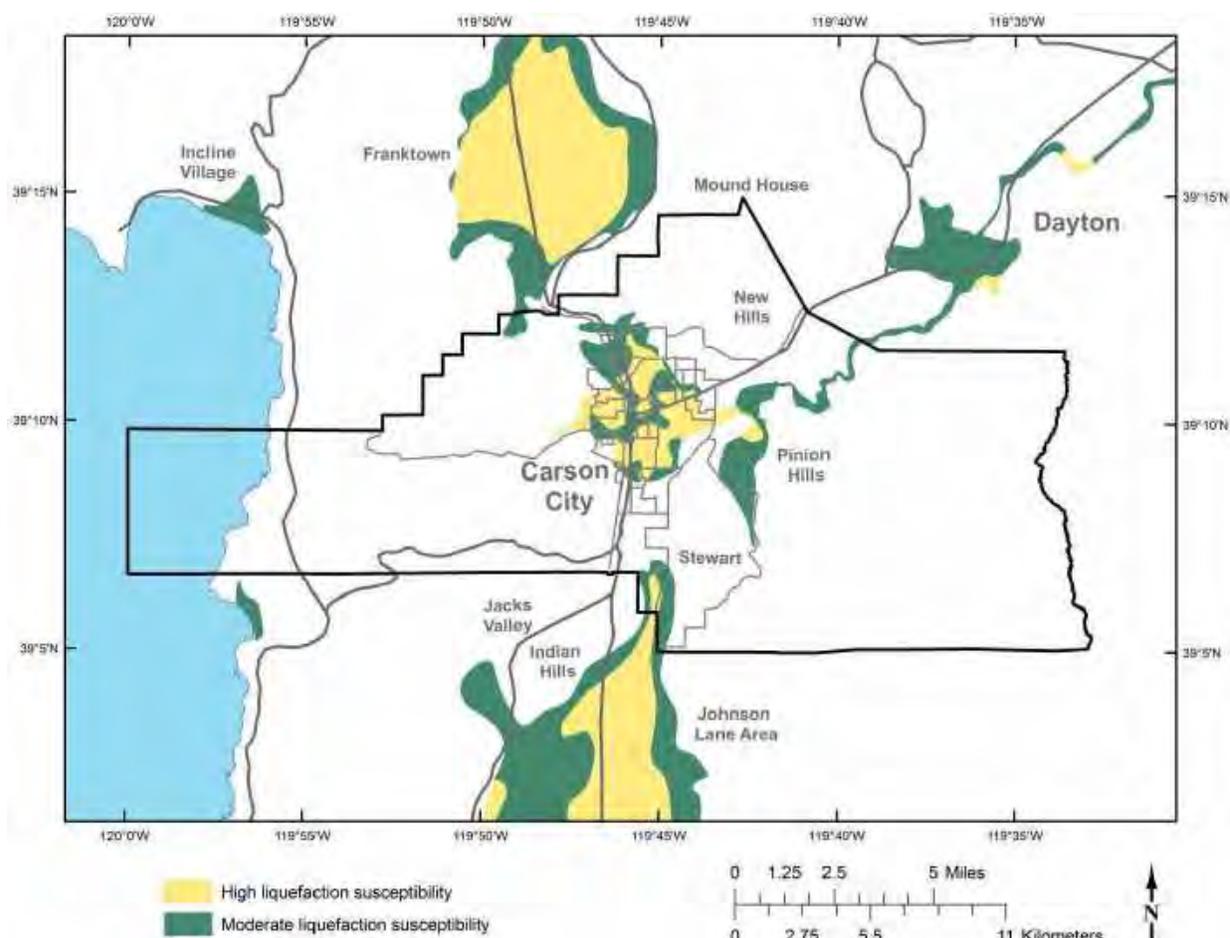


Figure 16. Liquefaction susceptibility in the Carson City region taken from dePolo and others (1996). These generalized areas can have shallow groundwater and young sediments. When earthquakes occur, generally only a few locations within these areas will liquefy, and factors, such as frozen ground, can affect whether liquefaction occurs. All roads connecting Carson City to other communities cross over areas with some liquefaction potential. More detailed studies are required to define the liquefaction hazard at a specific location.

A preliminary representation of liquefaction was constructed for the 1996 Planning Scenario for a Western Nevada Earthquake (dePolo and others, 1996; shown in figure 16). The map was made with the information available at the time and was generalized, but illustrates the hazard. For planning and appropriate land use purposes a more detailed, county-wide liquefaction analysis is necessary.

Guidelines for building on lands that are potentially liquefiable would be useful. Structures can be constructed with the appropriate resistance to potential ground oscillation and soils or structures can be conditioned to prevent damage from potential settlement and/or lateral movement caused by liquefaction.

Earthquake-Induced Rock Fall, Landslide, and Snow Avalanche Hazards

Mountain and hill slopes can be subject to seismically induced rock falls, landslides, and snow avalanches. Depending on down slope vulnerabilities, some of these hazards can have potentially disastrous consequences and should be addressed with planning and mitigation. Potential consequences include rock and earth impact, inundation, and burial of people, homes, buildings, roadways, and other infrastructure.

Mitigation actions include the definition and characterization of potential landslides and rock falls in developed areas and planned expansion areas. These maps can be used to characterize the potential impact of landslides and rock falls. Based on the risk, possible mitigation actions might include warning signs with safety instructions and relocation or hardening of facilities. Some situations can be recognized but not be practically mitigated, such as large landslides or rock falls along roadways. In critical cases, useful planning can still take place. The potential amount of landslide debris, the equipment required for removal of this debris, and the location of this equipment can be developed and would be useful in an earthquake emergency. Snow avalanches are generally covered by contemporary snow avalanche planning, but emergency planners and responders should keep this potential hazard in mind during wintertime disasters; one of the primary impacts would be the blockage of mountainous roadways.

Earthquake Lake Tsunami and Lake Seiche Hazards

Earthquake-induced waves along the shores of Lake Tahoe are possible immediately following a large earthquake. The West Tahoe-Dollar Point fault has a large underwater section and an earthquake along the fault could down-drop the floor of Lake Tahoe within a matter of seconds. The column of water above this offset would be dropped, leading to an uneven water surface and a wave flowing towards the down-dropped side. This wave would move quickly across the lake and run-up on shoreline. In coves, the wave would potentially be concentrated and have a higher run-up. Lake tsunamis can be generated by fault offsets of the lake bottom, by large landslides into a lake, or by failure of submerged shelves of sediment. Tsunami wave heights in Lake Tahoe from different earthquake scenarios were modeled by Ichinose and others (2000), but run up distances were not generated by that study.

A seiche is an oscillatory wave that goes back-and-forth in an enclosed body of water. It is similar to the sloshing back-and-forth that can occur in a bath tub when the water is disturbed. Seiches can form from lake tsunamis or they can be induced by seismic waves from earthquakes that are farther away.

A lake tsunami and seiche occurred following the 1959 M7.3 Hebgen Lake, Montana earthquake. Hebgen Lake is located in the hanging wall of the fault that generated the earthquake. The initial "surge" of water in Hebgen Lake overtopped the Hebgen Lake Dam by about a foot of water (30 cm; Myers and Hamilton, 1964).

Oscillatory waves (seiche) continued for at least 12 hours and had a period of about 15 minutes (Myers and Hamilton, 1964). The dam was overtopped three to four times. The tsunami was the initial surge of water was the lake surface trying to equilibrate after being deformed. The seiche set up in the lake, which traveled from one end to the other for hours. Other examples are a tsunami formed in Owens Lake, following the 1872 Owens Valley, California earthquake (Smoot and others, 2000) and a probable seiche set up in Mono Lake, California from the 1932 Cedar Mountain, Nevada earthquake (Reno Evening Gazette, 12/23/1932). Similar tsunami and seiche phenomenon are expected in Lake Tahoe.

Wave heights of Lake Tahoe tsunamis have been modeled by Ichinose and others (2000) and are shown in Figure 17. Two scenarios are shown, a rupture on the North Tahoe-Incline Village fault (A – black triangles), and a rupture on the WestTahoe-Dollar Point fault zone (B – gray dots). In these model runs, wave heights of

15 to 23 feet were generated at the lake shore in Carson City, but to the south wave heights of as high as 30 feet. These are reasonable wave heights to consider when developing ideas for the tsunami/seiche hazard along the Tahoe shoreline.

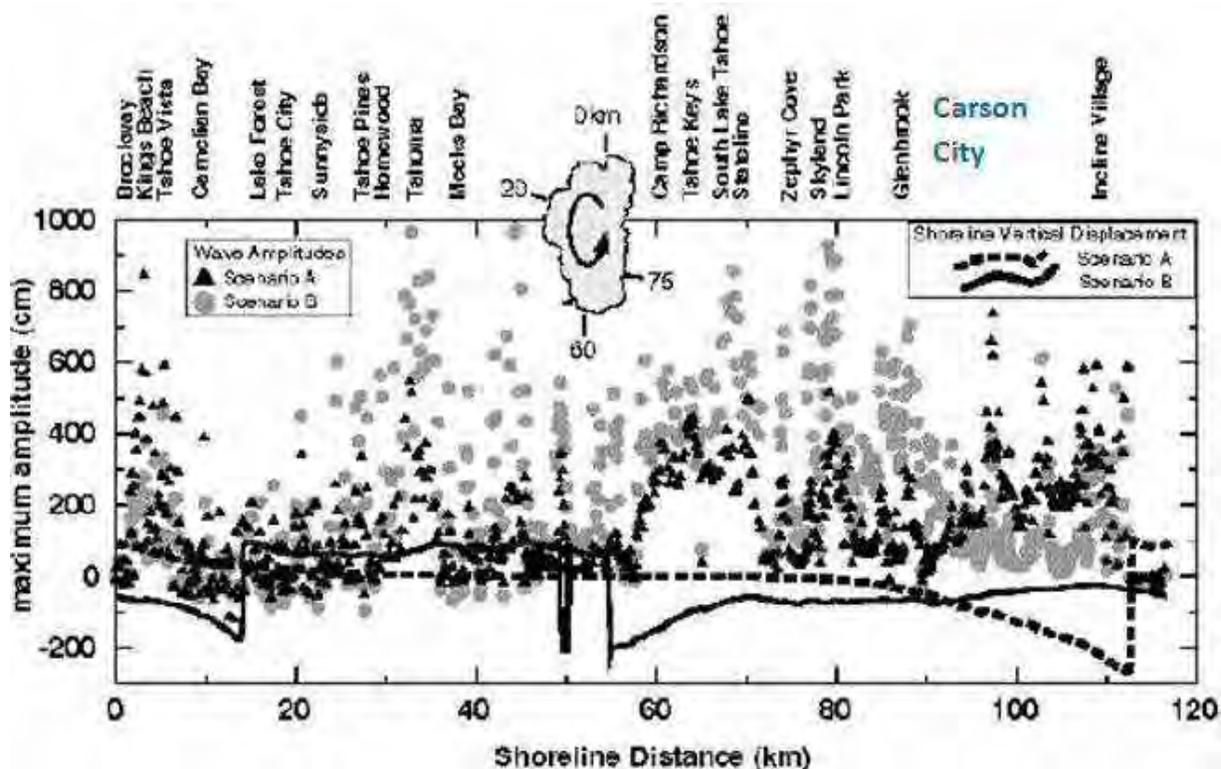


Figure 17. Potential tsunami wave heights around Lake Tahoe; the locations are indicated along the top of the figure with the area within the county labeled as “Carson City”. From Ichinosa and others (2000).

Carson City's boundary along the lake includes a few privately owned structures. The road and utilities are at a high enough elevation that they would not be affected by a 30 foot wave. Because of the low exposure of the county to the impacts from tsunami or seiche, this hazard is considered low in Carson City.

The potential run-up distance from tsunamis and seiches needs to be modeled and mapped so the distance that people are safe from such waves can be determined. Based on the potential waves, signs can be installed that indicate potential inundation areas, evacuation areas, and routes to safe elevations as information and guidance for citizens and visitors. An alternative to safe high ground evacuation route is to create vertical evacuation structures closer to the shoreline that can withstand a tsunami or seiche wave. These can be dual usage structures, such as an observation tower, and be blended into the landscape.

Vulnerabilities, Consequences, and Potential Earthquake Losses

Carson City Earthquake Scenarios

The impacts and the extent of the impacts from earthquakes are difficult to envision without modeling the potential effects. Although the computer modeling of earthquake impacts is based on generalizations of past earthquakes, they attempt to tailor those generalizations for a specific community, to produce more realistic results. The impacts of any specific earthquake is impossible to predict because each earthquake has unique characteristics (at least over the time frames we are considering) and there are a multitude of variables that determined what the ultimate impacts are, include soil properties and structural vulnerabilities. Nevertheless, responseplanning, emergency exercises, and recovery planning all benefit from using realistic earthquake impact estimates. The scenario earthquakes are considered to be maximumearthquakes that could occur (Fig. 18, Table 9). Plan for the worst and you can respond to any smaller magnitude events. The consequence estimates made using theFEMA HAZUS-MH program and are considered to be order-of-magnitude estimates (good to \pm a factor of 10).

The earthquake scenario magnitudes range from M6 to M7.2 (Table 9). The magnitude 6 scenarios are for locations near the city that have had persistent background seismicity. These two locations are in northern Carson City and south of Prison Hill. The magnitude of the 2008 Wells earthquake was adopted for these scenarios representing a large, non-surface rupturing event. A maximum background earthquake (M6.5) was used for the Pine Nut Mountains. The northern Pine Nut Mountains has a high level of background earthquakes and several potential landforms that could be related to Quaternary faulting. It is important to consider the impacts of an earthquake in that area. The capitol suite is a range of earthquake magnitudes (M5to M7) in the center of the city to explore the impacts of different sized events (Seelye and others, 2014). The other four scenarios are based on the maximum magnitudes estimated for the late Quaternary faults.

Scenario Earthquake Epicenters

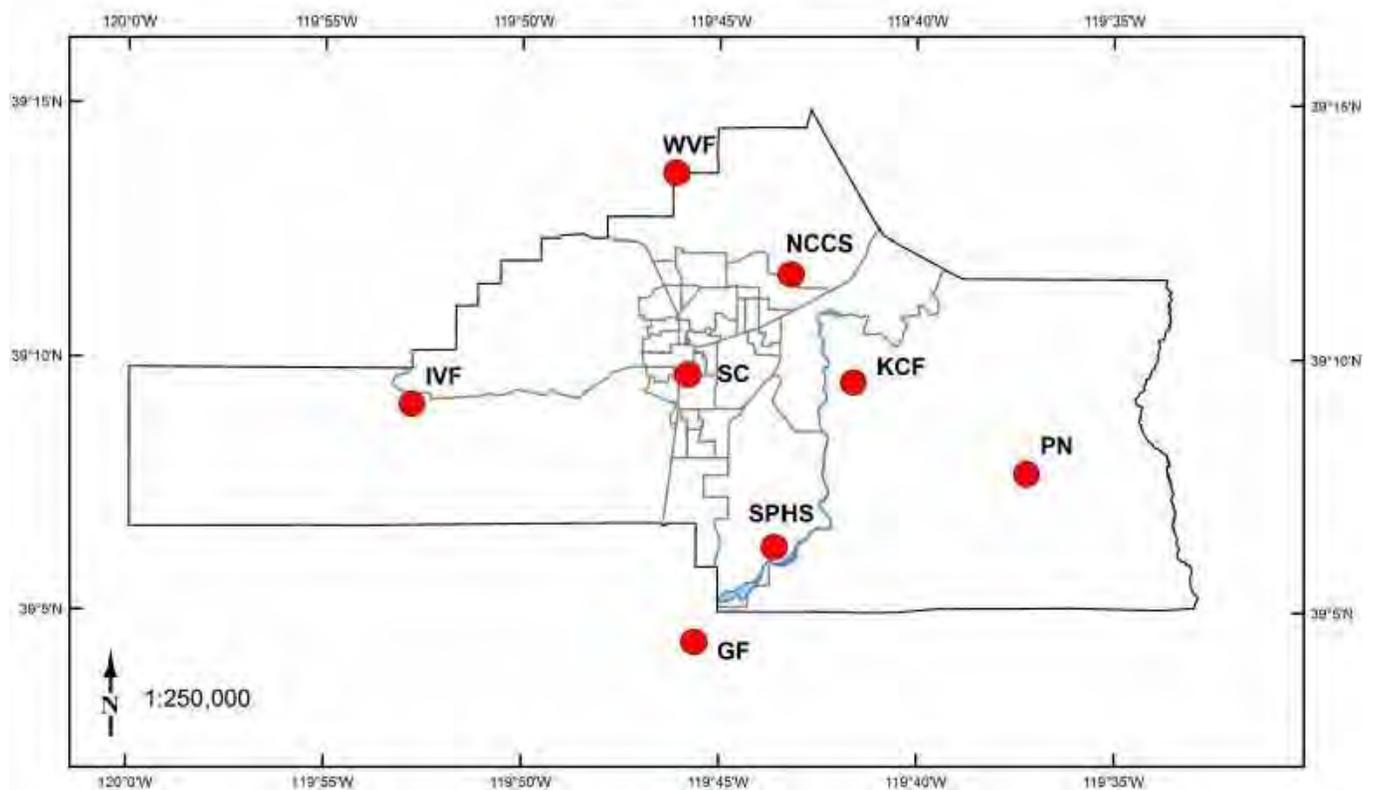


Figure 18. Scenario earthquake epicenter locations with the acronym of the scenario indicated in Table 9.

Table 9. Scenario Earthquakes for Carson City

<u>Fault</u>	<u>Magnitude</u>	<u>Type</u>	<u>Latitude</u>	<u>Longitude</u>
Incline Village fault (IVF)	7.0	normal	39.1496	-119.8803
Washoe Valley fault (WVF)	6.9	normal	39.2284	-119.7715
N. Carson City swarm (NCCS)	6.0	strike-slip	39.2040	-119.7319
State Capitol (SC)	5.0 to 7.0	normal	39.1639	-119.7661
Kings Canyon fault (KCF)	6.9	normal	39.1595	-119.6992
S. Prison Hill swarm (SPHS)	6.0	strike-slip	39.1071	-119.7271
Genoa fault (GF)	7.2	normal	39.0698	-119.7583
Pine Nut faults (PN)	6.5	strike-slip	39.1322	-119.6254

The 12 scenarios include the largest earthquakes that might strike Carson City (events on the Kings Canyon fault, Washoe Valley fault, and Genoa fault). Earthquakes in the western part of the county (Incline Village fault) and in the eastern part (Pine Nut faults) give a spatial view of potential impacts. Several tables of the HAZUS results are presented. The Capitol suite of earthquakes estimations were taken from Seelye and others (2014) and are presented in five tables (Tables 10 - 14). The first two tables are the costs of the different magnitude earthquakes to Nevada (Table 10) and to Carson City (Table 11). Table 12 was taken from Seelye and others (2014) summaries and shows the relationship between several loss parameters and the different magnitude earthquakes between Carson City, Nevada Counties (Nevada), and all counties within 62 miles (100 km), including counties in California. This table clearly shows that the impact of an earthquake in Carson City can have a much wider impact than just the county. Tables 13 and 14 give details of the Capitol suite HAZUS model results for creating planning earthquake scenarios; one table is for Nevada and second is for Carson City. The scenario earthquakes are presented in Tables 15 through 18.

The format and information is the same as the tables in the Capitol suite of events, except there is no table from Seelye and others (2014).

The Capitol suite of events presents a range of increasing impacts, as expected. Total costs and impacts to Nevada range from \$8 million for a magnitude 5 earthquake to \$1.3 billion with a magnitude 7 event. Total costs and impacts to Carson City range from \$4 million for a magnitude 5 earthquake to \$690 million with a magnitude 7 event. HAZUS modeling indicates that building damage begins at about M5.5 and may be substantial by magnitude 6. Building damage in Carson City becomes significantly worse at magnitude 6.5 and projected injuries jump as well with 48 people requiring hospitalization, 181 other injuries, and 12 people deceased. At magnitude 6 and 6.5 levels of damage, a recovery effort would have to be mounted by the city to repair or replace damaged buildings, restore economic vitality, and restore the quality of life to citizens. How long this recovery effort takes depends on the degree of recovery planning that has been done, the attitude of the citizenry, and circumstances surrounding the event, such as whether a disaster declaration has been issued at a Federal level. Shelter needs are estimated at a maximum of about 269

people, which seems low for a community of Carson City's size, but many people in Nevada stay with families, neighbors, or in regional hotels. The estimated number of fires following the earthquake is low for the larger events (M6.5 and M7); in reality several fires following earthquake might be anticipated for planning purposes. For example, chimneys are potentially damaged in all of these scenario events, which can lead to fires if used.

Table 10. State Capitol Scenario Earthquakes – Nevada

Earthquake Magnitude	Building Damage (\$million)	Transportation Damage (\$million)	Utility Cost Damage (\$million)	Total Cost Nevada Cost (\$million)
5.0	1	2	5	8
5.5	39	3	8	50
6.0	214	6	17	240
6.5	650	11	27	690
7.0	1246	17	50	1300

* values rounded to avoid perception of false precision

Table 11. State Capitol Scenario Earthquakes – Carson City

Earthquake Magnitude	Building Damage (\$million)	Transportation Damage (\$million)	Utility Cost Damage (\$million)	Total Cost Nevada Cost (\$million)
5.0	1	1	2	4
5.5	35	2	4	40
6.0	164	3	10	180
6.5	414	4	13	430
7.0	671	5	17	690

* values rounded to avoid perception of false precision

**Table 12 Comparison of Capitol Earthquake Suite Results
Between Different Study Regions**

Carson City, Nevada

Epicenter at 119.76°W longitude, 39.16°N latitude

Results of earthquake scenarios using HAZUS, the loss-estimation model from the Federal Emergency Management Agency. All numbers are estimates, individual numbers may vary by a factor of 10, depending on the location, depth, and magnitude of the earthquake.

Study Region: Carson City County	Earthquake Magnitude				
	5.0	5.5	6.0	6.5	7.0
Number of buildings with extensive to complete damage	0	2	310	1,400	2,300
People needing public shelter	0	0	32	160	270
People needing hospital care	0	0	4	48	120
Fatalities	0	0	1	12	32
Total economic loss (\$ million)	4	40	180	430	690

Study Region: All Nevada counties	Earthquake Magnitude				
	5.0	5.5	6.0	6.5	7.0
Number of buildings with extensive to complete damage	0	2	310	1,400	2,700
People needing public shelter	0	0	33	160	300
People needing hospital care	0	0	5	50	130
Fatalities	0	0	1	12	33
Total economic loss (\$ million)	8	50	240	690	1,300

Study Region: All counties within 100km	Earthquake Magnitude				
	5.0	5.5	6.0	6.5	7.0
Number of buildings with extensive to complete damage	0	2	310	1,400	2,700
People needing public shelter	0	0	33	160	300
People needing hospital care	0	0	5	50	130
Fatalities	0	0	1	12	33
Total economic loss (\$ million)	7	49	250	730	1,400

From Seelye and others (2014)

**Table 13. HAZUS Results for Capitol Suite Scenarios
Nevada Counties**

	Capitol M 5.0	Capitol M 5.5	Capitol M 6.0	Capitol M 6.5	Capitol M 7.0
Bldgs. w/ Moderate Damage	0	155	1,717	3,726	6,567
Bldgs. w/ Extensive and Complete Damage	0	2	312	1,438	2,661
Hospitals	0	0	0	1	1
Schools	0	0	1	14	17
Fire Stations	0	0	0	2	3
Highway Bridges	0	0	0	0	4
Potable Water Facilities	0	0	0	0	0
Waste Water Facilities	0	0	1	1	2
Natural Gas Facilities	0	0	0	0	0
Oil Systems Facilities	0	0	0	0	0
Electrical Power Facilities	0	0	1	4	5
Communications Facilities	0	0	0	0	0
Potable Water Leaks	466	474	529	673	1,200
Potable Water Breaks	117	119	132	168	300
Waste Water Leaks	234	238	266	338	603
Waste Water Breaks	59	60	66	85	151
Natural Gas Leaks	2	2	3	5	13
Natural Gas Breaks	1	1	1	1	3
Oil Leaks	0	0	0	0	1
Oil Breaks	0	0	0	0	0
Households w/o water service @ 1 day	0	0	0	0	3,581
Households w/o Electric Power @ 1 day	2,974	6,689	23,303	45,769	72,367
Fires (# of ignitions)	0	0	1	1	1
Debris (million tons)	0.00	0.00	0.04	0.17	0.34
Shelter (# of people in need of)	0	0	33	159	296
Injuries (2pm) Level 1 *	0	3	39	207	472
Injuries (2pm) Level 2 & 3 **	0	0	5	50	130
Casualties	0	0	1	12	33

* Hospitalization not required

** Hospitalization required

**Table 14. HAZUS Results for Capitol Suite Scenarios
Carson City**

	CCC M 5.0	CCC M 5.5	CCC M 6.0	CCC M 6.5	CCC M 7.0
Bldgs. w/ Moderate Damage	0	151	1,586	2,637	3,121
Bldgs. w/ Extensive and Complete Damage	0	2	311	1,394	2,325
Hospitals	0	0	0	1	1
Schools	0	0	1	13	15
Fire Stations	0	0	0	1	2
Highway Bridges	0	0	0	0	4
Potable Water Facilities	0	0	0	0	0
Waste Water Facilities	0	0	1	1	1
Natural Gas Facilities	0	0	0	0	0
Oil Systems Facilities	0	0	0	0	0
Electrical Power Facilities	0	0	1	4	5
Communications Facilities	0	0	0	0	0
Potable Water Leaks	2	7	30	95	250
Potable Water Breaks	1	2	8	24	62
Waste Water Leaks	1	3	15	48	126
Waste Water Breaks	0	1	4	12	31
Natural Gas Leaks	0	0	0	1	3
Natural Gas Breaks	0	0	0	0	1
Oil Leaks	0	0	0	0	0
Oil Breaks	0	0	0	0	0
Households w/o water service @ 1 day	0	0	0	0	3,539
Households w/o Electric Power @ 1 day	1,937	4,393	9,475	12,749	14,476
Fires (# of ignitions)	0	0	0	0	0
Debris (million tons)	0.00	0.00	0.04	0.14	0.25
Truckloads +	0	0	1,600	5,640	9,920
Shelter (# of people in need of)	0	0	32	155	269
Injuries (2pm) Level 1 *	0	3	36	181	383
Injuries (2pm) Level 2 & 3 **	0	0	4	48	120
Casualties	0	0	1	12	32

+ Debris tonnage converted to number of truckloads @25tons/truck

* Hospitalization not required

** Hospitalization required

**Table 15. Scenario Earthquake Modeled Costs and Losses –
Nevada**

<u>Scenario Earthquake</u>	<u>Building Damage (\$million)</u>	<u>Transportation Damage (\$million)</u>	<u>Utility Damage (\$million)*</u>	<u>Total Earthquake Cost Magnitude (\$million)</u>	
Incline Village fault	7.0	1485	16	40	1541
Washoe Valley fault	6.9	2439	28	67	2534
North Carson City swarm	6.0	660	10	33	703
Kings Canyon fault	6.9	1504	20	60	1584
South Prison Hill swarm	6.0	514	9	27	550
Genoa fault	7.2	2603	29	71	2703
Pine Nut faults	6.5	687	13	33	733

* values rounded to avoid perception of false precision

**Table 16. Scenario Earthquake Modeled Costs and Losses –
Carson City**

<u>Scenario Earthquake</u>	<u>Building Damage (\$million)</u>	<u>Transportation Damage (\$million)*</u>	<u>Utility Cost Magnitude (\$million)*</u>	<u>Total Earthquake Damage (\$million)</u>	
Incline Village fault	7.0	353	3	8	360
Washoe Valley fault	6.9	826	5	17	850
North Carson City swarm	6.0	477	5	21	500
Kings Canyon fault	6.9	527	5	20	550
South Prison Hill swarm	6.0	362	4	21	390
Genoa fault	7.2	952	6	21	980
Pine Nut faults	6.5	261	3	11	280

* values rounded to avoid perception of false precision

Table 17. HAZUS Results for Fault and Swarm Area Scenarios

	IVF M 7.0	WVF M 6.9	NCCS M 6.0	KCF M 6.9	SPHS M 6.0	GF M 7.2	PNF M 6.5
Bldgs. w/ Moderate Damage	9,389	14,724	5,055	10,957	4,265	15,809	5,961
Bldgs. w/ Extensive and Complete Damage	1,645	4,367	1,530	3,394	1,014	5,381	1,495
Hospitals	0	0	0	0	0	1	0
Schools	0	8	1	3	1	7	0
Fire Stations	0	0	1	2	0	1	2
Highway Bridges	4	8	2	6	0	10	3
Potable Water Facilities	0	0	0	0	0	0	0
Waste Water Facilities	1	5	2	2	1	5	2
Natural Gas Facilities	0	0	0	0	0	0	0
Oil Systems Facilities	0	0	0	0	0	0	0
Electrical Power Facilities	13	37	9	21	7	19	7
Communications Facilities	0	0	0	0	0	0	0
Potable Water Leaks	514	739	148	776	128	1,222	422
Potable Water Breaks	129	185	37	194	32	305	106
Waste Water Leaks	258	371	74	390	64	614	212
Waste Water Breaks	65	93	19	97	16	153	53
Natural Gas Leaks	12	15	4	20	4	22	10
Natural Gas Breaks	3	4	1	5	1	6	2
Oil Leaks	1	1	0	1	0	1	0
Oil Breaks	0	0	0	0	0	0	0
Households w/o water service @ 1 day	0	695	0	375	0	6,339	0
Households w/o Electric Power @ 1 day	95,344	114,390	51,514	95,178	38,812	112,553	62,088
Fires (# of ignitions)	1	1	1	1	0	1	1
Debris (million tons)	0.34	0.67	0.19	0.42	0.14	0.74	0.18
Shelter (# of people in need of)	275	794	213	424	149	806	213
Injuries (2pm) Level 1*	389	871	225	533	156	1,050	248
Injuries (2pm) Level 2 & 3**	91	242	57	140	36	313	63
Casualties	21	61	13	33	8	81	15

Incline Village fault - IVF
Washoe Valley fault - WVF
North Carson City swarm - NCCS
Kings Canyon fault - KCF
South Prison Hill swarm - SPHS
Genoa fault - GF
Pine Nut faults - PNF

* Hospitalization not required
** Hospitalization required

Table 18. HAZUS Results for Fault and Swarm Area Scenarios Carson City

CCC	IVF M 7.0	WVF M 6.9	NCCS M 6.0	KCF M 6.9	SPHS M 6.0	GF M 7.2	PNF M 6.5
Bldgs. w/ Moderate Damage	2,100	4,635	3,322	3,630	2,842	4,932	2,222
Bldgs. w/ Extensive and Complete Damage	491	2,225	1,295	1,653	855	2,691	597
Hospitals	0	1	1	1	1	1	0
Schools	1	15	14	15	7	15	2
Fire Stations	0	1	1	1	1	1	0
Highway Bridges	0	2	2	2	0	2	2
Potable Water Facilities	0	0	0	0	0	0	0
Waste Water Facilities	1	1	1	1	1	1	1
Natural Gas Facilities	0	0	0	0	0	0	0
Oil Systems Facilities	0	0	0	0	0	0	0
Electrical Power Facilities	2	7	8	10	7	7	5
Communications Facilities	0	0	0	0	0	0	0
Potable Water Leaks	105	165	70	140	55	226	106
Potable Water Breaks	26	41	18	35	14	56	26
Waste Water Leaks	53	83	35	70	28	113	53
Waste Water Breaks	13	21	9	18	7	28	13
Natural Gas Leaks	1	4	2	8	2	5	3
Natural Gas Breaks	0	1	1	2	0	1	1
Oil Leaks	0	0	0	0	0	0	0
Oil Breaks	0	0	0	0	0	0	0
Households w/o water service @ 1 day	0	550	0	122	0	2,555	0
Households w/o Electric Power @ 1 day	10,379	15,423	14,677	16,550	15,847	16,100	13,846
Fires (# of ignitions)	0	0	0	0	0	0	0
Debris (million tons)	0.09	0.28	0.15	0.18	0.10	0.33	0.08
Truckloads +	3,680	11,040	5,840	7,240	4,160	13,160	3,040
Shelter (# of people in need of)	69	364	193	246	133	439	146
Injuries (2pm) Level 1 *	104	410	185	251	122	509	111
Injuries (2pm) Level 2 & 3 **	28	130	51	74	31	166	31
Casualties	7	35	12	19	7	45	8

Incline Village fault.- IVF
Washoe Valley fault.- WVF
North Carson City swarm.- NCCS
Kings Canyon fault.- KCF
South Prison Hill swarm.- SPHS
Genoa fault.- GF
Pine Nut faults.- PN

* Hospitalization not required
** Hospitalization required
+ Debris tonnage converted to
number of truckloads
@25tons/truck

These 12 scenarios can be used for exercises and planning purposes. These scenario impacts are meant to give some examples of what could happen should a strong earthquake strike the Carson City. They are only general estimates. For exercises and planning purposes, it is reasonable to increase some of the numbers of incidences or impacts of these scenarios to test certain response capabilities and resource planning. For example, the number of damaged schools might be increased to test backup sheltering capability.

Unreinforced Masonry Buildings

Unreinforced masonry buildings (URM) are among the most dangerous buildings to be in or around during an earthquake. These types of buildings are associated with loss of life and extensive property damage from moderate or larger earthquakes. When the 2008 magnitude 6 earthquake struck, there were 19 URM or partial URM buildings in Wells, Nevada. All these buildings had cracking and minor damage, and

12 of them (63%) had major damage following the earthquake (dePolo, 2011). Earthquake damage to URM buildings from earthquakes includes parapet failures, collapse of floors, ceilings, and walls, and the partial or total collapse of the buildings themselves. Bricks and other debris fall from URM buildings and can cause injuries to bystanders and occupants trying to escape the structure. The unreinforced nature of these buildings allows them to break apart and lose cohesion when stressed by earthquake waves. Many unreinforced buildings were built in the late 1800s and early 1900s. The mortar was commonly poor in quality and has weakened with time. Today this older mortar can be disintegrated or eroded away entirely if not maintained, making these buildings even more susceptible to damage. In earthquake country, such as Nevada, it is also common for older earthquake damage not to be completely repaired if the building wasn't badly damaged and these damaged buildings may be in a weakened state from prior shaking.

Knowing the number and locations of URMs is the first step towards understanding the magnitude of this hazard in terms of type and usage of buildings, potential economic losses, and for rapid, prioritized emergency response and damage assessments. A preliminary statewide assessment was made based on a selection

criteria and extracting potential URMs from county assessor's data and the Nevada Public Works (Price and others, 2012). The study collected information on buildings that were built before 1974 and were constructed of brick, stone, or block masonry. Price and others (2012) caution that there are errors in the database, such as missing URMs that were not recorded, were incorrectly recorded, are on Federal or Native American lands, and buildings that have had their vulnerability altered by seismic retrofit or have been removed. Price and others (2012) concluded there were potentially 23,597 URMs in Nevada, 7,354 buildings are residential and 16,243 buildings are commercial or public.

URM homes (Fig. 19) are of particular concern because of the long occupancy times, but homeowners rarely consider seismic rehabilitation because of cost.

Commercial and public buildings may have ornamentation, such as parapets and crowning bond beams (Fig. 20), that are falling hazards around URMs even if the building doesn't collapse during an event (Fig 21).



Figure 19. Unreinforced masonry residence. The home is built on an inhomogeneous rubble-rock foundation, is likely not tied to the foundation, is made of ridged brick that break apart with strong earthquake forces, and has a topple hazard, the tall chimney. Possible secondary hazards include gas leaks and fire if the gas meter or hoses are damaged or further damaged by aftershocks. Shelter would likely be required for the residents following a major earthquake.



Figure 20. Unreinforced masonry commercial building with an unsupported parapet and crowning bond beam. The wheelchair-bound man below would have a difficult time getting out of the way during the shaking from an earthquake.



Figure 21. Bricks and crowning bond beam that fell on a car during the 2008 Wells, Nevada earthquake. Unreinforced masonry buildings can shed debris like this on sidewalks, alleys, and other buildings around them.

Price and others (2012) estimated that there were potentially 734 URM buildings in Carson City, of which 487 were commercial or public, 175 were residential, and 72 were state owned. In 2015, Carson City began reviewing this list of buildings to gain a better understanding of the number of URM buildings there are in the county and what their potential seismic vulnerabilities are. The study is ongoing, but is indicating the actual number of potentially dangerous buildings will be significantly lower than initial estimates. For example, the results of a windshield survey indicated about 150 buildings on the list of potential URM structures from Price and others (2012) are of cinder block construction (~20%), which would be anticipated to perform better in an earthquake than an older unreinforced brick building. Current estimates are that there are a little over 100 URM brick buildings in Carson City.

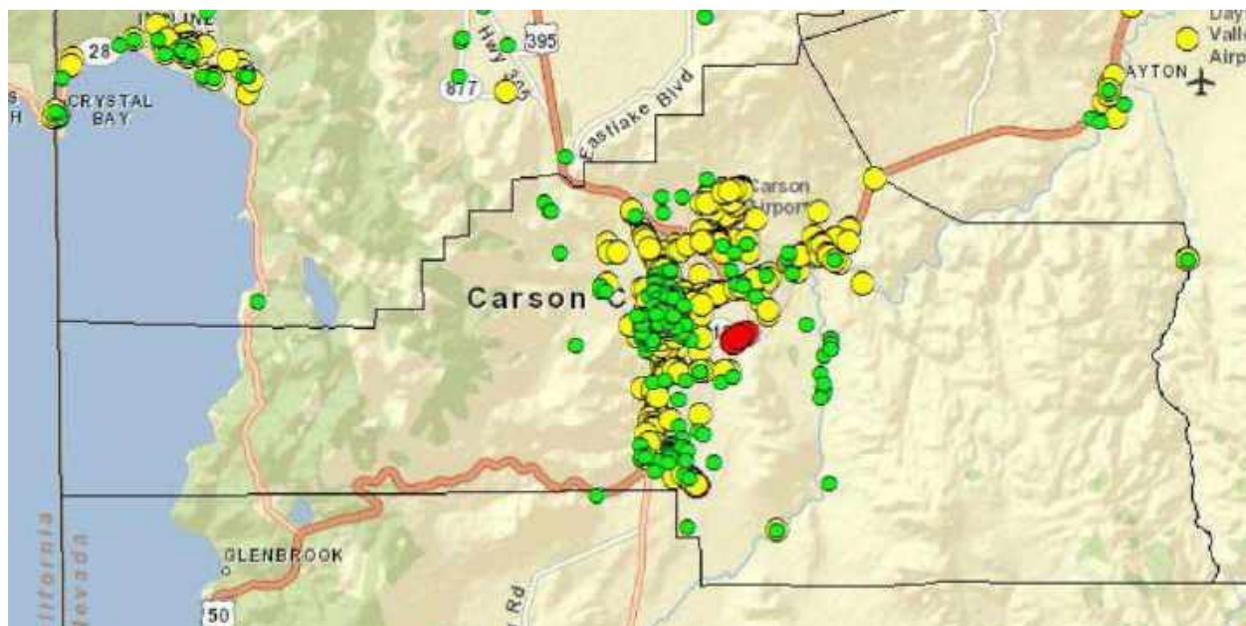


Figure 22. Locations of the possible unreinforced masonry buildings identified by Price and others (2012) in the county. Most of these are in downtown Carson City which has been built and settled since the mid-1800s. New surveys are being conducted to verify the results of this initial study and will substantially lower the number of recognized URM buildings in the county.

The unreinforced masonry building hazard is a very difficult engineering and social problem. These buildings commonly have a significant historical value and there is a strong desire to maintain their original appearance. But they are challenging to work with, even for non-seismic issues, such as installing utilities. If their seismic weakness is not considered, they could fail or shed debris that can kill or injure many people and be lost entirely when an earthquake occurs. The monetary resources needed to rehabilitate URMs are difficult to find and usually are obtained on a building-by-building basis, which is significant, but slow, progress. Communities that have URM buildings and have been through earthquakes, such as Napa and the 2014 South Napa earthquake, have decided it is worth pursuing the seismic rehabilitation or elimination and replacement of URM buildings. Sometimes this can be done with outside contributions, such as from FEMA mitigation grants. A community has to have a conversation about seismically dangerous buildings and what the best approach is. It takes time for a community to collectively decide. Some decisions are easier than others, such as repurposing a building to lower its occupancy versus the more costly structural rehabilitation of a building.

Earthquakes and Carson City Citizens

Earthquake preparedness is a personal and governmental responsibility. How an individual survives an earthquake is largely a function of the ability of an individual to react safely during an earthquake and the preparedness and mitigation they have done before the event. Every person in Carson City should know how to Drop, Cover, and Hold On when an earthquake occurs and the location of safety spots, the safest place to take cover from falling objects. This could dramatically decrease the number of injuries and deaths that could occur in the next major earthquake in the county.

Signing up for and participating in the ShakeOut reinforces the earthquake hazard in lieu of having a damaging earthquake. The ShakeOut is designed to engage participants and offer useful information on how to get prepared for earthquakes. This is why an important action for Carson City is to increase the participation in the annual Great Nevada ShakeOut, which is held in October. This can dramatically

increase the ability of the county's citizens to respond to an earthquake and can

generate a greater awareness and support for community projects that reduce earthquake risk.

In 2015, fewer than 7% of the population of Carson City participated in the Great Nevada ShakeOut. Table 19 indicates the number of Carson City participants in the Nevada ShakeOut for each category for the years 2013, 2014, and 2015. Figure

23 shows the 2014 participation as a percentage by county throughout the state to show how Carson City ranks with other counties. Unfortunately, the trend of participants has been decreasing in Carson City and in 2015 there were 69% fewer participants than in 2013 (3,678 versus 11,757 people). Most of this difference can be attributed to the school district not registering. There are several categories that have had modest increases in participants and Healthcare, an important category to be earthquake ready, did increase over 300% from 2014 to 2015. Nevertheless, there is a lot of opportunity for Carson City to increase its participation in the ShakeOut.

The annual ShakeOut drill is scheduled for the third Thursday in October of each year. However, individuals or organizations may have a ShakeOut drill/activity within two weeks of this date to be counted in this participation number. There is value in promoting participants to visit the ShakeOut website for more specific preparedness information. ShakeOut categories that Carson City residents have not yet signed up include: Tribes, Hotels and Other Lodgings, Senior Facilities/Communities, Disability/AFN Organizations, Neighborhood Groups (Community Emergency Response Teams), Preparedness Organizations, Faith-Based Organizations, Museums/Libraries/Parks, Volunteer/Service Clubs, Youth Organizations, Animal Shelter/Service Providers, Agriculture/Livestock, Volunteer Radio Groups, Science/Engineering Organizations, and Media Organizations. These groups are strategic targets for promoting the ShakeOut in Carson City and increasing the number of people and the breadth of society getting earthquake ready. Social cueing is one of the greatest ways to influence people. If someone sees others participating they are much more likely to participate themselves. This is why it is important to get a large breadth of society involved. Also, each category that has not been involved has an important role in the event of an earthquake – one they might not currently realize.

Table 19. Carson City Participants in the Great Nevada ShakeOut
2014-2015

<u>Category</u>	2013*	2014*	2015*	<u>Change</u>
Individuals/Families	44	20	22	+
Childcare and Preschool	0	114	0	-
K-12 Schools and Districts	9315	7865	1395	--
Colleges and Universities	0	1400	1154	-
Local Government	46	74	54	-
State Government	731	436	559	+
Federal Government (+military)	40	27	12	-
Businesses	120	92	102	+
Healthcare	30	85	365	++
Non-Profit Organizations	31	0	15	+
Total Participants	11,757	10,113	3678	--

* Number of people registered.

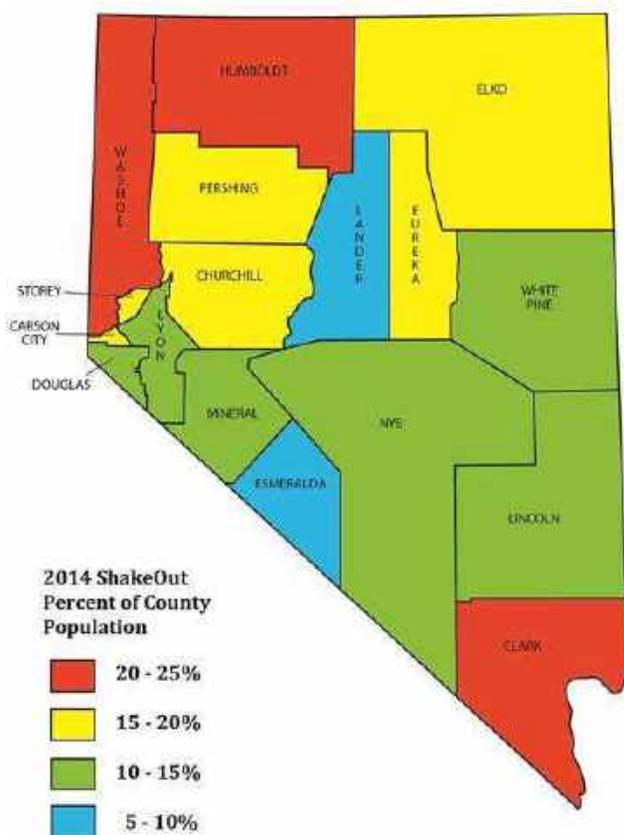


Figure 23. Percentage of population by county of ShakeOut participation in Nevada (from dePolo, 2015). In 2015, Carson City participation dropped to the 5-10% category. This is not commensurate with the high earthquake hazard. Ideally, Carson City would be in the highest category of participation.

Most people do not fully appreciate the threat posed by earthquakes. This is due to the less frequent occurrence of events compared with other hazards. Few earthquakes are desirable, but earthquakes still occur from time-to-time and people are quickly humbled when they strike. People realize why it is so important to prepare for this potentially deadly hazard after the event. The key is to take the earthquake threat to heart, always know how to react safely when an earthquake occurs wherever you are, prepare for earthquakes by making rooms safer by eliminating content and nonstructural hazards, and keep earthquakes in mind when making changes or additions to buildings. The goal is to survive future Carson City earthquakes with few or no injuries and minimize economic loss.

The Nevada's guide on how to prepare for earthquakes and mitigating seismic risks is "Living with Earthquakes in Nevada" produced by the Nevada Bureau of Mines and Geology and available on the Internet at: <http://data.nbmg.unr.edu/public/freedownloads/sp/sp027.zip>

The guide will come as a "zipped" file to save space – If you can open it in Windows Office, it should automatically unzip and open. It is a large file so please be patient.

Carson City Earthquake Mitigation Goals and Action Items

The overarching objective of these mitigation goals and actions is to make Carson City an earthquake resilient county that can experience earthquakes with no loss of life, minimal property damage, and a rapid and full recovery from earthquakes. It is inadequate to separate mitigation, preparedness, and policy issues as they are inextricably intertwined to produce effective earthquake resilience; therefore all three are included in these goals. Because of the importance of this opportunity to address the earthquake hazards of Carson City, these goals and actions go beyond the five-year operational life of the mitigation plan. They should not be considered “exhaustive” and can be prioritized as appropriate.

Goal 1: Encourage Earthquake Preparedness and Mitigation Activities at All Levels in Carson City

There is not a finishing point, or end, to being aware, being prepared, and mitigating for earthquakes. It is a continuous effort for leaders, managers, and citizens. People need to know how to react right away to an unusual, relatively rare, and commonly frightening situation. There is abundant evidence that the earthquake hazard and threat in Carson City is real and imminent. The actions of becoming aware of the hazard, preparing for, and mitigating seismic threats will help people stay in control and make wise decisions when a strong earthquake occurs.

Action Item 1: Create an earthquake hazard web page for Carson City that includes information on earthquakes, earthquake preparedness, seismic mitigation, and many helpful internet links. Specific information and guidance for individuals, neighborhoods, businesses, and communities should be included, as well as clear and convincing messaging of the earthquake hazard potential of Carson City for residents and newcomers. All county residents should know what to do during an earthquake and assist family, friends, customers, and visitors in the aftermath of an event. Part of the web page should be used to convince citizens of the earthquake threat Carson City faces.

[POLICY - PROJECT]

Action Item 2: Advertise, participate, and use as a motivational vehicle the GreatNevada ShakeOut exercise, setting high goals for participation with the supporting strategies to make this work. For example, Carson City can become the first county in the state to have a 50% participation rate. Encourage County Commissioners, the Mayor, the Fire Chief, and the County Manager to act as public champions for the ShakeOut. [POLICY – SMALL PROJECTS]

Goal 2: Assess Earthquake Vulnerabilities of Existing Buildings and Create Strategies to Reduce Earthquake Risks from these Buildings

Action Item 1: Assess the seismic vulnerability of emergency facilities, hospitals, fire and sheriff offices, and lifeline utilities, including the local airport. Recommend any needed actions to reduce seismic vulnerabilities for these facilities. Ideally emergency facilities should survive and be operational following a strong earthquake. [PROJECT]

Action Item 2: Assess the seismic vulnerability and potential content and nonstructural hazards of schools, county buildings and facilities, high-occupancy buildings, and historical buildings. Schools and public facilities are commonly used as shelters following an earthquake disaster. [PROJECT]

Action Item 3: Promote the proper anchoring of homes and buildings to their foundations, especially structures that were built prior to the adoption of anchorage practices in the building code. Instructions on how to evaluate anchoring and anchor if needed should be provided on the earthquake web page. [POLICY - SMALL PROJECTS]

Action Item 4: Continue assessing the number of buildings and facilities that are vulnerable to earthquakes and can cause casualties, injuries, or large property losses.

The most vulnerable buildings include unreinforced masonry buildings and non-ductile concrete buildings. The survey that was recently conducted can be further refined to include a prioritization with respect to seismic risk. In addition to the most vulnerable buildings, other types of construction and construction practices that can have seismic

weaknesses should be reviewed, including older wood-frame buildings that may not be tied to their foundations, tilt-up concrete buildings that may have inadequate ties between the walls and the roof, and soft-story construction that may lack enough lateral resistance for earthquakes. A tool that can be used in this survey is the Rapid Visual Screening of Buildings for Potential Seismic Hazards (FEMA 154, <http://www.fema.gov/library/viewRecord.do?id=3556>). Potential economic losses can be estimated to give a perspective of the impact of potential building damage and for understanding the benefit-cost analyses of seismic rehabilitation. A ranking of public and non-public buildings and facilities by earthquake risk would be useful, so that the highest risk structures can be easily identified. This is important for long-term planning and an emergency response. [PROJECT]

Action Item 5: Compile strategies or techniques for the seismic rehabilitation of public buildings and estimate the mitigation costs. Strategies can include sequencing rehabilitation with maintenance to help lower costs and impact, developing possible funding sources and partnerships, and potential incentives for the seismic rehabilitation of private buildings with high occupancy levels. These strategies and techniques can be made readily available on the earthquake web page. [PROJECT – POLICY]

Action Item 6: Seismically rehabilitate the highest earthquake risk public buildings in Carson City and continue to rehabilitate the next highest priority buildings until all buildings, new and old are seismically resistant or reach an acceptable level of earthquake risk. This would likely be done on a project-by-project basis over a period of years. [PROJECTS]

Goal 3: Reduce Content and Nonstructural Hazards in Homes, Businesses, and Public Buildings

Action Item 1: Create an awareness and motivation campaign in Carson City to reduce building content and nonstructural hazards, some of the largest causes of earthquake injuries and economic losses. Use the county website, the Great Nevada ShakeOut activity, and public gatherings, such as the county fair, to promote and

reinforce the nonstructural earthquake safety message. Encourage hardware stores to stock mitigation supplies for securing contents. Hold “how to” workshops to promote simple mitigation projects. Making sure water heaters are properly secured for shaking is an excellent place to start for safety and emergency water supply purposes. [POLICY - SMALL PROJECTS]

Action Item 2: Encourage assistance for individuals who might not be able to do nonstructural mitigation themselves. Possible programs include neighbors-helping-neighbors, community mitigation volunteers, or possibly Community Emergency Response Team (CERT) activities (training through mitigation). [POLICY]

Action Item 3: Promote an awareness campaign and mitigation activity to properly secure nonstructural items that are of an engineering nature, such as overhead light fixtures. Annual awards advertising the safety of buildings that have been mitigated can be given out as an incentive. [POLICY - SMALL PROJECTS]

Goal 4: Encourage the Purchase of Earthquake Insurance

Action Item 1: Encourage the purchase of earthquake insurance to cover vulnerable buildings and to protect major assets from earthquake losses, especially in areas with specifically identified hazards, such as stronger shaking areas, liquefaction areas, and areas of potential lake tsunami or seiche inundation. Earthquake insurance has to be specifically purchased and is not part of general insurance packages. Consequently, most homes and private buildings in Carson City currently do not have earthquake insurance. Add information and web links to information and insurance carriers, which offer earthquake insurance. Currently, government buildings are covered and the school district has earthquake insurance. [POLICY]

Goal 5: Continue to Adopt and Enforce Current Building Codes and their Seismic Provisions

Action Item 1: Continue adopting and enforcing the current International Building Code and its seismic provisions for new buildings, facilities, and construction in Carson City. [POLICY]

Action Item 2: Encourage the incorporation of earthquake resistance to mobile home installation guidelines. This will reduce overturning, foundation displacement, and the compromise of utilities including water, sewer, gas, and electricity. [POLICY]

Action Item 3: Evaluate the impact of different site velocity classes to input values for construction in Carson City. If significant, create earthquake shaking site class maps of the urban and urban expansion areas based on velocity measurements of the upper 100 feet of site material. This can be accomplished using Refraction Microtremor measurement of shallow ground velocity measurements and/or velocity-calibrated geologic mapping, and/or slope mapping. The site velocity maps can be used as input for the seismic provisions of the International Building Code, requiring more earthquake resistance to buildings in areas that are prone to more shaking, such as unconsolidated young sediments. [PROJECT]

Goal 6: Encourage and Plan for Appropriate Land Use to Minimize Earthquake Damage and Losses

Action Item 1: Create earthquake and fault hazard maps at a scale of 1:24,000 or larger for the Carson City, including: 1) an earthquake fault trace map with recommended set-back zones or other mitigation alternatives, 2) a potential earthquake liquefaction hazard map, 3) a landslide hazard map with possible run-out areas, and 4) a lake tsunami/seiche inundation map for the Late Tahoe shorelines with potential water run-up areas and water heights. These should be readily available to the public on the earthquake web page. [PROJECTS]

Action Item 2: Avoid construction over late Quaternary fault zones. Develop a strategy to avoid building structures for human occupancy and high-value structures across late Quaternary fault traces. For example, fault traces could be identified and a set-back zone of 50 to 60 feet either side of the main late Quaternary fault trace could be used as a guideline. Important structures that must cross faults should characterize and mitigate potential surface offset. [PROJECT – POLICY]

Action Item 3: Establish guidelines for appropriate design and construction in areas of potential liquefaction, landslides, and rock fall areas. Develop seismic guidelines for construction of buildings and other structures such that damage from liquefaction is acceptable and not life threatening. Include guidelines for avoidance of potential damage areas from seismically induced landslides/rock falls and landslide run-out areas in and around areas of habitation or infrastructure. [PROJECT - POLICY]

Action Item 4: Study the paleoearthquake history of local earthquake faults to better characterize the potential magnitude and occurrence of earthquakes in Carson City. These studies are scientifically detailed and expensive, and Federal grants are usually used in Nevada to help support them. A monetary match is often required for these grants and the development of local funds to use as match would facilitate paleoseismic studies in the county. Cooperation in land access to conduct paleoearthquake studies is another way communities can encourage these studies. The better defined the earthquake hazard is the easier it is to appropriately mitigate earthquake risks. [PROJECTS]

Goal 7: Plan for a Successful Earthquake Disaster Emergency Response and Recovery

Action Item 1: Prepare a detailed Earthquake Disaster Planning Scenario for the county, so that consequences, inter-related incidents, and compounding elements can be recognized and anticipated. Planning scenarios can be used to enhance emergency response and recovery plans and as a tool to help officials and the public visualize the earthquake threat. This visualization aids in evaluating and engaging in effective

mitigation. Using real buildings and inventories in the scenario emphasizes the earthquake risk to people. [PROJECT]

Action Item 2: Create a semi-detailed recovery plan to restore the function and quality of life in the county within three years or less following a large earthquake disaster. Successful recoveries have a distinct time variable and recovery is harder to achieve if it is unorganized or progresses slowly. The recovery phase of a disaster is also an opportunity to engage in mitigation and there are potential funding sources for mitigation projects. Recovery needs to begin immediately following the emergency response and needs clear strategies that can be engaged rapidly to help protect businesses, community function, and individuals. A good recovery plan will facilitate these activities. [PROJECT]

Prioritization of Earthquake Resiliency Actions

Table 20 is a suggested prioritization for the earthquake resiliency actions proposed in this study. It includes an abbreviated benefit of taking these actions in the table. The table can be a starting point for discussions on what the leaders and citizens of Carson City feel are the most appropriate and effective actions. The list can be dynamic, with completed actions falling off the list or being lowered in rank and new focus areas rising in importance.

Table 20. Suggested Prioritization of Actions for Earthquake Resiliency

Rank	Goal & Action	Title	Benefit
1	G1A1/G1A2/G3A1/G4A1	Public Awareness Campaign	reduce eq injuries
2	G2A1	Emergency facility assessment	emerg response
3	G2A2	School and county bldg. assess	safety and ER
4	G5A2	Mobile home guidelines	reduce eq losses
5	G2A3	Encour foundation anchoring	reduce eq losses
6	G2A4	Eq risk bldg assess	assess vulnera
7	G7A1	Eq disaster Scenario	motivation & vuln
8	G2A5	Seis rehab tech strategy	costs decision tool
9	G5A3	Site velocity eval & map	IB code tool
10	G3A3	Engineering nonstructural	mit reduce eq risk
11	G2A6	Rehab highest risk bldgs.	reduce eq risk
12	G7A2	Eq recovery plan	facilitate recov
13	G6A1	Seismic hazard maps	plan reduce risk
14	G6A2	Eq fault avoidance	reduce eq risk
15	G6A4	Paleoseismic studies	eq hazard charac
16	G6A3	Other eq haz mitigation	reduce eq risk
17	G3A2	Assist w/bldg. content mitigation	increase eq safety
18	G5A1	Continuing using IBC	reduce eq risk

Conclusions

Carson City has a high level of earthquake hazard. Fortunately there has been an investment in the county in terms of strong building codes and earthquake insurance that will help reduce damage and losses during the next earthquake. Carson City is poised to become an earthquake resilient county, but there are many actions that still need to be taken. For example, the strength of older, weaker buildings needsto be investigated and seismic risks mitigated over time. Perhaps the most important and time effective action that can be taken is the wholesale education of Carson City citizens on how to react and protect themselves when strong shaking occurs. The proper response to an earthquake can literally save people's lives and needs to be practiced to be effective. When the next damaging earthquake occurs in Carson City,or anywhere else, we want people to emerge unharmed. This requires the proper reaction to an earthquake and some thought and action on securing seismically threatening contents in rooms. This can result in protecting your loved ones, friends, employees, customers, and self from falling objects.

An earthquake safety web page and leadership will help facilitate personal preparedness. People need to understand their earthquake hazards and risk, and be motivated to mitigate the negative impacts. It takes a specific commitment to be proactive, have a conversation about earthquake risks, and sustain this effort into thefuture. With time, earthquake preparedness will become more folklore to be followed, reinforced by occasional earthquakes. This will help make harder efforts, such as repurposing or rehabilitating seismically dangerous buildings, easier to consider. Long- term planning should continue to include earthquakes and related hazards and opportunities to lower earthquake risk.

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Appendix –

Modified Mercalli Intensity Levels and Descriptions

Intensity I **Not Felt**

Not felt except by a few people under especially favorable circumstances.

Intensity II **Scarcely Felt**

Felt only by a few people at rest, especially in the upper floors of buildings.

Intensity III **Weak Shaking**

Felt quite noticeably indoors, especially on the upper floors of buildings, but many people do not recognize it as an earthquake. Hanging objects swing.

Intensity IV **Moderate, Widely Observed Shaking**

During the day, felt indoors by many, outdoors by few. At night some awakened, especially light sleepers. Dishes, windows, doors disturbed; walls make creaking sound.

Intensity V **Strong Shaking**

Felt by nearly everybody indoors, felt by many outdoors, awakened many if not most. Frightened a few people. Some dishes and windows broken.

Overtured vases or small unstable objects.

Intensity VI* **Slightly Damaging Shaking*

Felt by all, many to all frightened and run outdoors. Some alarm among individuals. Awakened all. People move about unsteadily during the event.

Damage slight in poorly built buildings. Small amounts of fallen plaster, cracked plaster and walls, broken dishes and glassware in considerable quantities, also some broken windows, fall of knickknacks, books, pictures, some heavy furniture removed and overturned.

Intensity VII* **Moderately Damaging Shaking*

Frightened all, general alarm, all run outdoors, some or many find it difficult to stand. Waves in ponds, lakes, running water, water turbid from being stirred up. Suspended objects made to quiver. Some rock falls. Damage considerable in poorly built or weak buildings, adobe buildings, unreinforced masonry buildings, old walls, and spires. Chimneys cracked to a considerable extent. Fall of plaster in large amounts. Numerous windows broken. Loosened brickwork and tiles shaken down. Fall of cornices, bricks and stones dislodged. Damage considerable to concrete irrigation ditches.

Intensity VIII* **Heavily Damaging Shaking*

General fright, alarm approaches panic. Trees shaken strongly, branches and trunks broken off. Liquefaction occurs locally accompanied by ejected sand or mud in small amounts. Changes in levels and temperatures of springs. Many rock falls and landslides. Damage slight in well-built structures designed with earthquake resistance, considerable in ordinary substantial buildings, weak structures partially collapsed, racked, and tumbled down. Fall of walls. Seriously cracked and broken stone walls. Twisting, fall of chimneys, columns, monuments, factory stacks, and towers. Very heavy furniture moved conspicuously or overturned.

***Intensity IX* Destructive Shaking**

General panic. Conspicuous cracked ground. Damage considerable in specifically designed structures, great in substantial masonry buildings with some collapse. Buildings wholly shifted off foundations. Well-designed frame structures thrown out-of-plumb and racked. Reservoirs damaged and underground pipes are sometimes broken.

***Intensity X* Very Destructive Shaking and Ground Displacement**

Cracked ground, especially when loose and wet. Parallel fissures along canal and stream banks. Landslides considerable along stream banks and steep cliffs. Changed levels in many water wells. Water thrown on the banks of canals, lakes, and rivers. Some well-built structures destroyed. Most masonry structures destroyed along with their foundations. Rails bent slightly. Serious damage to dams, dikes, and embankments.

***Intensity XI* Devastating Shaking and Ground Displacement**

Widespread ground disturbance, broad fissures, earth slumps, and land slips in soft, wet, ground. Ejection of large amounts of water charged with sand and mud. Few, if any masonry structures remain standing. Severe damage to wood-framed structures. Great damage to dams, dikes, and embankments.

Bridges destroyed by wracking of support piers or pillars. Rails bent greatly. Underground pipes completely out of service.

***Intensity XII Complete* Devastation from Shaking and Ground Displacement**

Damage total. Waves seen on ground surface. Objects thrown up in the air. Ground greatly disturbed. Waterways blocked by landslides. Large rock masses loose. Fault displacement of surface with notable horizontal and vertical displacements.

Appendix F: Vulnerability Documentation

- Carson City Land Use Codes

Vacant	
100	Vacant - Unknown/Other
108	Vacant - Patented Mining Claim, Not mined
110	Vacant - Splinter and Other Unbuildable
117	Vacant - Roads/Easements
120	Vacant - Single Family Residential
130	Vacant - Multi-Residential
140	Vacant - Commercial
150	Vacant - Industrial
160	Vacant - Mixed Zoning
190	Vacant - Public Use Lands
Single Family	
200	Single Family Residence
201	Single Family Residence Under Construction
210	Individual Residential Unit in a Multiple Unit Building - Condominium
211	Individual Residential Unit in a Multiple Unit Building - Condominium Under Construction
220	Manufactured Home Converted to Real Property
222	Manufactured Home (Converted) with Site Built Additions
230	Personal Property Manufactured Home on the Unsecured Roll
231	Manufacture Home Conversions Pending
232	Manufactured Home - Unsecured with Site Built Additions
233	Secured Manufactured Home with Site Built Additions (Not Converted)
236	Personal Property Manufactured Home Secured
240	Individual Residential Unit - Townhouse or Row House
241	Individual Residential Unit - Townhouse or Row House Under Construction
260	Single Family Residential Auxiliary Area
270	Single Family Residential Common Area
280	Single Family Residential with Minor Improvements
282	Single Family Residential with Minor Improvements - No livable structures
290	Mixed Use with Single Family Residential as primary use
Multiresidential	
300	Duplex
301	Duplex Under Construction
310	Two Single Family Units
311	Two Single Family Units Under Construction
313	Multi-Family Residence with Manufactured Home Conversion
320	Three to Four Units
321	Three to Four Units Under Construction
330	Five or More Units - Low Rise
331	Five or More Units - Low Rise Under Construction
333	Exempt or Partially Exempt Apartment Building
340	Five or More Units - High Rise
341	Five or More Units - High Rise Under Construction
350	Manufactured Home Park - Ten or More Manufactured Home Units

360	Multi-Family Residential Auxiliary Area
370	Multi-Family Residential Common Area
380	Multi-Family Residential with Minor Improvements
382	Multi-Family Residential with Minor Improvements - No livable structures
390	Mixed Use with Multi-Family Residential as primary use
Commercial	
400	General Commercial
401	General Commercial Under Construction
402	Parking and/or Parking Structures
403	Restaurants
404	Convenience Stores
408	Bars or Taverns without Restaurants
410	Offices, Professional and Business Services
411	Offices, Professional and Business Services - Under Construction
412	Residence used as Commercial Business
420	Casino or Hotel Casino
421	Casino or Hotel Casino Under Construction
430	Commercial Living Accommodations
431	Commercial Living Accommodations Under Construction
432	Bed and Breakfast
440	Commercial Recreation
441	Commercial Recreation Under Construction
450	Golf Course
460	Commercial Auxiliary Area
470	Commercial Common Area
480	Commercial with Minor Improvements
482	Commercial with Minor Improvements - with structures insufficient to determine intended use
490	Mixed Use with Commercial as primary use
Industrial	
500	General Industrial - light industry, trucking and warehousing, service, repair, etc.
501	General Industrial - light industry, trucking and warehousing, service, repair, etc. Under Construction
510	Commercial Industrial - retail or office use combined with Industrial use
511	Commercial Industrial - retail or office use combined with Industrial use Under Construction
512	Mini-Warehouses
513	Truck Stops
514	Truck Stops with Motels
520	Heavy Industrial
521	Heavy Industrial Under Construction
560	Industrial Auxiliary Area
570	Industrial Common Area

580	Industrial with Minor Improvements
582	Industrial with Minor Improvements - with structures insufficient to determine intended use
590	Mixed Use with Industrial as primary use

<u>Rural</u>	
600	Agricultural Qualified per NRS 361A - Vacant
610	Agricultural Not Qualified per NRS 361A for deferment - Vacant
612	Agricultural Not Qualified per NRS 361A for deferment - with Residence
613	Agricultural Not Qualified per NRS 361A for deferment - with Manufactured Home
614	Agricultural Not Qualified per NRS 361A for deferment - with Commercial
615	Agricultural Not Qualified per NRS 361A for deferment - with Minor Improvements, No livable structures
616	Agricultural Not Qualified per NRS 361A for deferment - with Industrial
618	Agricultural Not Qualified per NRS 361A for deferment - with Multiple Residences
620	Open Space
622	Sites designated as Historic - Residential
624	Sites designated as Historic - Commercial
625	Sites designated as Historic - Industrial
660	Rural Use Auxiliary Area
670	Rural Use Common Area
680	Rural Use with Minor Improvements
682	Rural Use with Minor Improvements - No livable structures
690	Mixed Use with Rural as primary use
692	Agricultural Deferred with Residence
693	Agricultural Deferred with Manufactured Home
694	Agricultural Deferred with Commercial
695	Agricultural Deferred with Improvements but no Residences
696	Agricultural Deferred with Industrial
697	Agricultural Deferred with Residential Land Value but No Residence currently in existence
698	Agricultural Deferred with Multiple Residences
<u>Utilities</u>	
700	Operating Communication, Transportation, and Utility Property of an Interstate or Intercounty Nature
710	Communication, Transportation, and Utility Property of a Local Nature
711	Communication, Transportation, and Utility Property of a Local Nature Under Construction
720	Communication, Transportation, and Utility Property of an Interstate or Intercounty Nature, Not Used in Operations (Locally Assessed)
731	Alternative Energy - Solar

732	Alternative Energy - Wind
733	Alternative Energy - Biomass
780	Locally Assessed Utility Use with Minor Improvements
790	Mixed Use with Locally Assessed Utility as primary use

Mining	
800	Mining Property - Locally Assessed - Pre-development or Abandoned Mine, Improvements not valued by State
810	Mining Property - Extractive Mineral, Valuation of Improvements by State, Land Valuation by County
820	Mining Property - Oil and Gas, Valuation of Improvements by State, Land Valuation by County
830	Mining Property - Geothermal, Valuation of Improvements by State, Land Valuation by County
840	Aggregates, Quarries, etc. - Locally Assessed
880	Locally Assessed Mine with Minor Improvements
882	Locally Assessed Mine with Minor Improvements - No livable structures
890	Mixed Use with Mine as primary use
Public Use	
900	Parks for Public Use
910	Cemeteries
920	Hospitals
921	Hospital or Skilled Nursing Home Under Construction
922	Skilled Nursing Homes
930	Special Use - Limited-Market Properties
960	Special Purpose Auxiliary Area
970	Special Purpose Common Area
980	Special Purpose with Minor Improvements
990	Mixed Use with Special Purpose as primary use

Appendix G: Hazus Reports

- Earthquake Results
- Flood Results

Appendix G: Hazus Reports

- Earthquake Results



FEMA

RiskMAP
Increasing Resilience Together

Hazus: Earthquake Global Risk Report

Region Name: CCHMP_EQ_CBlock

Earthquake Scenario: M6.5-Carson City fault v3

Print Date: June 30, 2021

Disclaimer:

This version of Hazus utilizes 2010 Census Data.

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

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FEMA

General Description of the Region

Hazus-MH is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Nevada

Note:

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 157.20 square miles and contains 14 census tracts. There are over 21 thousand households in the region which has a total population of 55,274 people (2010 Census Bureau data). The distribution of population by Total Region and County is provided in Appendix B.

There are an estimated 20 thousand buildings in the region with a total building replacement value (excluding contents) of 6,267 (millions of dollars). Approximately 90.00 % of the buildings (and 73.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 535 and 349 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 20 thousand buildings in the region which have an aggregate total replacement value of 6,267 (millions of dollars) . Appendix B provides a general distribution of the building value by Total Region and County.

In terms of building construction types found in the region, wood frame construction makes up 76% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 3 hospitals in the region with a total bed capacity of 229 beds. There are 19 schools, 4 fire stations, 13 police stations and 4 emergency operation facilities. With respect to high potential loss facilities (HPL), there are no dams identified within the inventory. The inventory also includes 8 hazardous material sites, no military installations and no nuclear power plants.

Transportation and Utility Lifeline Inventory

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 884.00 (millions of dollars). This inventory includes over 31.69 miles of highways, 31 bridges, 1,460.22 miles of pipes.

Table 1: Transportation System Lifeline Inventory

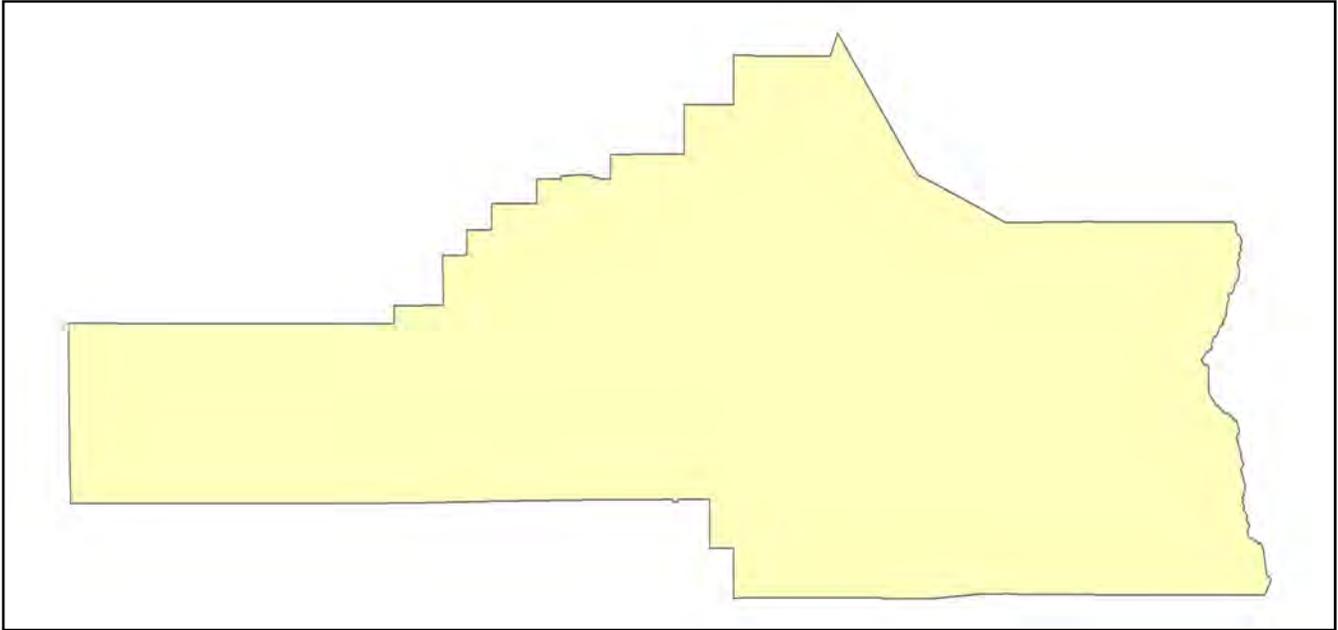
System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	31	108.7572
	Segments	13	366.2013
	Tunnels	0	0.0000
	Subtotal		474.9585
Railways	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	0	0.0000
	Tunnels	0	0.0000
	Subtotal		0.0000
Light Rail	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	0	0.0000
	Tunnels	0	0.0000
	Subtotal		0.0000
Bus	Facilities	2	3.1040
	Subtotal		3.1040
Ferry	Facilities	0	0.0000
	Subtotal		0.0000
Port	Facilities	0	0.0000
	Subtotal		0.0000
Airport	Facilities	1	12.2220
	Runways	2	45.1690
	Subtotal		57.3910
		Total	535.50

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	29.1307
	Facilities	0	0.0000
	Pipelines	0	0.0000
	Subtotal		29.1307
Waste Water	Distribution Lines	NA	17.4784
	Facilities	2	277.4200
	Pipelines	0	0.0000
	Subtotal		294.8984
Natural Gas	Distribution Lines	NA	11.6523
	Facilities	0	0.0000
	Pipelines	4	13.6027
	Subtotal		25.2550
Oil Systems	Facilities	0	0.0000
	Pipelines	0	0.0000
	Subtotal		0.0000
Electrical Power	Facilities	0	0.0000
	Subtotal		0.0000
Communication	Facilities	1	0.1090
	Subtotal		0.1090
	Total		349.40

Earthquake Scenario

Hazus uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.



Scenario Name	M6.5-Carson City fault v3
Type of Earthquake	
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	NA
Longitude of Epicenter	0.00
Latitude of Epicenter	0.00
Earthquake Magnitude	6.48
Depth (km)	0.00
Rupture Length (Km)	0.00
Rupture Orientation (degrees)	0.00
Attenuation Function	

Direct Earthquake Damage

Building Damage

Hazus estimates that about 7,800 buildings will be at least moderately damaged. This is over 38.00 % of the buildings in the region. There are an estimated 969 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Damage Categories by General Occupancy Type

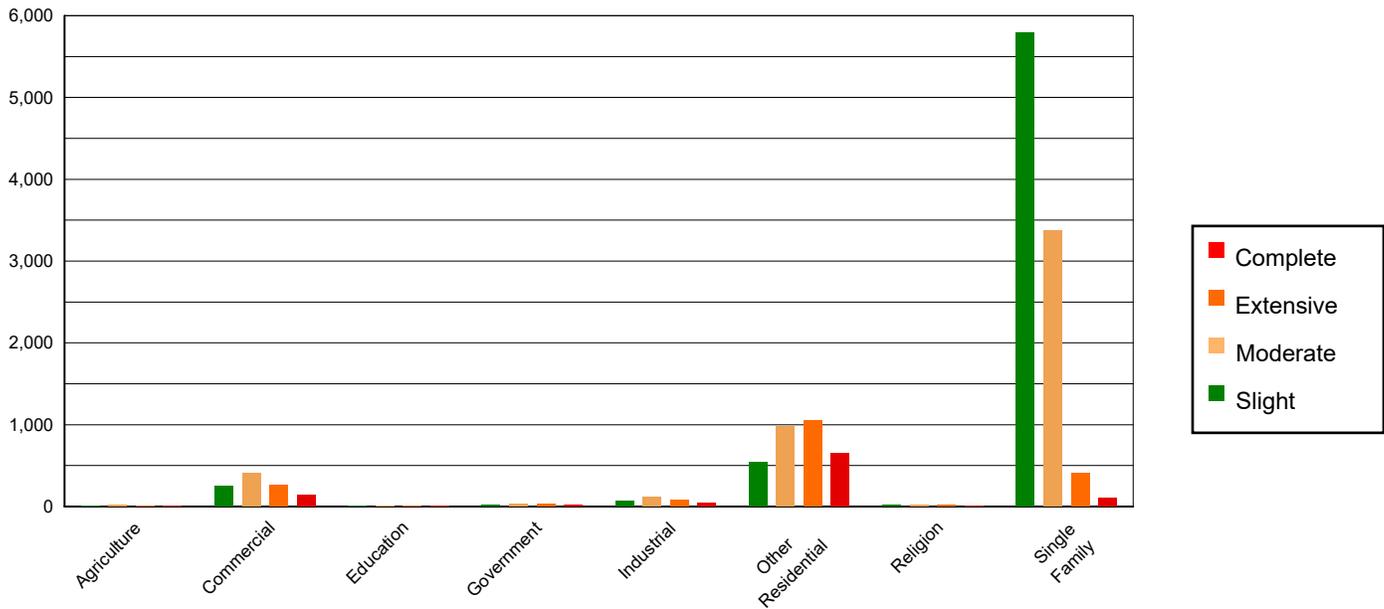


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	12.13	0.20	14.00	0.21	16.08	0.32	9.28	0.50	5.50	0.57
Commercial	228.25	3.78	244.54	3.65	405.68	8.17	263.73	14.14	135.79	14.00
Education	7.63	0.13	8.61	0.13	11.86	0.24	8.12	0.44	4.78	0.49
Government	16.62	0.27	20.95	0.31	36.92	0.74	27.71	1.49	14.79	1.52
Industrial	68.81	1.14	68.66	1.02	117.58	2.37	79.82	4.28	44.13	4.55
Other Residential	345.33	5.71	539.62	8.05	977.39	19.69	1048.27	56.19	647.38	66.75
Religion	15.32	0.25	18.57	0.28	25.17	0.51	16.16	0.87	7.78	0.80
Single Family	5352.09	88.52	5785.80	86.35	3373.98	67.96	412.41	22.11	109.72	11.31
Total	6,046		6,701		4,965		1,866		970	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	5548.14	91.76	6110.47	91.19	3538.53	71.27	400.28	21.46	120.45	12.42
Steel	74.67	1.23	68.29	1.02	143.98	2.90	109.66	5.88	54.42	5.61
Concrete	59.15	0.98	75.84	1.13	123.18	2.48	90.58	4.86	42.96	4.43
Precast	49.43	0.82	50.31	0.75	109.97	2.22	83.71	4.49	47.52	4.90
RM	241.47	3.99	168.89	2.52	285.95	5.76	180.05	9.65	53.51	5.52
URM	6.11	0.10	10.29	0.15	22.70	0.46	26.58	1.42	38.66	3.99
MH	67.24	1.11	216.67	3.23	740.37	14.91	974.65	52.25	612.35	63.14
Total	6,046		6,701		4,965		1,866		970	

*Note:

- RM Reinforced Masonry
- URM Unreinforced Masonry
- MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 229 hospital beds available for use. On the day of the earthquake, the model estimates that only 69 hospital beds (30.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 57.00% of the beds will be back in service. By 30 days, 80.00% will be operational.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	3	1	0	0
Schools	19	17	0	0
EOCs	4	4	0	0
PoliceStations	13	13	0	0
FireStations	4	3	0	0

Table 6: Expected Damage to the Transportation Systems

System	Component	Number of Locations_				
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	13	0	0	13	13
	Bridges	31	0	0	31	31
	Tunnels	0	0	0	0	0
Railways	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	2	2	0	2	2
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	1	1	0	1	1
	Runways	2	0	0	2	2

Table 6 provides damage estimates for the transportation system.

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	2	2	0	0	2
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	0	0	0	0	0
Communication	1	1	0	1	1

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	905	362	91
Waste Water	543	182	46
Natural Gas	13	2	0
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	21,427	3,729	94	0	0	0
Electric Power		10,146	5,645	1,974	323	16

Induced Earthquake Damage

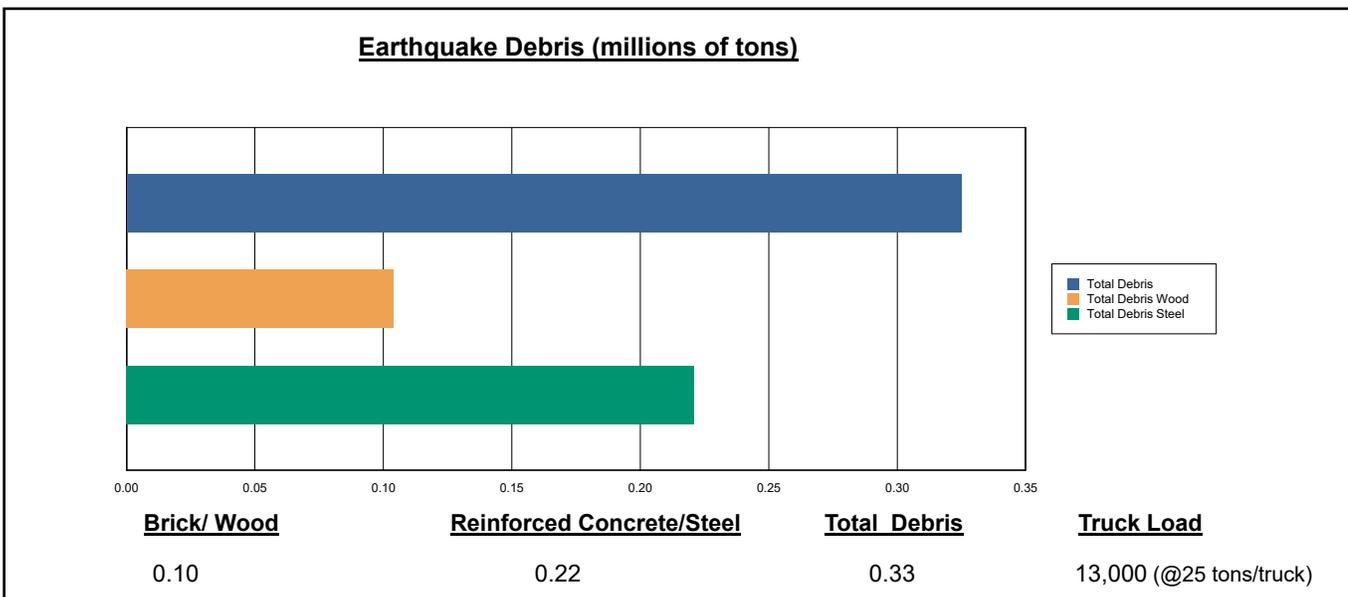
Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 45 people and burn about 3 (millions of dollars) of building value.

Debris Generation

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

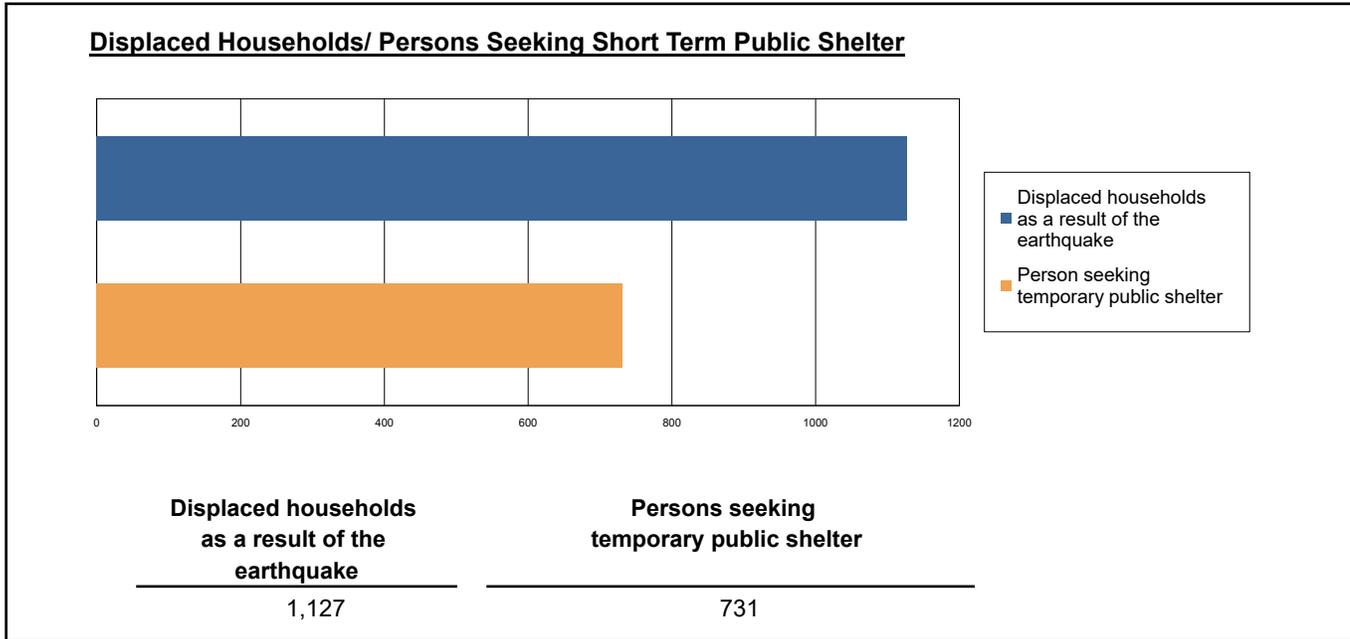
The model estimates that a total of 325,000 tons of debris will be generated. Of the total amount, Brick/Wood comprises 32.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 13,000 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.



Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 1,127 households to be displaced due to the earthquake. Of these, 731 people (out of a total population of 55,274) will seek temporary shelter in public shelters.



Casualties

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	5.10	1.49	0.25	0.49
	Commuting	0.01	0.02	0.03	0.01
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	6.74	1.96	0.32	0.63
	Other-Residential	154.56	37.32	3.71	6.85
	Single Family	63.11	10.59	0.82	1.52
	Total	230	51	5	9
2 PM	Commercial	308.89	90.33	14.90	29.29
	Commuting	0.13	0.18	0.30	0.06
	Educational	94.35	27.92	4.69	9.18
	Hotels	0.00	0.00	0.00	0.00
	Industrial	49.69	14.44	2.34	4.58
	Other-Residential	34.20	8.28	0.84	1.53
	Single Family	14.14	2.37	0.20	0.33
	Total	501	144	23	45
5 PM	Commercial	225.85	65.88	10.91	21.16
	Commuting	2.17	2.94	4.91	0.95
	Educational	9.00	2.67	0.45	0.88
	Hotels	0.00	0.00	0.00	0.00
	Industrial	31.06	9.03	1.46	2.86
	Other-Residential	56.91	13.83	1.43	2.59
	Single Family	24.47	4.12	0.34	0.57
	Total	349	98	19	29



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Economic Loss

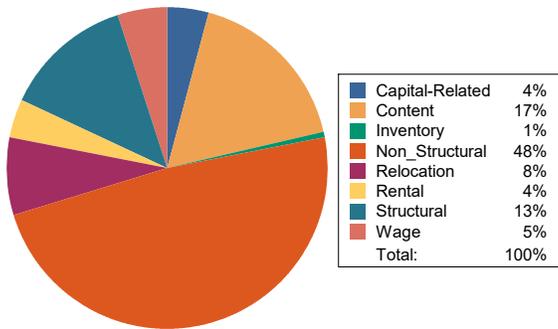
The total economic loss estimated for the earthquake is 1,265.48 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 1,166.92 (millions of dollars); 21 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 47 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

Earthquake Losses by Loss Type (\$ millions)



Earthquake Losses by Occupancy Type (\$ millions)

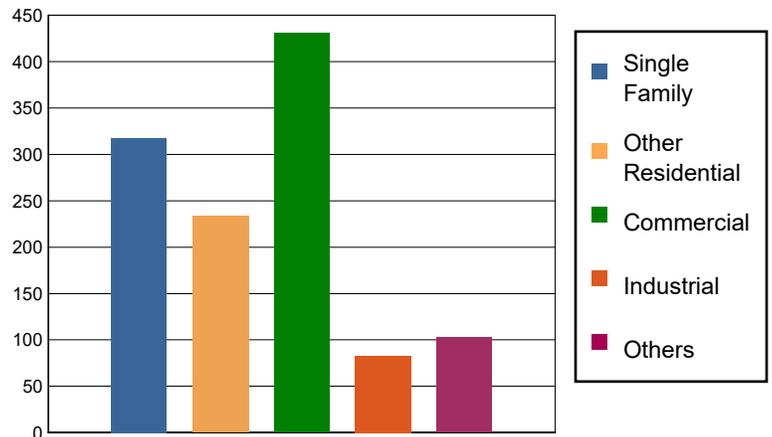


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	2.9975	49.5259	1.8078	5.4934	59.8246
	Capital-Related	0.0000	1.2783	44.7503	1.1023	0.5101	47.6410
	Rental	7.7288	12.3208	21.6563	0.6288	3.6315	45.9662
	Relocation	28.1744	13.2967	33.6839	2.9654	13.8352	91.9556
	Subtotal	35.9032	29.8933	149.6164	6.5043	23.4702	245.3874
Capital Stock Losses							
	Structural	39.9461	32.7499	51.5274	10.8661	14.4984	149.5879
	Non_Structural	184.0860	141.3301	156.6959	37.0132	44.8838	564.0090
	Content	57.9104	29.4335	71.0593	23.9064	19.5085	201.8181
	Inventory	0.0000	0.0000	1.7348	4.2392	0.1391	6.1131
	Subtotal	281.9425	203.5135	281.0174	76.0249	79.0298	921.5281
	Total	317.85	233.41	430.63	82.53	102.50	1166.92

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Table 12: Transportation System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	366.2013	0.0000	0.00
	Bridges	108.7572	8.2294	7.57
	Tunnels	0.0000	0.0000	0.00
	Subtotal	474.9585	8.2294	
Railways	Segments	0.0000	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	0.0000	0.0000	
Light Rail	Segments	0.0000	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	0.0000	0.0000	
Bus	Facilities	3.1040	1.1874	38.25
	Subtotal	3.1040	1.1874	
Ferry	Facilities	0.0000	0.0000	0.00
	Subtotal	0.0000	0.0000	
Port	Facilities	0.0000	0.0000	0.00
	Subtotal	0.0000	0.0000	
Airport	Facilities	12.2220	4.6932	38.40
	Runways	45.1690	0.0000	0.00
	Subtotal	57.3910	4.6932	
Total		535.45	14.11	

Table 13: Utility System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	29.1307	1.6307	5.60
	Subtotal	29.1307	1.6307	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	277.4200	81.6988	29.45
	Distribution Lines	17.4784	0.8191	4.69
	Subtotal	294.8984	82.5179	
Natural Gas	Pipelines	13.6027	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	11.6523	0.2806	2.41
	Subtotal	25.2550	0.2806	
Oil Systems	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	0.0000	0.0000	
Electrical Power	Facilities	0.0000	0.0000	0.00
	Subtotal	0.0000	0.0000	
Communication	Facilities	0.1090	0.0255	23.39
	Subtotal	0.1090	0.0255	
	Total	349.39	84.45	



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Appendix A: County Listing for the Region

Carson City, NV

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Nevada	Carson City	55,274	4,552	1,715	6,267
Total Region		55,274	4,552	1,715	6,267

Appendix G: Hazus Reports

- Flood Results



Hazus: Flood Global Risk Report

Region Name: CarsonCityFlooding

Flood Scenario: CCHMP_Flood_CencusBlock

Print Date: Wednesday, June 30, 2021

Disclaimer:

This version of Hazus utilizes 2010 Census Data.

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.



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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Nevada

Note:

Appendix A contains a complete listing of the counties contained in the region .

The geographical size of the region is approximately 157 square miles and contains 1,450 census blocks. The region contains over 21 thousand households and has a total population of 55,274 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B .

There are an estimated 20,547 buildings in the region with a total building replacement value (excluding contents) of 6,268 million dollars. Approximately 90.49% of the buildings (and 72.64% of the building value) are associated with residential housing.



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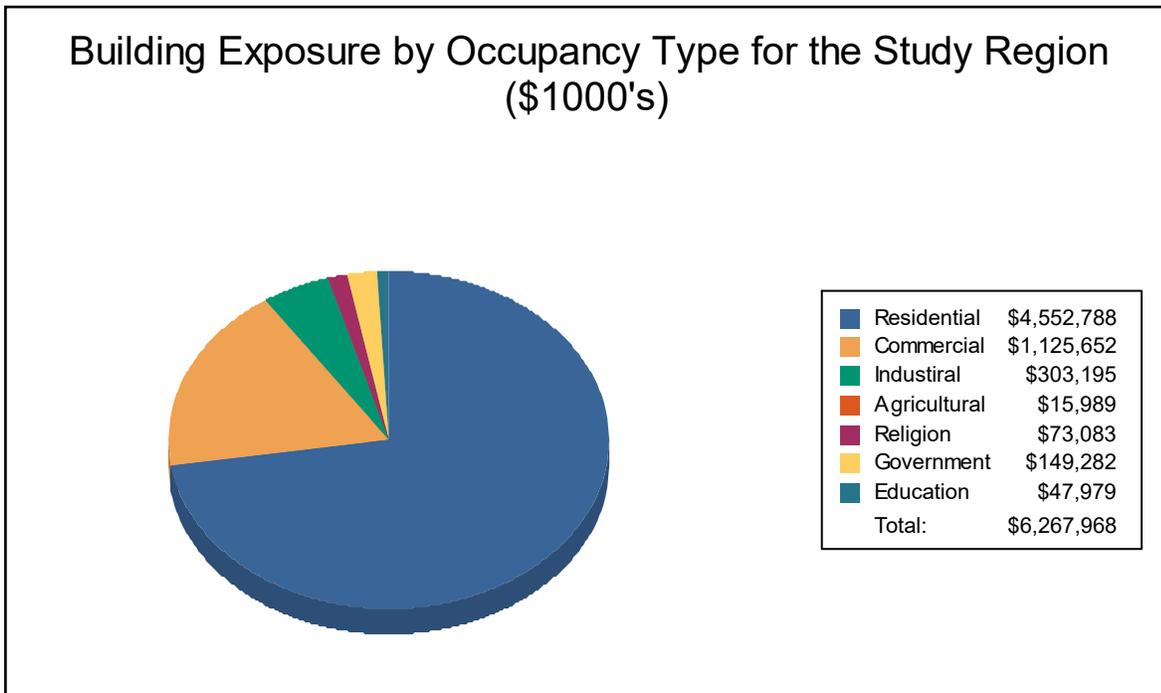
Building Inventory

General Building Stock

Hazus estimates that there are 20,547 buildings in the region which have an aggregate total replacement value of 6,268 million dollars. Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure (\$1000)	Percent of Total
Residential	4,552,788	72.6%
Commercial	1,125,652	18.0%
Industrial	303,195	4.8%
Agricultural	15,989	0.3%
Religion	73,083	1.2%
Government	149,282	2.4%
Education	47,979	0.8%
Total	6,267,968	100%



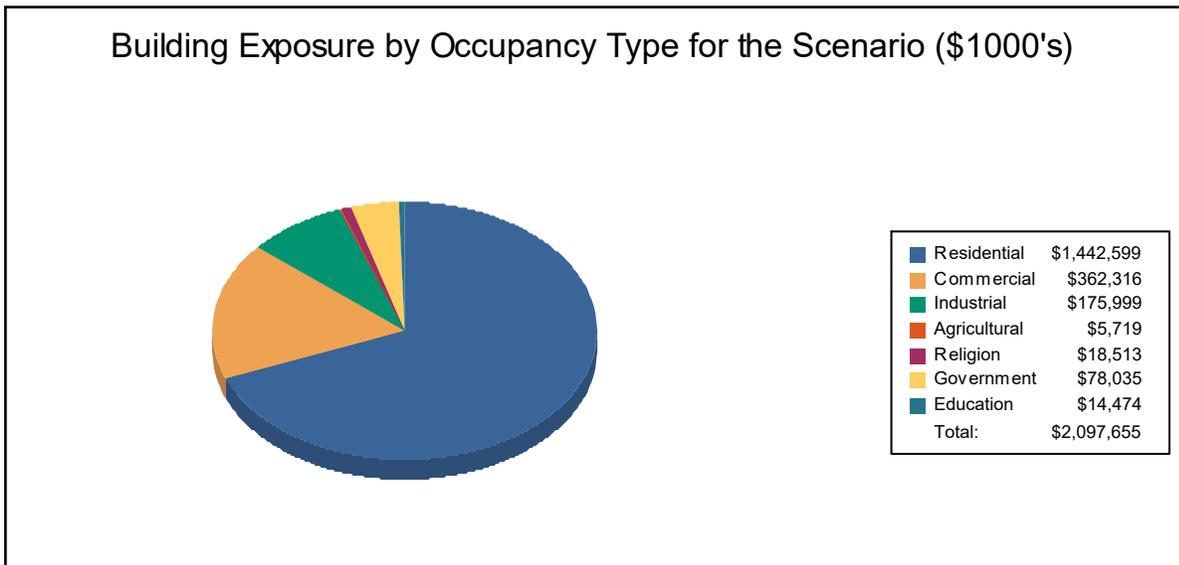
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Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure (\$1000)	Percent of Total
Residential	1,442,599	68.8%
Commercial	362,316	17.3%
Industrial	175,999	8.4%
Agricultural	5,719	0.3%
Religion	18,513	0.9%
Government	78,035	3.7%
Education	14,474	0.7%
Total	2,097,655	100%



Essential Facility Inventory

For essential facilities, there are 3 hospitals in the region with a total bed capacity of 229 beds. There are 19 schools, 4 fire stations, 13 police stations and 4 emergency operation centers.



Building Damage

General Building Stock Damage

Hazus estimates that about 123 buildings will be at least moderately damaged. This is over 37% of the total number of buildings in the scenario. There are an estimated 31 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Total Economic Loss (1 dot = \$300K) Overview Map

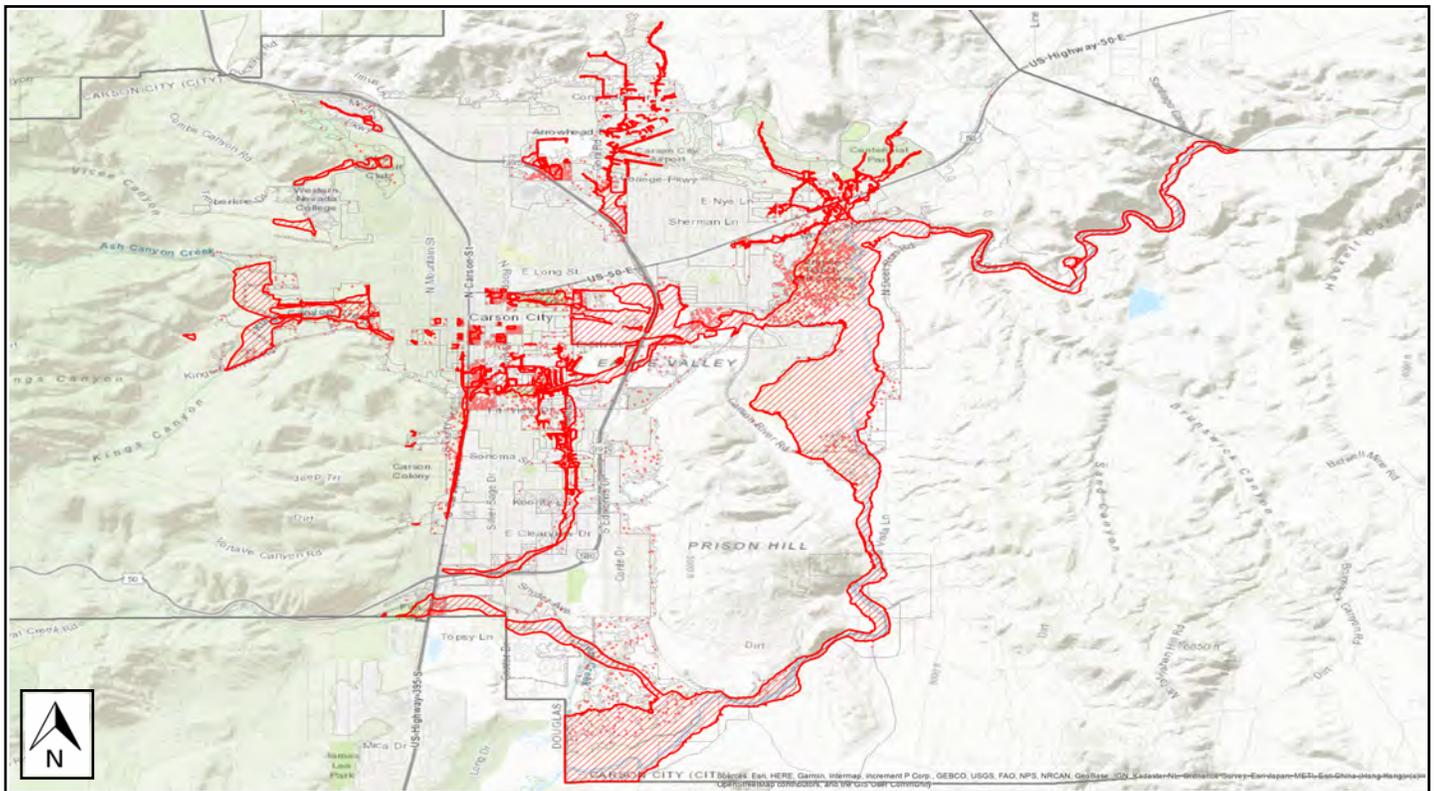
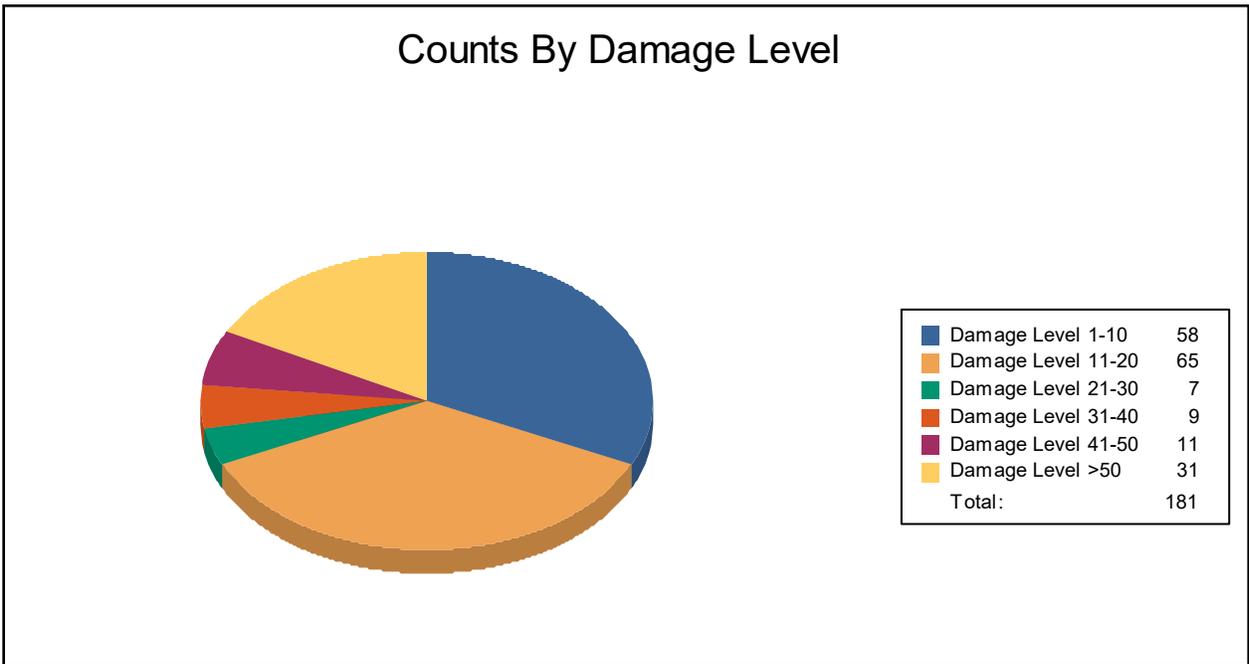




Table 3: Expected Building Damage by Occupancy

Occupancy	1-10		11-20		21-30		31-40		41-50		>50	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	0	0	0	0	0	0	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0	0	0	0	0
Religion	0	0	0	0	0	0	0	0	0	0	0	0
Residential	58	32	65	36	7	4	9	5	11	6	31	17
Total	58		65		7		9		11		31	



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Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		>50	
	Count	(%)										
Concrete	0	0	0	0	0	0	0	0	0	0	0	0
ManufHousing	0	0	2	67	0	0	0	0	0	0	1	33
Masonry	0	0	0	0	0	0	0	0	0	0	0	0
Steel	0	0	0	0	0	0	0	0	0	0	0	0
Wood	57	33	62	35	7	4	9	5	10	6	30	17



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Essential Facility Damage

Before the flood analyzed in this scenario, the region had 229 hospital beds available for use. On the day of the scenario flood event, the model estimates that 229 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

Classification	# Facilities			
	Total	At Least Moderate	At Least Substantial	Loss of Use
Emergency Operation Centers	4	0	0	0
Fire Stations	4	0	0	0
Hospitals	3	0	0	0
Police Stations	13	3	0	3
Schools	19	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

- (1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.
- (2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.



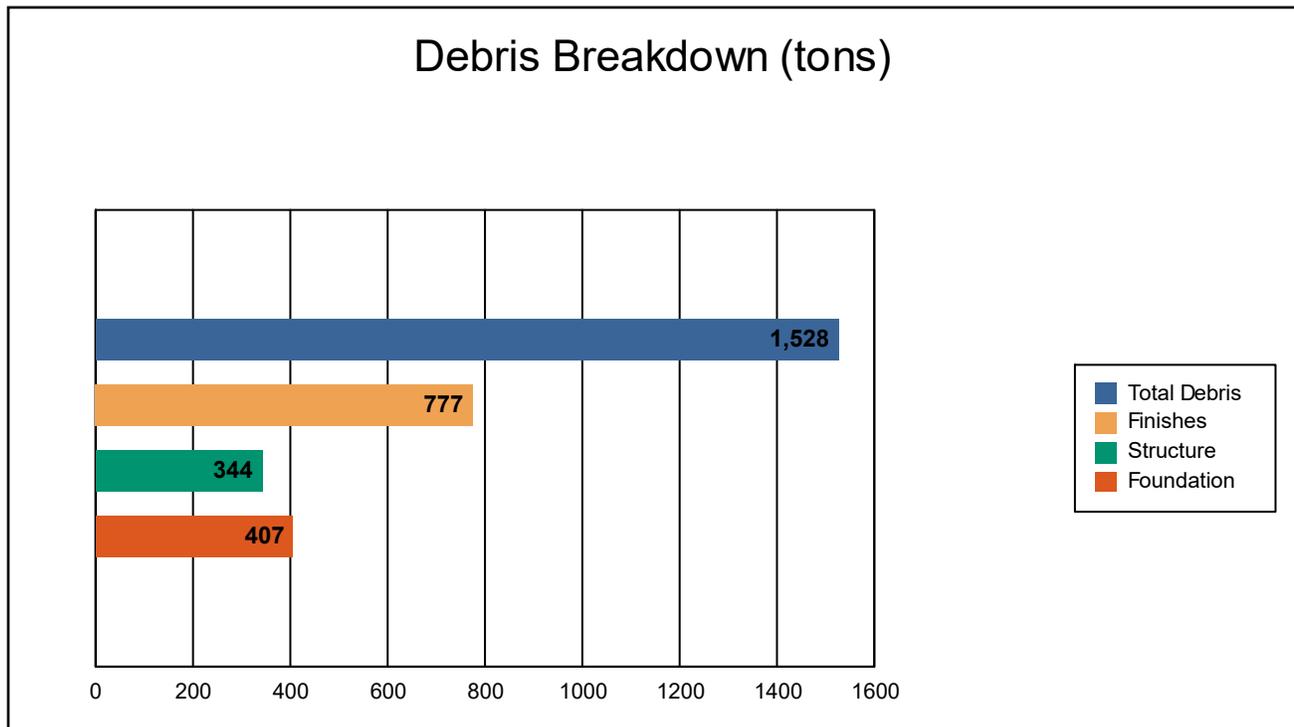
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Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.



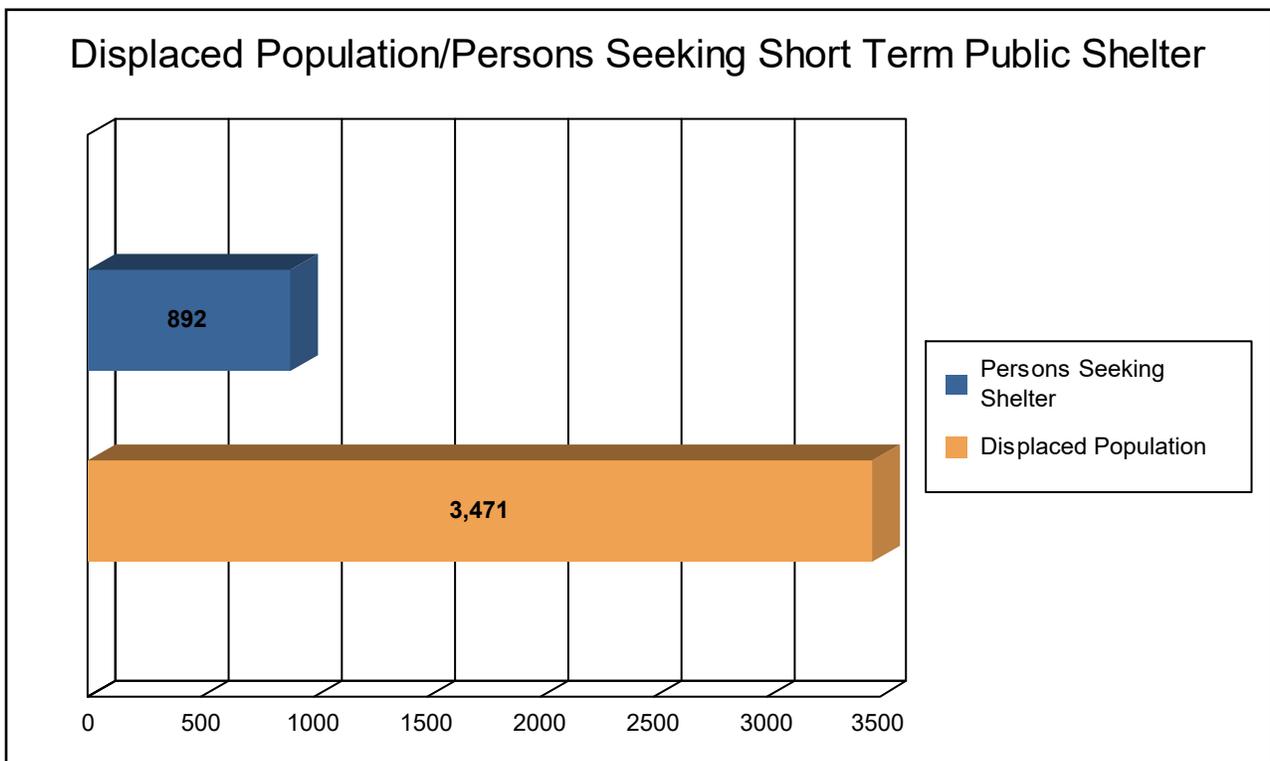
The model estimates that a total of 1,528 tons of debris will be generated. Of the total amount, Finishes comprises 51% of the total, Structure comprises 23% of the total, and Foundation comprises 27%. If the debris tonnage is converted into an estimated number of truckloads, it will require 62 truckloads (@25 tons/truck) to remove the debris generated by the flood.



Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 1,157 households (or 3,471 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 892 people (out of a total population of 55,274) will seek temporary shelter in public shelters.



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Economic Loss

The total economic loss estimated for the flood is 179.38 million dollars, which represents 8.55 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 56.96 million dollars. 68% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 34.57% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.



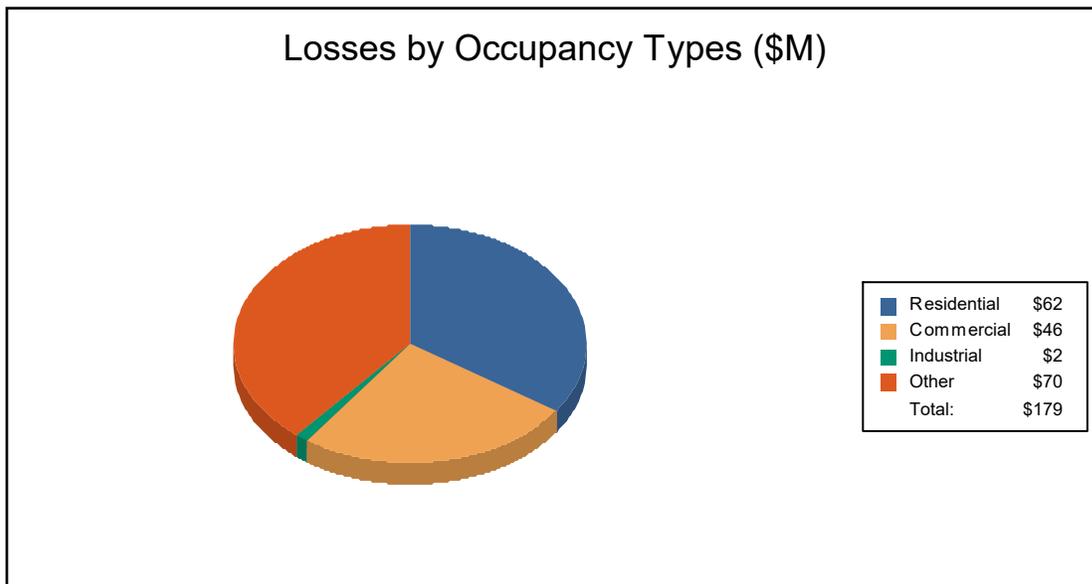
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Table 6: Building-Related Economic Loss Estimates
(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
<u>Building Loss</u>						
	Building	25.63	1.99	0.58	0.35	28.55
	Content	19.19	5.62	1.20	2.15	28.15
	Inventory	0.00	0.08	0.17	0.01	0.26
	Subtotal	44.82	7.69	1.95	2.51	56.96
<u>Business Interruption</u>						
	Income	0.26	15.83	0.09	2.86	19.04
	Relocation	10.50	3.91	0.08	3.16	17.66
	Rental Income	5.81	2.82	0.01	0.98	9.62
	Wage	0.62	15.27	0.13	60.08	76.10
	Subtotal	17.20	37.84	0.30	67.08	122.42
ALL	Total	62.01	45.53	2.25	69.59	179.38





Appendix A: County Listing for the Region

Nevada

- Carson City



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Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Nevada				
Carson City	55,274	4,552,788	1,715,180	6,267,968
Total	55,274	4,552,788	1,715,180	6,267,968
Total Study Region	55,274	4,552,788	1,715,180	6,267,968