Carson River Watershed Floodplain Management Plan

Our Mission:
"To promote cooperative actions with communities to protect the Carson River Watershed"

CARSON WATER SUBCONSERVANCY DISTRICT

ACKNOWLEDGEMENTS

Thank you to the members of the Carson River Coalition (CRC) Floodplain Management Working Group, who serve as the steering committee for this plan and its updates. The support of county staff who provided information and reviewed this document has been critical. The data and input you provided to draft this document are key ingredients to successful regional floodplain management. We thank the Carson Water Subconservancy District's (CWSD) board of directors for your continued support of a regional approach to floodplain management and acknowledge CWSD staff for facilitating this update process. Federal Emergency Management Agency's (FEMA) Cooperating Technical Partner program funded this revision.

Front cover photo credits clockwise from top: *Juan Guzmán, Carson Canyon; Storey County, Mark Twain Subdivision; Shane Fryer, Carson City*

Prepared with assistance from:

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ABBREVIATIONS

ADMP	Area Drainage Master Plan
ASFPM	Association of State Floodplain Managers
BFE	Base Flood Elevation
BLM	Bureau of Land Management
BRIC	Building Resilient Infrastructure Communities
CDRZ	Community Disaster Resilience Zones
CERT	Community Emergency Response Team
cfs	cubic feet per second
COMS	Community Outreach Mitigation Strategies
CRASP	Carson River Watershed Adaptive Stewardship Plan
CRFMP	Carson River Watershed Floodplain Management Plan
CRC	Carson River Coalition
CRC FMWG	Carson River Coalition Floodplain Management Working Group
CRS	Community Rating System
CTP	Cooperating Technical Partner
CWA	Clean Water Act
CWSD	Carson Water Subconservancy District
ERM	Elevation Reference Mark
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FMA	Flood Mitigation Assistance
FMWG	Floodplain Management Working Group
GI	Green Infrastructure
GIS	Geographic Information Systems
HHPD	High Hazard Potential Dam
HMGP	Hazard Mitigation Grant Program
HMGP-PF	Hazard Mitigation Grant Program Post Fire
HMP	Hazard Mitigation Plan
LID	Low Impact Development
LIDAR	Light Detection and Ranging
MAS	Mapping Activity Statement
NDEM	Nevada Division of Emergency Management
NDOT	Nevada Department of Transportation
NDWR	Nevada Division of Water Resources
NFIP	National Flood Insurance Program
NOAA	National Oceanographic and Atmospheric Administration
NOFO	Notice of Funding Opportunity
NPS	Nonpoint Source Pollution
NWS	National Weather Service
PSA	Public Service Announcement
RL	Repetitive Loss
SFHA	Special Flood Hazard Area
TCID	Truckee Carson Irrigation District
TDR	Transfer of Development Rights
UNCE	University of Nevada Cooperative Extension
USBR	United States Bureau of Reclamation
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey

PREFACE

The Carson River Floodplain Management Plan (CRFMP) aims to implement a long-term vision through the Living River Approach by developing strategies to reduce flood damage impacts in the Carson River Watershed. This revision process assesses regional flood risks, proposes watershed-wide mitigation strategies, tracks regional and local progress on objectives, and documents the update process. (Appendix A).

CRFMP is a living document to guide implementation of suggested actions (Appendix E) for regional floodplain management planning which are compatible with each community's planning documents and activities. This document serves as a quick reference for each identified floodplain management strategy and as a guide that benefits all users of the river and its floodplain.

Five counties along the Carson River adopted the 2008 CRFMP and the 2013 Update. All six county boards within the Carson River Watershed adopted the 2018 CRFMP to support regional floodplain management approaches and collaborative actions. Each Watershed county will be asked to adopt and use the revised 2025 CRFMP as a planning reference when planning or implementing development that impacts the floodplain (Appendix G).

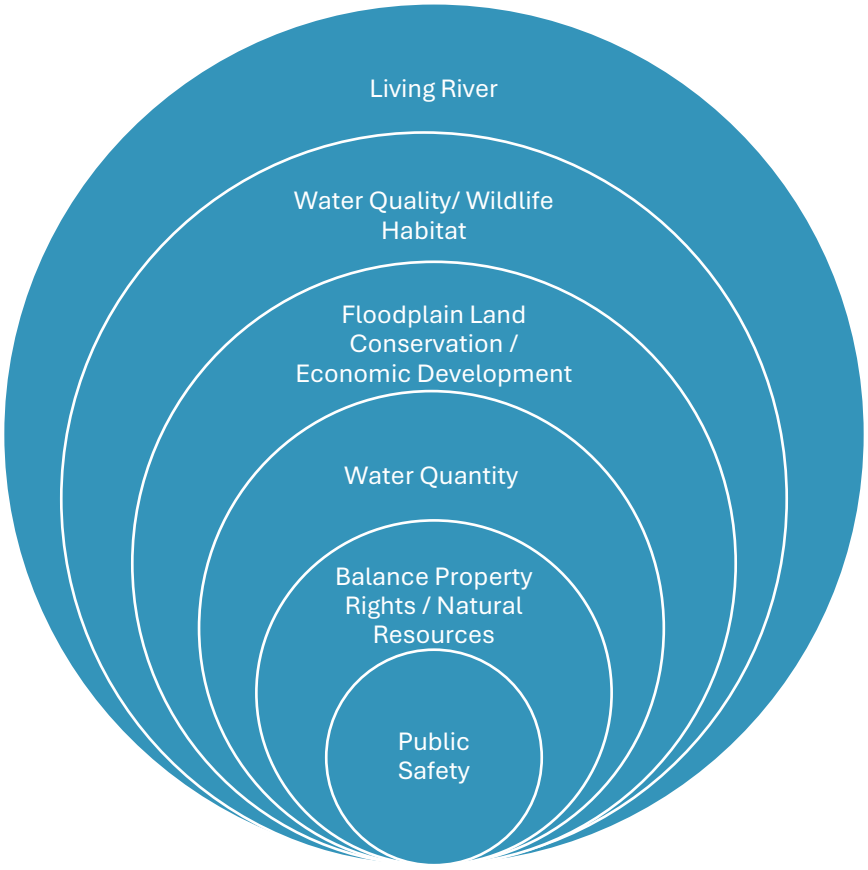
This plan, and all previous revisions, is a collaborative effort guided by Carson Water Subconservancy District (CWSD) and the Carson River Coalition's (CRC) Floodplain Management Working Group. The CRC is a longstanding group of interested stakeholders made up of local, state, federal and Tribal agencies, conservation districts, local nonprofits, landowners, and residents. CRC members support the regional approach to floodplain management, which considers protection of floodplain lands from development critically to ensure the health and safety of residents, the river, and the Watershed in relation to flood impacts.

Figure 1: Gatehouse of Lahontan Reservoir in Churchill County - *Debbie Neddenriep*

EXECUTIVE SUMMARY

This Carson River Floodplain Management Plan (CRFMP) promotes floodplain protection, management and restoration activities that allow the river to access its natural floodplain. Alluvial fans, dry lake beds, and dry watercourses known as arroyos also need this floodplain access because flash floods can inundate a community in a matter of moments. It is critical to consider these areas when discussing natural and beneficial functions of water systems. This CRFMP revision reviews Watershed flood risks and lists suggested actions for local and regional strategists. It also outlines actions to reduce and mitigate these risks to maintain plan objectives. The CRFMP acknowledges floods can occur across all seasons and that they are not limited to the Carson River corridor. Stormwater runoff from urbanized areas is another challenge each community in our Watershed must address.

Figure 2: Watershed Objectives



This CRFMP addresses the Federal Emergency Management Agency (FEMA) requirements for floodplain management planning and delineates potential Community Rating System (CRS) credit for the National Flood Insurance Program (NFIP). The CRFMP is a supplemental document to the Carson River Watershed Adaptive Stewardship Plan (2007/2017) and updates the Floodplain Conservation and Management Category, one of seven integrated watershed management categories outlined in that document. The CRFMP strategies for flood mitigation are consistent with the State of Nevada's and each participating county's Multi-Hazard Mitigation Plan.

Figure 3 : Stakeholders at the 2024 Carson River Coalition Forum

WATERSHED OBJECTIVES

Provide river continuity and connectivity of river to its floodplain (*Living River Approach*).

Protect and improve water quality and wildlife habitat.

Promote conservation of lands within the river corridor.

Plan thoughtfully for water supply and demand.

Protect property rights while conserving natural resources.

Manage economic development without sacrificing floodplain and river form and function.

Ensure public safety – upstream and downstream.

FLOOD HAZARD MITIGATION STRATEGIES

1. Protect Natural Floodplain Function and Values
2. Set Higher Regulatory Standards
3. Collect Flood Data and Maintenance Information
4. Balance Channel Migration and Bank Erosion Monitoring
5. Increase Floodplain and Flood Hazard Outreach & Education
6. Reduce Infrastructure Impact
7. Map and Study Alluvial Fans
8. Minimize Stormwater Impacts

REGIONAL APPROACH AND PLAN ADOPTION

Communities benefit from a regional approach through consistency in planning efforts, programs and projects. CWSD coordinates cooperative action between counties and other stakeholders to address floodplain and river management. The CRC Floodplain Management Working Group steers the process to recognize, prioritize and address hazards within the region. This method helps communities see the benefits of protecting floodplain areas, both locally and throughout the Watershed, to keep people safe from floods. Communities are vital for maintaining the CRFMP's long-term goals and for implementing strategies that strengthen the Watershed's resilience. Having local communities participate and adopt the CRFMP is critical for effective implementation and continued protection of the floodplain.

CRC members developed a long-term vision for floodplain protection, the Living River Approach, which recognizes the importance of balancing the river's natural floodplain form and function with various land uses to reduce flood damage impacts. As far back as 1998, the CRC championed the protection of the Carson River corridor and preserving open, undeveloped land adjacent to the river channel as a high priority, stating:

"Protect the floodplain from future development. Once the floodplain and especially the river's meander belt corridor are impacted by development, the river loses the ability to reestablish its natural functions. Agricultural fields near the channel are critical for floodwater attenuation, groundwater recharge, non-point source pollution buffering and providing habitat for wildlife." – CRC main message, affirmed by University of Nevada Cooperative Extension in 2004

This CRFMP also recognizes that flooding is a watershed-wide challenge and that the actions of one community affect those downstream. The 48 suggested actions in Table 15 are outcomes of CRC collaboration, FEMA requirements, and the application of long-term regional floodplain management principles (Watershed Guiding Principles, Carson River Coalition, 2017). This plan includes a written description of regional flood risks and suggests actions for communities to consider when they address how to mitigate those flood hazards.

Figure 4: The Carson River in Hope Valley accesses its floodplain - *Shane Fryer*

This Regional Floodplain Management Plan affirms the ***Living River Approach***, which recognizes the importance of balancing the river's natural floodplain form and function with various land uses.

1.0 INTRODUCTION AND BACKGROUND

The first humans entered the watershed around 12,000 years ago. Known as the Martis people, they built pit houses along the edges of valleys close to springs and small streams. During this period, the valley bottoms of the Carson River Watershed were seasonally inundated, and wetlands were more abundant. Before the 1800s, the Washoe people inhabited the upper Watershed, and the Northern Paiute people lived in the lower Watershed. Their descendants are here today: members of the Washoe Tribe of Nevada and California live in communities in Alpine County, California as well as Carson City and Douglas County, Nevada. Members of the Fallon Paiute Shoshone Tribe live in the Fallon and Stillwater areas.

Figure 5: Ancient rock art of Numa at Grimes Point in Churchill County
- JQ Jacobs

Western pioneers arrived en masse after 1840 in search of gold through placer mining. Genoa and Dayton were founded in the 1850s due to the Comstock mining boom. The Comstock boom created demand for local produce and meat. Therefore, migrants who tried to strike it rich mining and failed instead established ranches and farms. Before long, agricultural operations were thriving from Carson Valley to Dayton Valley to feed the people in the rapidly expanding mining communities. In the early 1900s, the Newlands Project brought water to the Carson Desert, and Churchill County also began producing food for Northern Nevada residents. Farms and ranches occupied the lands adjacent to the Carson River to access water for their crops and animals. Fortunately, this agricultural production preserved large tracts of undeveloped Carson River floodplain.

1.1 WATERSHED CHARACTERISTICS

The Carson River Watershed is the land in Nevada and California that captures, stores and releases rain and snowmelt to the Carson River (Figure 8). It is located east of the Sierra Nevada range and is characterized by partly filled alluvial valleys ranging in elevation from 3,900 to 6,000 feet above mean sea level (msl) and is surrounded by mountains ranging in elevation from 6,000 to 11,000 feet msl. The area is seismically active, with a complex series of faults spanning a large area of Western Nevada. The Genoa Fault Zone is one of the most active faults in the region (Ramelli, et al., 1999).

Figure 6: Lost Lakes in Alpine County forms the headwater of the West Fork Carson River

The Watershed is 3,966 square miles, with 606 square miles located in California and the balance in Nevada. The Carson River flows approximately 184 miles from its headwaters in Alpine County, California, to the terminus at the Carson Sink in Churchill County, Nevada. The upper Watershed in the Sierra Nevada experiences long, very cold winters and short, moderate-to-warm summers. The upper elevations receive more than 40 inches of precipitation per year, usually as snowfall, decreasing to about four to eight inches in the arid to semi-arid valley floors. Habitats within the watershed range from dry, salt-desert scrublands, cottonwood- and willow-lined riparian areas, and sagebrush steppes to lush mountain meadows, aspen groves and coniferous forests. Section 3 of the 2017 Carson River Watershed Adaptive Stewardship Plan (CRASP) comprehensively details the characteristics and history of the Watershed.

Figure 7: 2017 Post-fire mudslide after the Washington Fire in Alpine County - *Courtesy Brian Peters, Alpine County*

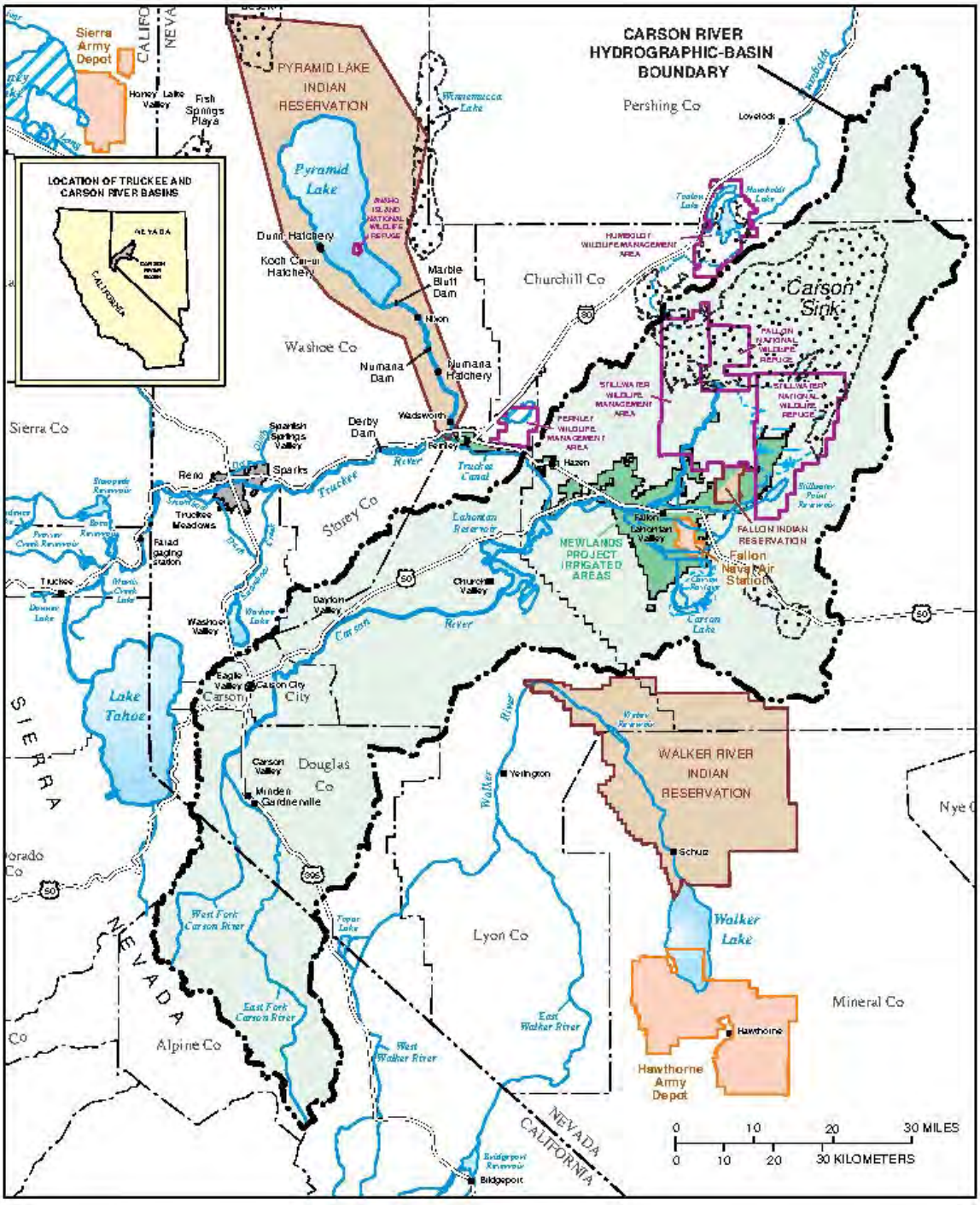


Figure 8: USGS hydrologic features of the Carson River Watershed and surroundings

1.2 POPULATION CHARACTERISTICS

Figure 9: The Carson River Watershed begins in Alpine County high in the Sierra Nevada

Two federally recognized tribes currently call the Carson River Watershed home: The Washoe Tribe of Nevada and California encompasses four watershed communities – Carson, Stewart, and Dresslerville in Nevada and Hung A Lel Ti near Woodfords, California – and the Fallon Paiute-Shoshone Tribe's community is located near Fallon in Churchill County.

The Watershed is primarily rural. Its only incorporated communities are Carson City and the City of Fallon in Nevada and Markleeville, California. Carson City is the only community with a population of more than 50,000 people. Unincorporated towns and other communities in the Carson River Watershed are listed below in Table 1.

Figure 10: Sheep grazing in Lyon County

Table 1. Carson River communities by county

County	Community Name	Incorporated	Unincorporated
Alpine:	Woodfords		X
	Markleeville	X	
	The Washoe Tribe of Nevada and California (Washoe) live in upper and middle Watershed.		X - Sovereign Nation
Carson City:	Carson City	X	
	The Washoe Tribe of Nevada and California (Washoe) live in upper and middle Watershed.		X - Sovereign Nation
Churchill :	Fallon	X	
	Fallon Paiute Shoshone Tribe live in the lower Watershed.		X - Sovereign Nation
Douglas:	Gardnerville		X
	Genoa		X
	Minden		X
	Ruhenstroth		X
	Johnson Lane		X
	Indian Hills		X
	The Washoe Tribe of Nevada and California (Washoe) live in upper and middle Watershed.		X - Sovereign Nation
Lyon:	Mound House		X
	Silver City		X
	Dayton		X
	Stagecoach		X
	Silver Springs		X
Storey:	Gold Hill		X
	Virginia City		X
	Mark Twain		X

Population centers in the Watershed developed based on its physical setting. Most communities were originally developed outside the floodplains because settlers recognized the flood risk. Over time, communities expanded into the floodplain areas, lured by the fertile soils for agriculture, accessibility to water, and additional land. The additional growth of these communities continues to increase flood risk and present continued challenges for managing development in these flood-prone areas. Many Watershed communities are located near the river, with ranchlands, farmlands, or open rangelands adjacent. The population of Carson River Watershed communities has increased over the last few decades (Table 2). Community fact sheets and community interview notes are included in the 2018 Risk Map and can be accessed via the link provided in Appendix C.

Table 2. Population growth per watershed county from 2010 - 2020

County	2010	2015	2020
Alpine County	1,175	1,071	1,204
Douglas County	46,997	48,020	49,488
Carson City	55,274	54,742	58,639
Lyon County	51,980	53,179	53,253
Storey County	4,010	4,051	4,104
Churchill County	24,877	24,198	25,516
Source: US Census Data (www.data.gov)			

Each Watershed community has vulnerable residents who would suffer more during a disaster. Of the 36 schools located in the watershed, 21 are designated Title 1 schools. Understanding the flood risk to all residents is an important first step. The next step is to identify strategies to protect the vulnerable and minimize their losses.

Figure 11: A duck blind near the terminus at Stillwater National Wildlife Refuge - *Brenda Hunt*

1.3 THE LAND AND FLOOD HISTORY

This agrarian land use has provided unique opportunities. Most often, communities develop adjacent to rivers and encroach floodplains. As a result, businesses and residences within the floodplain suffer severe economic loss during flood events. In contrast, because floodplain development is minimal in our Watershed communities, the open floodplain land along the river offers the best form of flood protection.

Figure 12: Carson Valley flood, 1997
- Courtesy of Wolf Productions

This document describes how open floodplain protects people and structures during floods by storing, slowing down and absorbing floodwater. The Carson River's floodplain enhances our communities and preserves our natural resources by recharging groundwater, protecting water quality, and providing wildlife habitat.

The Watershed experiences various types of flooding depending on the season and characteristics of the storm. Rain-on-snow storms cause the most flood damage in and along the Carson River (Figure 12). These storms tend to be infrequent but cause large-scale riverine flooding that results in tremendous damage. Extended periods of high water in rivers and streams that are associated with longer and heavier spring runoff create extensive flood damage. Riverbanks fail, and structures like bridges and roads are vulnerable to collapse during extended periods of continued hydraulic pressure.

Alluvial-fan flooding, flash flooding, and debris flows inundate dry creek beds and wreak havoc year-round. Most flash floods, or gully washers, are small and localized but can quickly cause severe damage to public infrastructure and private property. Stormwater flooding, as defined by FEMA, occurs when heavy rainfall overwhelms the capacity of natural and constructed drainage systems such as dry creek beds – also known as arroyos – storm drains, culverts, and ditches. Stormwater flooding can happen in both urban and rural areas. Diverse types of floods create distinct types of hazards and damage. Thoughtful planning and implementation of floodplain management strategies is essential to build resilient communities that are prepared for all types of flood disasters.

Figure 13: 2023 flooding in Douglas County - *Courtney Walker*

According to FEMA, floods cause a greater loss of life and property and devastate more families and communities across the United States than all other natural hazards combined. As Nevada floods, losses rise despite attempts to control damage with costly flood control infrastructure such as levees and dams. Across the United States, people and communities recognize they can effectively reduce flood losses by conserving their floodplain's natural resources and functions. Therefore, FEMA funds incentivize communities to adopt plans and implement actions that not only preserve floodplain resources and functions but also reduce flood hazards. FEMA recognizes floodplain management plans that provide a written description of the flood risks, list goals to mitigate those flood hazards, and track actions that document community progress toward its goals.

A floodplain management plan aids communities in building resilience and reducing flood risk. Flood hazards in the Watershed primarily occur when residents or developers build structures within the floodplain, river corridor, or in and around alluvial fans. When a community allows the construction of family

Figure 14: 2017 Dayton, Nevada

residences and businesses in flood-prone areas and wetlands, the chances of considerable damage or loss of life increase. The National Institute of Building Sciences recently reported mitigation funding can save the nation $6 in future disaster costs for every $1 spent on hazard mitigation (Natural Hazard Mitigation Saves: 2017 Interim Report). Therefore, protecting the Carson River's natural floodplain function and values is the most effective mitigation strategy in reducing costly flood loss.

Presently, most Watershed communities are acutely aware of riverine floods. Over the last decade, climate and weather patterns have fluctuated, leading to an increased frequency and severity of different flooding types. Amplified flow volumes are experienced in alluvial fan/flash flooding, post-fire flooding, extended high riverine flows, and stormwater flooding. We must increase awareness of these other types of floods and emphasize the need for preparation and mitigation because many of these areas are not properly mapped. These factors warrant the holistic floodplain management approach espoused by this plan, which identifies and mitigates flood hazards throughout the Watershed.

Figure 15: The view of Mt. Davidson from Virginia City. Water flows from Virginia City to the Carson River through Six Mile Canyon – *Debbie Neddenriep*

WATERSHED OBJECTIVES

Provide river continuity and connectivity of river to its floodplain (*Living River Approach)*.

Protect and improve water quality and wildlife habitat.

Promote conservation of lands within the river corridor.

Plan thoughtfully for water supply and demand.

Protect property rights while conserving natural resources.

Manage economic development without sacrificing floodplain and river form and function.

Ensure public safety – upstream and downstream.

FLOOD HAZARD MITIGATION STRATEGIES

1. Protect Natural Floodplain Function and Values
2. Set Higher Regulatory Standards
3. Collect Flood Data and Maintenance Information
4. Balance Channel Migration and Bank Erosion Monitoring
5. Increase Floodplain and Flood Hazard Outreach & Education
6. Reduce Infrastructure Impact
7. Map and Study Alluvial Fans
8. Minimize Stormwater Impacts

1.4 OBJECTIVES AND STRATEGIES

The purpose of this CRFMP revision is to continue to support the adopted Living River Approach, which conserves the natural and beneficial functions of both the Carson River and the many arroyos in the Watershed to reduce flood damage losses. The Living River Approach recognizes the importance of balancing the river's natural floodplain form and function, or fluvial geomorphology, with various land uses. Some of the actions to meet the objectives and strategies of this CRFMP include:

- Connect floodplain to its riverine channels in the Carson River or alluvial fans;
- Improve water quality;
- Recharge the water supply;
- Keep structures out of unstable, unsafe areas within the floodplain;
- Minimize modification of riverine channel and riparian habitat;
- Balance sediment input with sediment transport;
- Provide seasonal continuity of riverine flows;
- Convey variable flows that preserve and restore habitat in the floodplain;
- Sustain fish, birds, and other wildlife;
- Enhance aesthetic and recreational qualities that enrich the human environment;
- Minimize stormwater impacts through various best management practices; and
- Implement post-disaster mitigation measures.

In 2018, two new strategy categories were added to this plan:

- Map and Study Alluvial Fans; and
- Minimize Stormwater Impacts.

These categories provide suggestions for minimizing flooding in alluvial fans and reducing stormwater impacts using methods such as Green Infrastructure (GI) and Low-Impact Development (LID). They also identify post-disaster mitigation strategies to mitigate flood hazards. As communities implement more strategies to reduce flood losses, everyone in the Watershed will benefit.

CWSD coordinates risk communication with federal, state, and local partners to ensure risk communication and outreach is consistent across audiences. This regional approach reduces duplication of efforts, amplifies messages, and supports community efforts.

Regional floodplain management is beneficial to everyone in the Watershed because it:

- Enhances public safety;
- Reduces flood risk;
- Reduces flood damage costs;
- Enhances awareness of flood danger and risk;
- Provides consistent strategies, messaging and resources for local floodplain programs;
- Delivers collaborative support to local floodplain administrators;
- Maximizes Community Rating System credit; and
- Lowers community flood insurance rates.

- Increases funding leverage and opportunities.

Figure 16: Damage to the Upper Allerman Canal in Douglas County in 2023 – *Shane Fryer*

1.5 SPECIAL STATUS FISH AND WILDLIFE SPECIES

In addition to supporting people, our Watershed supports many wildlife species, and several hold special status. These species include Sage Grouse, Lahontan Cutthroat Trout, Paiute Cutthroat Trout, Sierra Nevada Yellow-legged Frog, Yosemite Toad, and the Western Yellow-billed Cuckoo. In September 2023, the U.S. Fish and Wildlife Service proposed listing both species of the Western Pond Turtle as threatened, but this designation for both the Northwestern Pond Turtle and Southwestern Pond Turtle has not been finalized. Nevada Division of Natural Heritage provides the most up-to-date information for special status species as shown in Table 3.

Figure 17: Lahontan Cutthroat Trout

Figure 18: Greater Sage Grouse

Table 3. Special Status Species of fish and wildlife in the Carson River Watershed

Name	Status	Last Status Update	Critical Habitat Type
Sage Grouse	Indicator Species / Proposed Threatened	4/27/2023	Proposed
Lahontan Cutthroat Trout	Threatened	3/23/2021	N/A
Paiute Cutthroat Trout	Threatened	7/26/2019	N/A
Sierra Nevada Yellow-legged Frog	Endangered	3/23/2021	Final Habitat
Yosemite Toad	Threatened	2/10/2020	Final habitat
Western, Yellow-billed Cuckoo	Threatened	3/23/2021	Final Habitat
Northwestern Pond Turtle	Proposed Threatened	10/3/2023	N/A

Information accessed 02/26/2024: Nevada Natural Heritage website: https://heritage.nv.gov/species_info

Figure 19: Western Pond Turtles at The Nature Conservancy's River Fork Ranch Preserve – *Doug Dill*

1.6 ECONOMIC IMPACTS OF FLOODS

Nevada floods. The Carson River Watershed can experience different types of flooding any time of the year. Flooding has left residents wary and communities in need of money to pay for the cleanup of roads, homes, businesses and infrastructure. However, during the 1997 winter rain-on-snow flood event, economic damage to the communities adjacent to the Carson River was exponentially less than damage in the Truckee River Watershed (Table 4). Because floodplain lands next to the Truckee River in Washoe County are developed and the river is channelized through Reno and Sparks, once the river reached capacity it spread throughout downtown Reno, the Reno-Tahoe Airport, and industrials areas of Sparks. The Carson River Watershed is mainly agricultural land or otherwise undeveloped, so it retains floodplain function and reduces the economic impact when large-scale flooding events occur.

Figure 20: Downtown Reno in 1997 – *Reno Gazette-Journal*

Figure 21: New Year's 1997 record floods in Carson Valley – *Courtesy Pat Glancy, USGS retired*

Historically, most riverine floods occur during winter rain-on-snow events. Many residents regularly experience this type of flooding along the Carson River as the 1997 and 2005 floods attest. Summertime cloudbursts dump rain on hillslopes or alluvial fans and cause flash floods. These floods have left residents wary and communities in need of money to pay for the cleanup of roads and infrastructure. Record-breaking winter snowfall and unrelenting atmospheric rains in 2017 and 2023 led to lingering high flows and river flooding that went on for months (Table 4). Lands and structures next to the river were saturated, which eroded many banks and channels. Local ranchers lost productive lands and irrigation infrastructure. Riverbanks were washed away, and the river continued to incise due to the force of water coming through the river channel. The incised river limited floodwaters from reaching much of the valley's floodplain lands, accelerating flows and not allowing the river to flow out, spread out, slow down and sink in. Other factors include saturated floodplain lands directly adjacent to the river due to the high-water runoff event, which led to bank sloughing. This loss of acreage and irrigation infrastructure adjacent to the river due to bank erosion from the 2017 and the 2023 runoff events are still being addressed by our ranching partners, local conservation districts and the NRCS today.

Table 4. 1997 New Year's flood damage estimates and 2017 damage estimates, Carson and Truckee Rivers*

COUNTY	1997 FLOOD DAMAGE	2017 FLOOD DAMAGE
Alpine County[1]	$331,372	$1,250,003
Douglas County[2]	$13,100,000	$475,000
Carson City[2]	$5,300,000	$1,700,000
Lyon County[2]	$10,000,000	$100,000
Churchill County [2]	$345,000	$5,800,000
Storey County [3]		$288,623
Total Carson River	$29,076,372	$9,613,626
Total Washoe County Only	$686,000,000	

1 Alpine County Auditor's Office

2 NBMG 1998

3 Storey County Planner's Office *Cost estimates include entire counties not just the Carson River Watershed and do not represent the actual paid out costs associated with the 1997 flood event.

Figure 22: 2017 Lahontan emergency spillway

Without upstream storage, record snowfall in 2017 also led to record runoff volumes in the Carson River and downstream into Lahontan Reservoir. Lahontan Reservoir was designed to store approximately 300,000 acre-feet of water. However, in 2017 the inflow was three times this amount. The Carson River alone had its largest cumulative flow volume on record at 920,000 acre-feet (the average is 269,000 acre-feet). Construction of an emergency spillway to convey the water away from populated areas was accomplished in only a few weeks. There was significant threat of widespread flooding along the main stem of the Carson below Lahontan Dam and at the diversion dam. Inundation of the downstream communities of Fallon and Churchill County could have caused catastrophic economic damage and cut off all transportation routes to and from the Churchill Valley. The actions to release and convey the water from Lahontan Reservoir cost almost $5.8 million; costs for the Nevada Department of Transportation (NDOT) were approximately $1.5 million for the culverts under Highway 50/95. Monthly average river flow data from 1940 through 2016 (USGS Carson River Gage near Carson City, 10311000) was compared to the monthly flows during 2017, emphasizing the difference between the two periods of record (Table 5, Figure 16). The relentless storms and resultant floods in the first few months of 2017 yielded two presidential disaster declarations in Northern Nevada as summarized in Table 6.

A series of alluvial-fan and flash-flood events in 2014 and 2015 resulted in damage to residents in some communities. However, the costs of cleanup did not reach the required minimum to receive a federal disaster declaration. The lesson learned during those events was that an accumulation of costs by multiple affected jurisdictions could have brought a declaration, potentially allowing federal funds to help pay for the cleanup and damages, as well as emergency operations during the event.

This data highlights that communities must maintain an awareness of the different types of flood events and continue to implement management strategies to address these hazards.

Table 5. Comparison of average monthly flows (cfs) at Carson River near Carson City and recent high flow years

	Calendar Month									
Year	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**
1940 – 2016	348	363	409	580	1,153	921	252	53	42	95
2017	1,397	2,302	1,404	1,910	3,162	3,050	1,114	235	215	236
2023	1,217	490	1,458	1,956	3,895	3,535	1,453	292	168	209

Figure 23: Graph of monthly average flow conditions for 2017 and 2023 compared to the period of record.

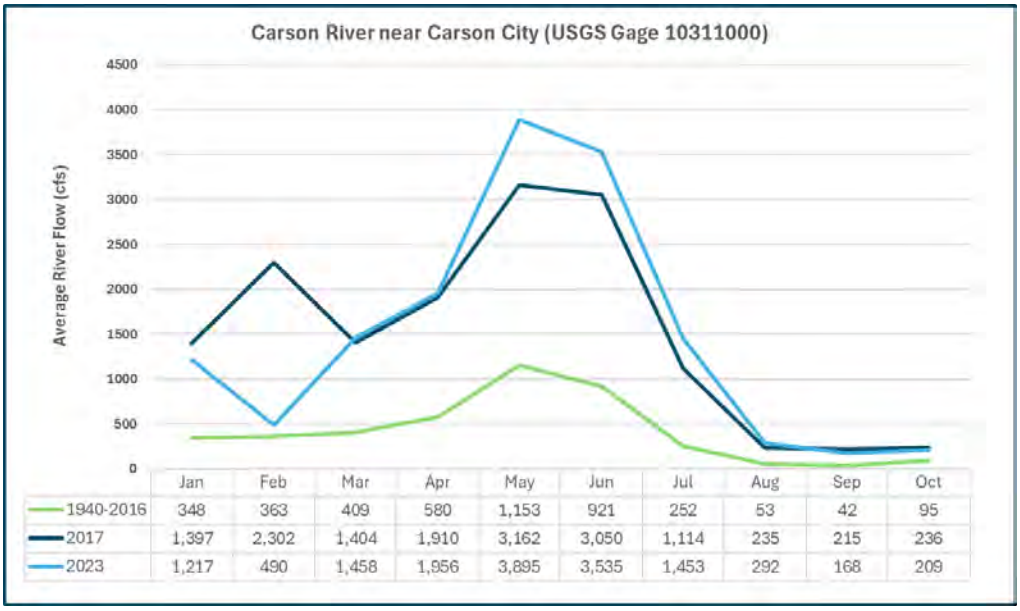


Table 6. Recent Preliminary Damage Assessment (PDA) for Northern Nevada counties with a presidential disaster declaration

DECLARATION	DAMAGE ASSESSMENT	COUNTIES AFFECTED
January 5-14, 2017, DR-4303	$14,988,043	Washoe, Storey, Lyon, Douglas, Carson City
February 27-March 3, 2017, DR-4307	$13,135,370	Washoe, Storey, Douglas, Carson City, Churchill, Humboldt, Elko
March 8- March 19, 2023, DR-4708	$10,628,523	Douglas, Lyon, Mineral, Storey, Eureka, Lincoln

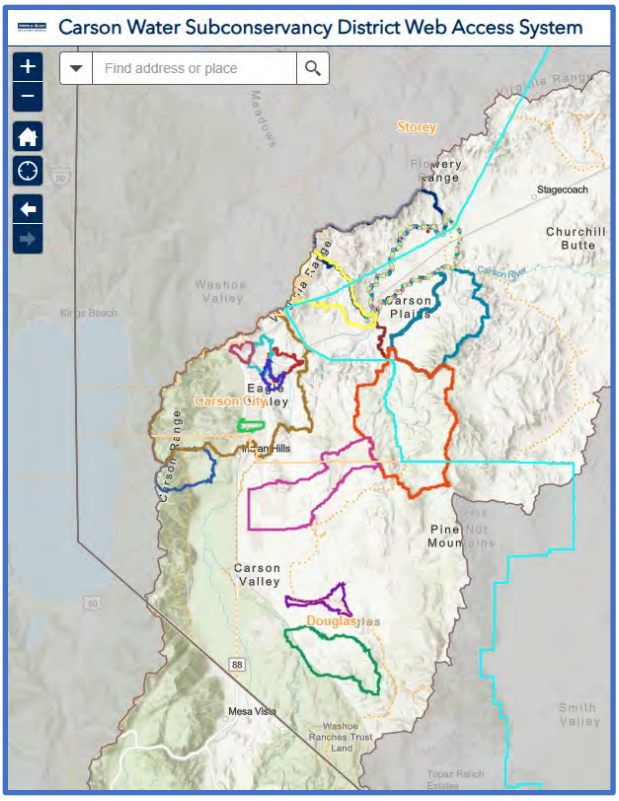
2.0 FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA)

The Federal Emergency Management Agency (FEMA) coordinates the federal government's response to all domestic disasters, whether natural or human-caused. FEMA's suite of disaster actions includes disaster preparation, loss prevention, hazard mitigation, and response & recovery when catastrophes strike. The National Flood Insurance Program (NFIP) was created in 1968 to provide flood insurance to homeowners. The NFIP encourages communities to enact and enforce minimum federal floodplain regulations so that residents qualify for flood insurance. Communities that adopt regulations exceeding the NFIP's minimum standards earn premium discounts for residents who purchase flood insurance. This premium discount program is described in depth in the Community Rating System (CRS) section (2.2).

2.1 COOPERATING TECHNICAL PARTNER PROGRAM (CTP)

Figure 24: Carson Valley Physical Map Revision Graphic

FEMA carries out some of its flood hazard mitigation activities through the Cooperating Technical Partner (CTP) program. This program provides funding to local communities for actions such as flood-hazard map revisions, flood-hazard mitigation planning, and outreach & education. FEMA created the CTP program to stretch limited Risk MAP dollars and increase local involvement when flood maps are created. The CTP program creates partnerships between FEMA and participating NFIP communities, regional agencies, state agencies, tribes, and universities that are interested and capable of being active participants in the FEMA flood-hazard mapping program. Each fiscal year, FEMA issues a Notice of Funding Opportunity (NOFO) document to announce the CTP grants available to its program partners. The NOFO describes the available funding, priorities, requirements, and process for eligible applicants to request funding for program activities. CWSD has been a CTP since 2005; through its CTP activities it acquires, administers, and distributes FEMA project funding and oversees all funded projects. Each



funding round includes a scope of work (either a Mapping Activity Statement (MAS) or Community Outreach Mitigation Strategies (COMS) that identifies the various flood studies and activities that will be accomplished. From 2010 to 2024, CWSD received approximately $6.9 million from FEMA and has provided more than $500,000 as in-kind and cash match. Projects resulting from CWSD CTP funding are detailed in Table 7. Projects that received MAS funding include LiDAR or surveying as project components. The CTP agreement is included as Appendix F; the links to CTP projects CWSD has completed is in Appendix D. Area Drainage Master Plan projects can be viewed on the Carson River flood hazard map (see right).

Figure 25: Click the image to connect to the Flood Hazard Map Viewer

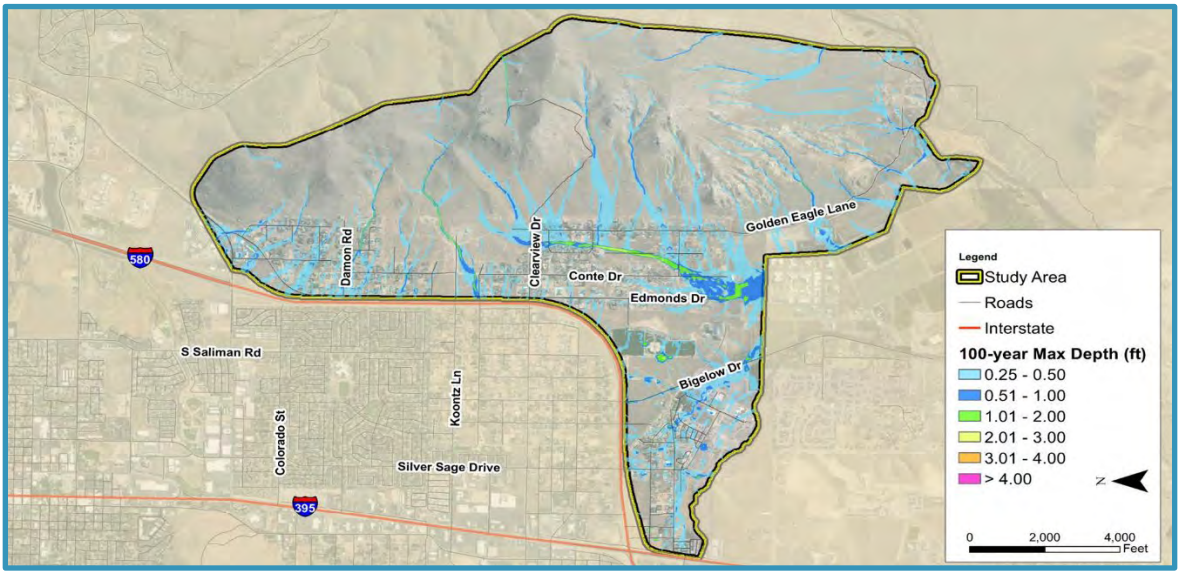


Figure 26: Alluvial fan drainages in southeast Carson City

Table 7. Cooperating Technical Partner Projects

Funding Round	Year Granted	CTP PARTNERSHIP PROJECT
1	2009	Physical Map Revision (PMR) of the portions of the Carson River through Lyon County.
2	2011	PMR of the portions of the Carson River from Lyon County to Carson City
3	2012	Hydraulic modeling of the Carson River in the Carson Valley
4	2013	Hydraulic modeling of the Carson River in the Carson Valley; Mitigation Plan and Draft Ordinance created
5	2014	Map alluvial fan watersheds in Douglas County and the Eagle Valley Golf Courses A&B Drainages in Carson City; support Northern Nevada Flood Awareness Campaign.
6	2015	Identification and mitigation projects in Douglas County; support Northern Nevada Flood Awareness Campaign; and creation of Carson City Inundation maps
7	2016	Update the Saliman/Voltaire alluvial fan drainages in Carson City; create a Johnson Lane Area Drainage Master Plan in Douglas County; and update the 2012 Discovery Report and 2013 Regional Watershed Floodplain Management Plan; and funded public outreach and education

Table 8. Cooperating Technical Partner Projects

Funding Round	Year Granted	CTP PARTNERSHIP PROJECT
8	2017	Creation of a Dayton Valley Area Drainage Master Plan in portions of Lyon and Storey Counties; update floodplain ordinances in Alpine County, California, and Douglas, Carson City, and Lyon Counties in Nevada; and work with state and federal partners to continue flood outreach and education.
9	2018	South Dayton Valley ADMP, N. Carson City Drainage Study, PineNut Creek LOMR & Community Outreach
10	2019	Churchill County Physical Map Revision, Ruhenstroth ADMP Phase 1, Carson City Drainage Study, & Community Outreach
11	2020	Ruhenstroth ADMP Phase 2, Clear Creek & Smelter Creek LOMRs, Flood Forecast Model, Web Access System, & Community Outreach
12	2021	Buckeye Creek Detention, VC/Six Mile ADMP, East Carson City ADMP, Southeast Carson City ADMP, Risk Communication and Outreach
13	2022	Stagecoach ADMP, Silver Springs ADMP, Flood Risk & Communication, High Water Mark, Fish Springs Culvert Study, Walker River Risk Analysis, and Floodplain Management Plan update
14	2024	Gold Canyon ADMP, S. Silver Springs ADMP, Flood Risk & Communication, and Pinenut Wash/ Sawmill Wash Drainage Study

2.2 COMMUNITY RATING SYSTEM (CRS)

The Community Rating System (CRS) supports the NFIP by providing a premium discount to policyholders if their communities participate in the program. The CRS program design encourages communities to implement floodplain management programs that go beyond the minimum NFIP requirements. Community activities are scored by public information activities; mapping and regulatory activities; flood-damage reduction activities; and flood preparedness activities. Nineteen activities shown in Table 6 use formulas to measure the extent a community achieves three overarching CRS program objectives:

- Reduce and avoid flood damage to insurable property
- Strengthen and support the insurance aspects of the NFIP
- Foster comprehensive floodplain management

Figure 27: Outreach in Douglas County provides CRS points for outreach

Flood insurance discounts are based on a community's CRS classification, determined by CRS activity points. There are 10 classes (1 through 10), with a Class 1 Community receiving the greatest flood insurance premium reduction. Table 8 provides a breakdown of the CRS credit points, classification and premium reductions, as well as the status of CRS classification for the counties within the Watershed.

This regional floodplain management plan addresses activities eligible for CRS credit and provides a significant number of points for those counties in the Watershed who participate (Figure 3).

Figure 28: A high-water mark was installed in Douglas County to highlight the types of flooding that can occur in Carson Valley. It provides CRS points for public information to Douglas County – *Courtesy of Courtney Walker*

The FEMA Community Rating System is guided by three core principles: reducing flood damage to insurable property, strengthening the National Flood Insurance Program, and promoting comprehensive floodplain management.

Table 9: CRS activities outlined in CRS Coordinator s Manual (2017)

300 Public Information Activities	ACTIVITY	MAXIMUM CRS POINTS
310	Elevation Certificates	116
320	Map Information	90
330	Outreach Projects	350
340	Hazard Disclosure	80
350	Flood Protection Information	125
360	Flood Protection Assistance	110
370	Flood Insurance Promotion	110
400 Mapping and Regulatory Activities	**ACTIVITY**	**MAXIMUM CRS POINTS**
410	Additional Flood Data	802
420	Open Space Preservation	2020
430	Higher Regulatory Standards	2042
440	Flood Data Maintenance	222
450	Stormwater Management	755
500 Flood Damage Reduction Activities	**ACTIVITY**	**MAXIMUM CRS POINTS**
510	Floodplain Management Planning	622
520	Acquisition and Relocation	2250
530	Flood Protection	1600
600 Flood Preparedness Activities	**ACTIVITY**	**MAXIMUM CRS POINTS**
610	Flood Warning Program	395
620	Levee Safety	235
630	Dam Safety	160

CWSD's integrated watershed management process incorporates many CRS activities, including:

- Section 300: Public information activities such as public outreach and flood-protection information
- Section 400: Mapping and regulations activities such as flood-hazard mapping and higher regulatory standards
- Section 500: Flood-damage reduction activities through its floodplain management planning, floodplain acquisition, and flood protection
- Section 600: Flood-prevention activities include a flood warning system, actions that ensure levee and dam safety

CWSD provides an annual CRS report summarizing these activities to Watershed communities who participate in the CRS program. Watershed communities already conduct many of these activities during their regular maintenance and operations; therefore, obtaining the discount is often a matter of documenting those actions. A Class 1 community can reduce flood insurance rates for homeowners in special flood hazard areas (SFHA) by 45 percent. Currently, CRS communities in the watershed provide a 10% - 20% flood insurance rate reduction for homeowners in SFHAs as noted in Table 9. In 2023, FEMA began a remodel of the CRS program to better align to its updated risk rating; as of December 2024, potential changes to the CRS program are pending. CWSD will create a CRS crosswalk the CRFMP when the updated CRS program is made available by the Federal Government.

Figure 29: River Fork Ranch High Water Mark – *Courtesy of Danae Olsen*

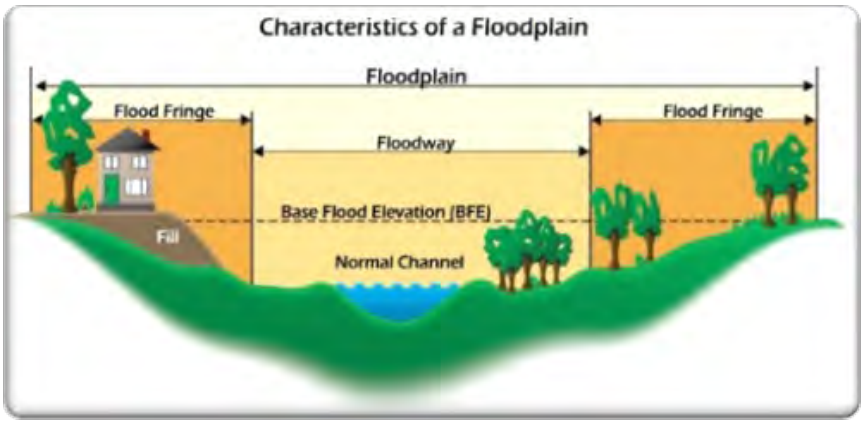
Figure 30: High-water mark along I-580 in Carson City provides CRS points for public information.

Table 10. Community Rating System (CRS) classification and flood insurance premium reductions

CREDIT POINTS	CLASS	SFHA	NON-SFHA	JURISDICTION
4,500 and above	1	45%	10%	
4,000 – 4,999	2	40%	10%	
3,500 – 3,999	3	35%	10%	
3,000 – 3,499	4	30%	10%	
2,500 – 2,999	5	25%	10%	
2,000 – 2,499	6	20%	10%	Douglas County, Carson City
1,500 – 1,999	7	15%	5%	
1,000 – 1,499	8	10%	5%	
500 - 999	9	5%	5%	Storey County
0 - 499	10	0%	0%	Lyon*, Churchill* Alpine County*

Notes: SFHA – special flood hazard area. *Participates in the NFIP but does not currently participate in the CRS program.

2.3 FLOODPLAIN 101



This section provides a brief overview of floodplains and how they function and describes how FEMA regulates floodplains through the National Flood Insurance Program (NFIP).

Figure 31: Characteristics of a floodplain, FEMA Flood Insurance Guidebook 2009

The level area bordering a river channel is known as the floodplain, the area that is naturally subject to flooding. The river channel meanders through the landscape and over time shapes the surface geology of the landscape and deposits sand, silt, and other material. These deposits are called alluvium.

Figure 32: Carson City has purchased more than 70 percent of its floodplain. These open spaces allow floodwaters to slow down, spread out, and sink in – *Courtesy D. Neddenriep, 2017*

The floodway is a critical component of the floodplain because it maintains the water-carrying capacity of the river. For regulatory purposes, the floodplain is categorized into the floodway and the floodway fringe. A "regulatory floodway" indicates the channel of a river or other watercourse and its adjacent land areas that must be reserved to discharge a base flood without increasing the cumulative water-surface elevation more than the designated

Protect the floodplain from future development… ***Carson River Coalition Main Message***

height local ordinances require. Communities must regulate development in these floodways to ensure that there are no increases, also known as zero rise, in flood elevations. Within the floodway fringe, there must be no more than a one-foot rise in flood elevations above base flood elevations. FEMA encourages state, local, and private programs that preserve or restore the natural state of floodplains.

The CRC's main message was developed in 2003 and reaffirmed in 2013 and 2018:

"Protect the floodplain from future development. Once the floodplain and especially the river's meander belt corridor are impacted by development, the river loses the ability to reestablish its natural functions. Agricultural fields near the channel are critical for floodwater attenuation, groundwater recharge, nonpoint-source pollution buffering and providing habitat for wildlife."

Floodplains perform natural and beneficial functions. FEMA describes three types of natural and beneficial functions that warrant protecting floodplains in their natural state (FEMA 2002).

- Floodplains in their natural state have an important positive impact on flooding. Floodwaters can spread over a large area in floodplains that have not been encroached upon. This reduces flood velocities and provides flood storage to reduce peak flows downstream. Native riparian vegetation stabilizes soil when it floods so banks do not wash away. Protected floodplains reduce flood energy and therefore reduce damage to adjacent properties and areas downstream.
- Floodplains in their natural state provide ancillary beneficial functions beyond flood reduction. Water quality is improved in areas where natural vegetative cover acts as a filter for runoff and overbank flows.
- Natural floodplains moderate water temperature, reducing the possibility of damaging impacts to plants and animals.
- Natural floodplains can act as recharge areas for groundwater, which reduces the frequency of low-flow events, and can increase minimum flow rates of riverine systems.
- Natural floodplains provide habitat for diverse species of flora and fauna, some of which can live nowhere else. They are particularly important as breeding and feeding areas for birds, both residents and migratory, and other wildlife.

Figure 33: Bird photos captured at the 2017 "Get on the Bus" tour – *Peter Lathrop*

The economic value of undeveloped floodplain land is often overlooked. These open floodplain lands provide benefits that include flood attenuation, public safety, clean water, food production, water recharge, climate regulation, wildlife habitat and are often referred to as ecosystem services. These are economic goods even if they are not explicitly bought and sold like other commodities (Lichtenberg 1994).

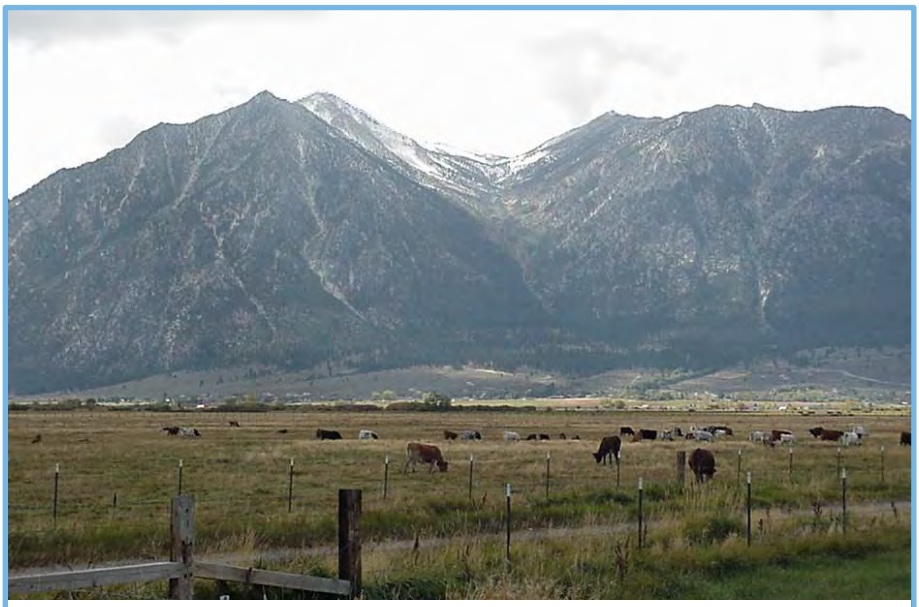


Figure 34: Agricultural land use in Carson Valley conserves floodplain lands.

It is critical to acknowledge and support landowners who provide these benefits by conserving undeveloped or agricultural floodplain lands.

It is important to maintain floodplain function and space for a river to meander when development occurs. Development increases the amount of hard or impervious surfaces, such as buildings and pavement, as it replaces vegetative cover. Water quality is degraded when naturally functioning floodplains are replaced with impervious surfaces. Rather than water being infiltrated and filtered through the ground, it runs off these hard surfaces, picking up pollutants in its path to the river. This polluted runoff, or nonpoint-source pollution (NPSP) becomes a vector for moving lawn fertilizers, leached materials from waste disposal, sediment from excessive erosion, and chemicals from automobiles into the river. As NPSP accumulates in runoff, it threatens water quality. Natural floodplains and vegetated buffers along waterways filter pollutants and reduce NPSP. Section 4.8 describes how green infrastructure (GI), and low-impact development (LIDs) reduce the impacts of polluted runoff.

Land use that allows and encourages native vegetation to flourish is best suited for floodplains. Well-placed parks, trails, or other recreational areas that include native vegetation are ideal for flood-storage capacity. They support the floodplain's natural and beneficial functions that protect water quality, sustain wildlife habitat, and offer beautiful spaces to recreate. Agricultural lands provide the largest portion of open lands that maintain flood storage capacity in the Watershed. In Carson City, approximately 71 percent of the Special Flood Hazard Area (SFHA) are designated open space so the city can mitigate flood damage that would occur if it were otherwise developed. Compatible land use choices that conserve floodplains and wetlands serve to naturally reduce flood hazard risks experienced in more developed floodplains.

A 100-year flood does not only occur once every hundred years; there is a 1% for it to occur in any given year.

Floods are frequently defined in terms of the probability of occurring each year. A 100-year flood does not only occur once every hundred years; it can occur anytime because there is a one-percent chance it could occur in any given year. Floodplain managers are moving away from calling it a 100-year flood because people underestimate their risk. Instead, they are referring to a base flood as a flood that has a one-percent chance of occurring in any given year. Table 10 lists flood classifications for floods with a 10%, 25%, 4%, 2%, 1% and .02% annual chance of flooding. The 1% annual chance flood (also known as the base flood) is statistically less frequent but is deeper and far more destructive. The base flood's floodplain and the floodway makes up FEMA's SFHA. Buildings located within the SFHA are required to have flood insurance as a condition of receiving a federally backed mortgage loan or a home-equity loan. Given that most mortgages have a 30-year repayment period, there is a 26-

percent chance that the building located within a higher risk flood area will experience flooding during the life of the loan (Table 11).

Table 11. Statistical chances of being flooded during a 30-year mortgage. Percentages represent the probability of the flood occurring in any given year.

TIME PERIOD	10-YR FLOOD	25-YEAR FLOOD	50-YEAR FLOOD	100-YEAR FLOOD
1 year*	10%	4%	2%	1%
10 years	65%	34%	18%	10%
20 years	88%	56%	33%	18%
30 years	96%	71%	45%	26%
50 years	99%	87%	64%	39%

Source: Morgan, 2003

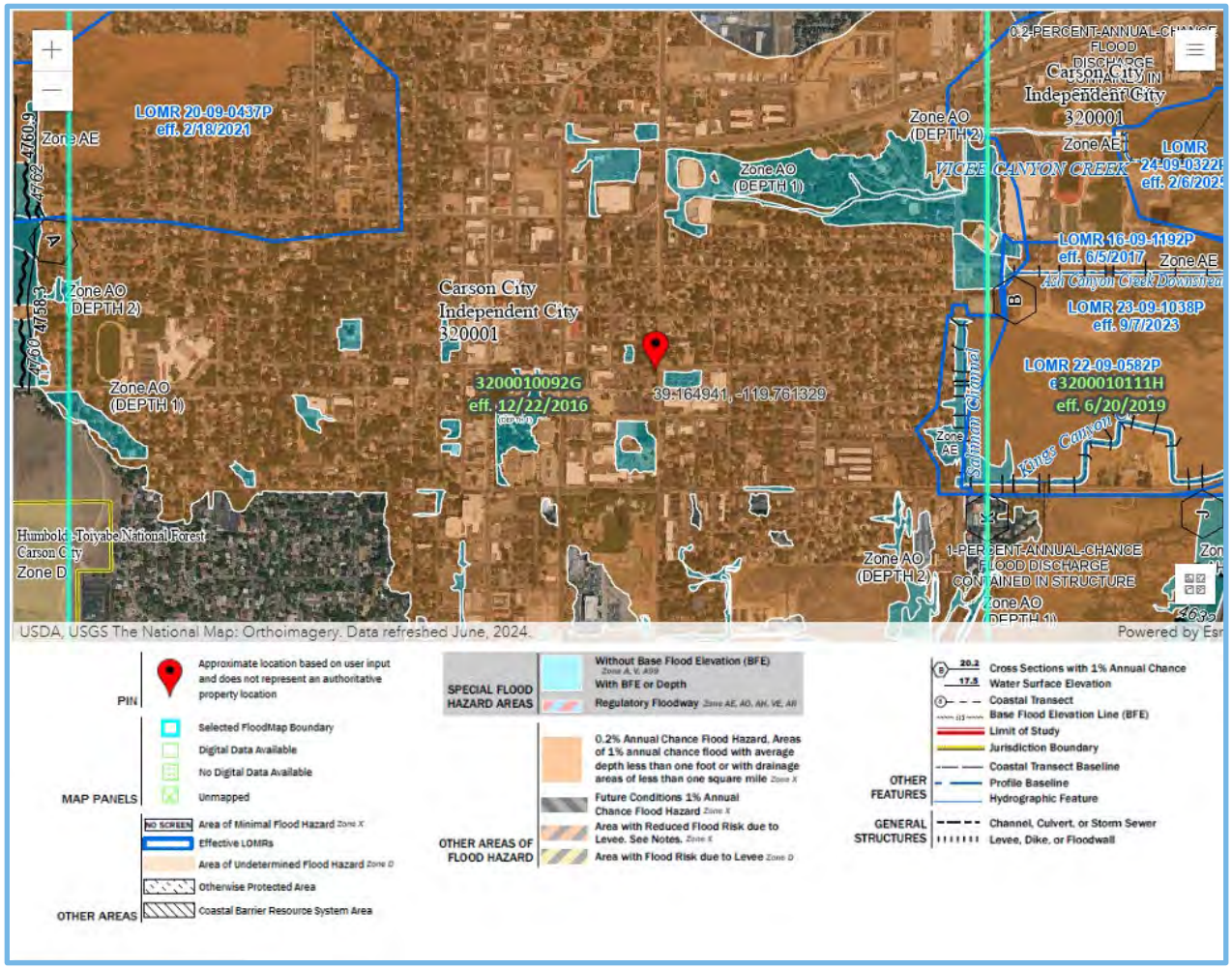
The occurrence of a flood does not affect the probability of a flood occurring again in the same or next year. Flood frequency values adjust either up or down as more data is collected, and the flood frequency is recalculated. Bankfull discharge is predicted to occur for most alluvial streams, like the Carson River, once every 1.5 years on average (Leopold 1994). Out-of-bank flooding occurs once every 2.3 years on average, with a 40% chance of occurring each year. Inappropriate development on vulnerable floodplain lands and wetlands can cause an increase in the risk and frequency of flood-related damage to property and infrastructure. It is important to inform homeowners of their flood risk in areas adjacent to rivers, wetlands, arroyos, and so they understand how to reduce their risk. The most effective method to avoid or reduce (mitigate) flood damage is provided by thoughtful construction. The most effective flood mitigation is not building in areas that flood; structures are less likely to be destroyed if they are not built in the path of floods. Flood insurance mitigates flood losses and is required if a home is in the SFHA and backed by a federal mortgage. Flood Insurance can be purchased even if a structure is not in the special flood hazard area. As many residents learned during the 2014-2015, and 2023 alluvial flash flood events, residents everywhere must be aware of potential flood risks and hazards and be prepared accordingly.

Structures are less likely to be destroyed if they are not built in the path of floods.

Floodways and flood zones are denoted on a FEMA flood insurance rate map (FIRM). Flood maps can be found on FEMA's Map Service Center website. FIRMs delineate flood hazard areas and divide mapped areas into zones according to flood hazard factors. They are prepared for insurance rating, land use regulations, and for lenders. FIRMs indicate where

flood insurance must be purchased. Local governments typically use FIRMS to locate SFHAs. SFHAs have a high risk of flooding and are delineated by FEMA as flood Zones A and V (V refers to coastal flooding). The 2018 Risk MAP Discovery Report (Appendix C) provides images of FEMA flood zones and a link to FEMA DFIRMS are provided in Appendix D. Because of CTP activities coordinated by CWSD (see Table 10), FIRMs for many jurisdictions in the watershed have been and continue to be updated (Alpine, Carson City, Churchill, Douglas, and Lyon). In the remaining jurisdictions where FIRMs are outdated, the current watershed conditions may not be correctly represented; however, those jurisdictions are considering updating their county's FIRMS.

Figure 35: Carson City Flood Insurance Rate Map, FEMA



3.0 FLOOD HISTORY AND RISK ASSESSMENT

Repeated incidents of flooding in the Watershed are detailed on the U.S. Geological Survey (USGS) website, *Flood Carson River Flood Chronology of the Carson River Basin*. While rain-on-snow, high-intensity and short-duration flood events continue to occur, other flood events have raised awareness of the distinct types of flood hazards. These events include alluvial fan flooding; post-fire debris floods; extended periods of high river flows; and consistent rain which overwhelm stormwater systems. Section 3.1 describes occurrences of these types of floods.

Figure 36: Lutheran Bridge, Carson Valley in 1938, *Courtesy Dale Bohlman*

There is no flood control storage in the Carson River's upper watershed. Attenuation of floods after large storms is limited to natural storage available in mountain meadows. When these storms are during the winter or early spring, the capacity of mountain meadows to attenuate flooding is limited. Therefore, during a major flood, Carson Valley, Eagle Valley, and Dayton Valley are typically inundated. These floodplain lands are the storage areas where the river and overbank flows can spread out, slow down and sink in. Overbank flows often reach depths of multiple feet. If floodplains along rivers, alluvial fans, and wetlands are developed without careful planning, these lands become even more susceptible to flooding. Initially elevating building pads, foundations and first floors above

the 100-year flood level (base flood elevation) may appear to protect the inhabitants. However, this strategy backfires as the fill required to elevate these structures reduces a floodplain's natural storage capacity; thus, increasing flow velocities and diverting water to new locations.

Residents with homes in or near rivers, alluvial fan channels, and wetlands are first to experience flood loss. The floods of 1997 and 2005 significantly damaged structures along the Carson River. Summertime cloudbursts above alluvial fans also cause flash flooding. Numerous summer storms like these occurred in 2014 and 2015. In winter 2023, rain-on-snow floods occurred on alluvial fans since there was a significant amount of low elevation snow. These flood events left residents wary, and communities had to pull money from other parts of their budget to pay for the cleanup of roads and infrastructure.

The National Oceanographic and Atmospheric Administration (NOAA) National Weather Service (NWS) website provides information on flood levels and associated potential flood impacts. Table 11 provides risk assessment information from NWS for the Carson River near Carson City. As evidenced in the table, when the river flows at 9,800 cfs, flooding causes considerable damage to communities. A flood exceeding the 22,000 cfs event recorded in 1997 is plausible. For reference, in 2017, peak flow reached 10,500 cfs during the February runoff period. Sustained flows of 1,500 to over 3,000 cfs continued from March through October.

Where development has been allowed to occur in the floodplains, these communities may now be prone to flood risk. A community's floodplain management regulations do not entirely deter new development unfortunately; it requires raising homes above the Base Flood Elevation (BFE) and sometimes providing compensatory storage to make up for the loss of floodplain land. It is important to know and to note, the river is going to do what it naturally does - and flooding may still result despite our best planning efforts.

Figure 37: USGS Graph of February 2017 flows of Carson River

Figure 38: Dayton Valley During the 1997 Flood. Courtesy Pat Glancy, USGS Retired

Table 12. Potential flood impacts related to flood stage of Carson River near Carson City (USGS)

LEVEL (FT)	FLOW (CFS)	POTENTIAL FLOOD IMPACTS
19	38,000	Record flooding with damage previously unknown from Carson Valley to Fort Churchill, including Carson City and Dayton areas. Exceeding the January 1997 peak level, and about 1 in 100 chance of occurring in any given year.
17	29,600	Record flooding. All towns along the Carson River above Lahontan Dam may be inaccessible, with bridges and roads destroyed or badly damaged, including heavy damage to homes, businesses, and infrastructure. Carson Valley becomes a lake 3 miles wide by 12 miles long, the river is over a half mile wide in places. Thousands of acres of farmland flooded. Peak flows near this level have only been exceeded twice in the 80+ year history of the gage (1997 and 1955), and about a 1 in 50 chance in any year.
16	25,800	Near record flooding with massive destruction throughout reach. Most towns isolated with transportation impossible.
15	22,200	A major flood disaster with widespread destruction throughout reach from Genoa to Weeks. Transportation extremely difficult.
13	17,400	Extensive flooding with major damage to roads, bridges, and structures from Genoa to Fort Churchill, Nevada, including Carson City and Dayton. Almost all roads in valley areas flooded, making transportation very difficult. Massive bank erosion is possible. Large agricultural losses are likely due to erosion and rapid flow, including potential livestock drownings if not moved to higher ground.
12	13,300	Major flooding with significant damage to roads, bridges, and structures from Genoa to Fort Churchill, Nevada, including Carson City and Dayton. Many roads in valley areas flooded, making transportation very difficult. Major bank erosion is possible. Agricultural losses are likely due to erosion and rapid flow. Move livestock and machinery to higher ground if possible. US Hwy 395 near Cradlebaugh Bridge likely closed in advance of reaching this stage.drownings.

Table 13. Potential flood impacts related to flood stage for Carson River near Carson City (USGS)

LEVEL (FT)	FLOW (CFS)	POTENTIAL FLOOD IMPACTS
11	10,900	Major flooding with many roads, highways, homes, and structures flooded from Genoa to Fort Churchill, Nevada, including Carson City, Stewart, Empire, and Dayton. Many transportation routes affected, including US Hwy 395 near Cradlebaugh Bridge, which is likely closed six to twelve hours before this stage is observed. Significant bank erosion is possible with the capability of causing major damage as the river channel begins to move around laterally.
10.5	9,800	Minor flooding of lower portions of flood plain from Genoa to Fort Churchill, Nevada, including Carson City and Dayton. River begins to go out of banks at this stage. Several homes may begin to experience minor flooding in Genoa, Carson Valley, and Dayton. Minor to moderate damage to parks and agriculture.
10	8,800	Minor Flood stage. Minor flooding of lower portions of flood plain from Genoa to Fort Churchill, Nevada, including Carson City and Dayton. River begins to go out of banks at this stage. Several homes may begin to experience minor flooding in Genoa, Carson Valley, and Dayton. Minor to moderate damage to parks and agriculture.
9.5	7,800	Minor lowland flooding in flood prone areas along river from Genoa to Fort Churchill, Nevada, including Carson City and Dayton.
9	6,900	Minor lowland flooding in lower reaches from Genoa to Fort Churchill, including Carson City and Dayton, Nevada.
8.5	6,000	8.5 - Very minor lowland flooding from Genoa to Fort Churchill, including Carson City and Dayton, Nevada.
8	5,200	Monitoring stage. Flood threat and localized overbank flows begin in lowest areas from Genoa to Fort Churchill, including Carson City and Dayton along the Carson River.

3.1 TYPES OF FLOOD HAZARDS

Flooding, whether localized or basin-wide, is a common occurrence in the watershed. The Flood types are described below with recent examples of these floods in our watershed. Section 4 provides suggested actions to address diverse types of floods.

Figure 39: Carson River flooded downtown Dayton and Highway 50 in 1997.
USGS Photo Courtesy of Pat Glancy, Retired

3.1.1 MAIN CHANNEL (RIVERINE FLOODING)

Devastating main-channel floods result from warm rain on the mountain snowpack which contributes to rapid snowmelt. As flows in the Carson River increase due to the rapid snowmelt, the channel overflows and submerges the floodplain. Documented footage of the 1997 flood is available and useful for public outreach and education.

The most significant recorded flooding event in the watershed occurred on New Year's 1997, when flows of up to 22,800 cfs ravaged Carson, Eagle, and Dayton Valleys. A decade later, on New Year's 2006, another flood (~12,000 cfs) reminded our communities that flooding regularly occurs on the Carson River. Residents and natural resource managers reported flooding in areas during this small event which had not previously flooded. Potential causes of increased river flooding in areas previously considered safe during moderate to moderately high-volume water flows have been hypothesized but more study is needed to confirm why lower river flows are causing more damage. Some hypotheses

included: increased floodplain development changed the flood routes and increased velocities; increased debris and sediment in the river displaced water and plugged bridges which caused water to back up; or both.

Over the past decade, regional flooding has been worsened by increasingly unpredictable weather conditions. The watershed is subject to extreme drought, forest fires, excessive rain, with minimal snowfall for one year and record-breaking amounts of snow the next. Variable weather creates diverse types of flood hazards which challenge community resilience. In addition to variable weather, there is a significant elevation gradient between the high Sierra and the Carson Sink. The winters of 2016-2017 and 2022-2023 provide examples of two unique winters that led to different flood scenarios for communities to address.

Figure 40: 2017 Carson River Flood

Record breaking winter snowfall in 2017 followed by a warm wet spring led to melt conditions that caused high flows and lingered for months. On the Eastern Sierra there is a typically a rain shadow affect that occurs when atmospheric rivers make landfall in California and dissipate on Sierra peaks. In 2017, that was not the case as storms barreled across the Sierra. Snowfall on the Eastern Sierra and Western Nevada accumulated extensive snow levels that almost matched the highest on record in 1982-83. Floods caused by these persistent waves of heavy precipitation were reported in Western Nevada and the Eastern Sierra slopes. The wet months of October and December 2016 saturated the soil before prolonged bouts of rainfall in early 2017. Riverine floods upon the saturated floodplain eroded the river's banks and channels and caused extensive damage to land and structures watershed wide. Local ranchers experienced loss of productive lands as portions washed away along the river corridor due to this flooding.

NOAA reported that rivers rose to near record levels and quickly filled reservoirs which were low from drought. By winter's end, most of Nevada was declared to be out of drought. What was a drought buster for the region became a threat for communities downstream of Lahontan Reservoir. For instance, in 2017, record snowfall and subsequent snowmelt runoff led to the threat of flooding along the Carson River into the City of Fallon. Stakeholders met in March 2017 to discuss the best options for mitigating flood risk from the projected high runoff. Stakeholders included staff from the U.S. Bureau of Reclamation (USBR), Truckee Carson Irrigation District (TCID), Churchill County and City of Fallon agricultural producers, and residents. Ideas to control the forecasted runoff volume such as inter-basin transfer, groundwater injection, and revisiting former dam sites were considered but none were feasible in the short time frame before the water filled the reservoir.

Figure 41: Bafford Bridge, Churchill County. ***Brenda Hunt 2017***

An emergency task force comprised of TCID, Churchill County, USBR, and the Nevada Department of Transportation met to solve the immediate hazard, seeking downstream structural solutions. The task force worked together to gather funding, approve designs, and install emergency weirs and ditches that released flows from Lahontan Reservoir and its irrigation ditches into the desert and onto Bravo 16, a Navy training range. Nevada Department of Transportation (NDOT) installed new box culverts placed on both U.S. Highway 95 and U.S. Highway 50 to allow water to flow East.

Construction of these emergency structural improvements to convey the water away from populated areas and highways was accomplished in only a few weeks, as there was significant threat of imminent, widespread, potentially damaging flooding to the communities of Fallon and Churchill County. The actions to release and convey the water from Lahontan Reservoir cost almost $5.8 million; costs for the Nevada Department of Transportation (NDOT) were approximately $1.5 million for the culverts under Highway 50/95. Monthly average river flow data from 1940 through 2016 (USGS Carson River Gage near Carson City, 10311000) was compared to the monthly flows during 2017, emphasizing the difference between the two periods of record. The water filled Carson Lake (a dry playa) and the construction of the "Big Dig" (a deep, wide channel) carried water from U.S. Highway 50 north of Grimes Point toward the Stillwater National Refuge and Carson Sink.

This creative solution averted severe damage to Churchill County and City of Fallon residents and businesses developed within the historic floodplain. These communities and local entities continue to work together to determine if this is the best permanent solution and consider any maintenance or follow-up mitigation measures to alleviate unforeseen impacts from the construction (e.g., dust, water quality, and invasive species).

Figure 42: The 2017 emergency spillway. ***Brenda Hunt***

The relentless storms and resultant floods in the first few months of 2017 yielded two Presidential Disaster Declarations in Northern Nevada as summarized in Table 6 along with a declaration in 2023.

Although the winter of a lifetime occurred in 2017, the winter in 2022-2023 shattered that illusion. Winter 2022-2023 was the product of cool temperatures and low elevation snow levels. The temperature stayed below 60 degrees from November 1, 2022, to May 5, 2023. Periods of intense precipitation occurred in December to January and again in February to March. Nevada observed the 3rd wettest and the 11th Coldest December through March in history. The region underwent 9 atmospheric river storms and witnessed many melting snow events that led to flooding in the Watershed. High elevation basins had less flooding because of the high snow water equivalent and the uncharacteristic amount of snow was at lower elevations.

3.1.2 ALLUVIAL FAN FLOODING

Alluvial fan floods, also known as flash floods or gully washers, are caused by intense rainfall during summer thunderstorms on alluvial fan surfaces (gently sloping, fan-shaped landforms common just below mountain canyons as shown in Figure 4. Flash floods are characterized by high-velocity flows, sediment and bedload transport, erosion and deposition, and unpredictable flow paths. In 2014, 2015, 2017, and 2023, localized alluvial fan floods inundated neighborhoods, clogged drainage infrastructure, and covered roads with sediment and debris in Carson City, Douglas, Lyon, and Storey counties. The risks from gully washers increase when development occurs on alluvial fans, as demonstrated in Douglas County.

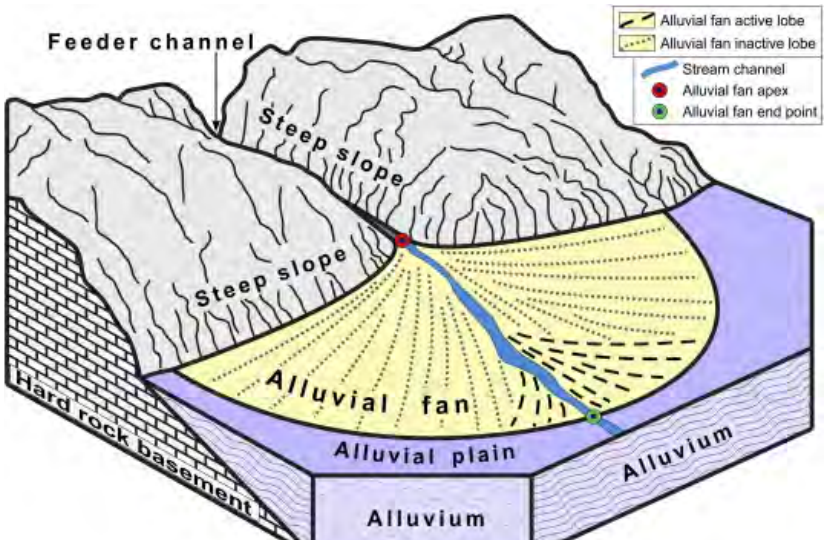


Figure 43: Alluvial Fan Diagram (Source: Geomorphology Journal, Volume 273, 15 November 2016

In the summer of 2014, the Johnson Lane area of Douglas County was damaged from three intense flash flood events (July 20, July 30, and August 6). The Nevada Division of Emergency Management (NDEM) conducted a damage assessment and estimated that 101 properties were damaged with a total cost to private homeowners of $1.5 million. Damage to public infrastructure was estimated at $927,205. In the summer of 2015, the Johnson Lane area of Douglas County was inundated from flash floods on July 8 and 9. A

damage assessment conducted by NDEM estimated that 162 properties were damaged, and $2.2 million was required to restore damaged public infrastructure.

While the series of alluvial fan or flash flood events in 2014 and 2015 resulted in damage to residents in some communities, the costs of cleanup did not reach the required minimum to receive a disaster declaration. A lesson learned during those events, however, was that an accumulation of costs by multiple jurisdictions affected could have brought a declaration, potentially allowing for federal funds to help pay for the cleanup and damages.

Figure 44: 2015 Alluvial Fan caused flash floods in Douglas County.

CWSD was able to obtain CTP funding for an area drainage master plan (ADMP) in Douglas County. While this study was being conducted, approximately 30 residents sued Douglas County, citing a lack of drainage maintenance. The ADMP was completed and adopted by the Douglas County Board of Commissioners in August 2018. The County and residents reached a settlement agreement in October of 2019.

The settlement required Douglas County to construct two detention basins identified in the ADMP (Stephanie and Romero) and left about $300,000 of discretionary funding for the plaintiffs to use for projects that benefit the Johnson Lane area. The County worked with the plaintiffs to allocate some of those funds towards construction of the Chowbuck and Stephanie basins and acquire a one-acre parcel on Pamela Place for an additional

detention basin. It took Douglas County about two years to acquire the right-of-way from BLM to construct the four basins upstream of the Johnson Lane area. These basins were completed in August of 2023.

In 2023, alluvial fans in Douglas, Lyon and Storey counties received considerable damage from severe winter flooding. Damage to public infrastructure in the Watershed portions of Douglas County, Lyon County, and Storey County costs were estimated to be over $5 million. In 2023, Douglas County staff reported floods caused by rain-on-snow in the alluvial fans of the Pinenut Mountains. The county had to pivot to address this winter flooding in what are typically areas of summer monsoons; it caused damage to roads, infrastructure, irrigation canals and creek channels. 2023 underscored how floodplain conservation of transient streams is just as important to consider in reference to community resilience. What was unique about 2023 was the snowfall totals were like 2017; resource professionals did not expect to see these conditions again in their careers. These water years prove a one-hundred-year flood means there is a 1% annual chance a storm can dump an extraordinary amount of water every year!

Figure 46: Douglas County flooding in March 2023 on Buckeye Road, *Courtesy of Courtney Walker*.

Figure 45: Highway 79 in Six Mile Canyon destroyed the road in 2017 and 2023. *Courtesy of Adam Wilson*.

3.1.3 STORMWATER FLOODING

Stormwater flooding, as defined by FEMA, occurs when heavy rainfall overwhelms the capacity of natural and constructed drainage systems, such as storm drains, culverts, and ditches. It can happen in both urban and rural areas. The primary cause is excessive precipitation that the ground, hard or impervious surfaces blocked drainage systems, or that the systems in place either cannot absorb or carry the water to a more appropriate area, quickly enough. Urban flooding, a subset of stormwater flooding, occurs when densely populated areas have hard, or impervious, surfaces that prevent water from naturally soaking into the ground. In addition, the United States Environmental Protection Agency (USEPA) identifies stormwater as one of the primary sources of non-point source pollution, also known as polluted runoff. Floods amplify pollution and create significant health risks. Stormwater flooding is also dangerous and can prevent emergency personnel and vehicles from reaching critical areas. Encouraging green infrastructure or LID in the community development process promotes best management practices that increase infiltration and reduce runoff that contributes to flooding (CWSD 2015). Using these practices also decreases polluted runoff from entering surface waters. Carson City requires any development project to utilize LID practices. Douglas County is currently working on draft ordinances to incentivize LID practices.

Figure 47: Stormwater flood in Carson City, June 2023. *Chris Neddenriep*

Stormwater flooding is attributed to many factors:

1. **Loss of Natural Drainageways:** In some places historic drainage ways have been built upon, eliminating their natural flow paths, and/or replacing them with undersized pipes designed for smaller, more frequent storms. Protection of these natural drainageways is as critical as the protection of alluvial fans and riverine floodplains. Natural drainageways encourage water to slow down, spread out and sink in, like it does on alluvial fan and riverine floodplains. On the other hand, channelizing the water into a pipe speeds up the stormwater and eliminates or limits the natural drainage, exacerbating and causing loss of habitat, filtration, shade, aesthetics, respite and recreation areas, and other beneficial amenities.

2. **Lack of Development, Land Use, and Stormwater Management Standards:** Initially development in communities occurred with minimal or no criteria for stormwater mitigation. As communities grew and stormwater quantity and quality problems became evident, tracking and controlling stormwater ran off with well thought out methods, ranging from natural to more engineered solutions, grew in importance. Most communities now must meet federal mandates enforcing floodplain management (quantity) and runoff pollutant control (quality).
3. **Inadequate Stormwater Management Standards:** Local design standards for stormwater infrastructure do not always address flooding from large rainfall events. Local City or County drainage design requirements vary across the watershed (Douglas County uses a 25-year 24-hour storm; Carson City the 10-year and 100-year 24-hour storm; others the 2-year or 5-year events. These designs may not consider where flood water may go when these systems are overwhelmed. See Figure 36 below.

Figure 48: Water Flows onto Curry Street during a flash flood. June 2024. *Courtesy Brenda Hunt*

4. **Increased Impervious Surfaces (Development) Upstream of Existing Stormwater Conveyance Systems:** As development occurs upstream of existing stormwater conveyance systems and natural surfaces are replaced with concrete (or other hard surfaces), runoff increases, and infiltration decreases. The increases to runoff may have been overlooked when new construction occurred that could impact previously built infrastructure. It is critical to understand the cumulative impacts of runoff volume and velocity that new development and existing hard surfaces in areas where stormwater conveyance systems already exist.

Figure 49: An apartment complex was built upstream of this theatre's parking lot. A summer cloudburst parked above a natural arroyo causing a flash flood. Debris filled water rushed directly into the Galaxy Theater parking lot and surrounding streets causing this damage in less than half an hour. *Courtesy of Brenda Hunt*

5. **Levee Systems and Residual Local Flooding:** Where levee systems were designed to keep river flooding out of urban areas, local stormwater can back up on the urbanized side of constructed levees, creating persistent flood zones.
6. **Insufficient Maintenance:** Maintenance challenges include:
    - Sediment or debris accumulation reduces the capacity of stormwater management systems and can plug pipes or limit the efficiency of detention/ retention facilities and reduce infiltration capacity of LID facilities (such as permeable pavement, or rock lined swales, etc.
    - Lack of maintenance to stormwater facilities (like basins) reduce the effectiveness of the infrastructure.
    - Filled or constructed improvements within permanent drainage easements are built by property owners who may not realize such improvements are not permitted.
    - Local agencies may not have infrastructure easements that allow access for regular maintenance of stormwater systems.
    - Storm drain systems that have not been installed correctly (backfill, underdrain, slope, etc.).
    - Lack of regular inspection and repair (such as backflow prevention valves) to ensure stormwater will drain as intended.

7. **Increased Climate Variability:** According to University of Nevada Cooperative Extension, climate variability affects Nevada residents and businesses. In addition, flooding will be more frequent owing to a shift from snow to rain and more intense storms, even if precipitation does not increase. Current stormwater systems may not have the capacity required for future rainfall events due to climate variability.

Flood losses outside of the Federal Emergency Management Agency (FEMA) mapped 100-yr floodplain (1% chance) make up 25% of all National Flood Insurance Program (NFIP) claims. FEMA's regulatory flood maps represent riverine and limited alluvial fan flooding, but do not account for localized stormwater flooding. Ignoring stormwater floods exponentially increases public and private costs. Research on climate variability is necessary to address localized flooding and develop plans to mitigate stormwater hazards and losses.

According to FEMA "Natural Hazard Mitigation Saves Fact Sheet", every dollar invested in a community's inventory, repair and replacement of stormwater and road drainage infrastructure, they save $6 in disaster costs. CWSD and the CRC work together to support local efforts to advance resilience by addressing stormwater flooding from a regional perspective. The movement to treat stormwater as a water resource and not a nuisance is important, especially in our dry climate. The world has practiced collecting and discharging runoff into the nearest water body to be shunted downstream for a long time. However, the relationship between surface water, ground water, water supply, and water quality reiterate the importance of stormwater as a significant resource. This plan's suggested actions support a myriad of creative solutions to help mitigate stormwater flooding so it is not a hazard but can be a resource (see Section 4.8). Section 5 outlines stormwater management challenges in rural counties and offers potential strategies to overcome those barriers.

3.1.4 FLOOD-AFTER-FIRE AND DEBRIS FLOWS

Debris flows are the result of water from intense rainfall or rapid snowmelt mixing with sediment and bedload to become a slurry like the consistency of wet concrete. In steep canyons (for example, the east slope of the Carson Range), debris flows can reach high velocities, transport large boulders, and cause catastrophic damage from impact or burial. Debris flows frequently originate in post-fire burn areas. After a fire event, the landscape becomes altered and is less susceptible to infiltration. Even up to 5 years after Wildfires, flooding occurs in places that previously were unimpacted (FEMA fact sheet).

Figure 50: FEMA social media infographic provided by their Flood After Fire Toolkit

In 2016, 2017, and 2022, post-fire flooding caused mudslides, and debris flows in multiple locations in the upper watershed as described in the following incidents:

- The Washington Fire in Alpine County (January and February 2017) caused debris flows severe enough that when County staff were able to examine the damage, the debris flows into the East Fork of the Carson River had changed the course of the river and filled Wolf Creek Road with over 10 feet of rocks and mud. There were also many landslides on Highway 89 adjacent to the East Fork of the Carson River.
- From July 6 - 14, 2020, the Numbers Fire burned over 18,342 acres in the Pine Nut Mountains, near Gardnerville, Nevada. The Numbers Fire impacted the Smelter Creek and Pinenut Creek watersheds. These two drainages flow more frequently now and bring down a lot of debris and sediment into the developed areas.

- The Tamarack Fire burned 68,637 acres primarily in the Mokelumne Wilderness in Alpine County, California. This fire crested the Sierra to also burn in Douglas County, Nevada and Lyon County, Nevada in the 2021 wildfire season. As a result, in 2022 a mudslide in the Tamarack Fire burn scar buried parts of Penrod Lane, Reese Lane, and Holbrook Highlands areas of Douglas County. This mudslide occurred above Highland Way, bringing down copious amounts of mud and debris. This drainage now flows in every rain event, which did not occur pre-fire.
- A mud flow in the burn scar of the Tamarack fire also cut Markleeville off and filled Millberry Creek with debris. This flood closed Highway 89 North of Markleeville. Caltrans had to do an emergency repair to the culvert and highway, forcing residents to take a completely different route to their community by going south over Monitor pass.

The Tamarack Fire burned 68,637 acres, primarily in the Mokelumne Wilderness in Alpine County, California. This fire crested the Sierra, burning portions of Douglas County, Nevada and Lyon County, Nevada in 2021 wildfire season. A mudslide in the Tamarack Fire burn scar buried parts of Penrod Lane, Reese Lane, and Holbrook Highlands areas of Douglas County. In 2022, a mudslide occurred above Highland Way, bringing down copious amounts of mud and debris. This drainage now flows in every rain event, which did not occur pre-fire.

Figure 51: Caltrans photos of mudflows after Tamarack fire that closed Highway 89

After the Tamarack Fire, additional improvements were made in Crystal Springs, and bridges were improved on the road to Grover Hot Springs. Community volunteers have revegetated areas burned by the Tamarack Fire, planting trees in Musser and Jarvis drainage, Turtle Rock Park, Thornburg Canyon, Pleasant Valley, Curtz Lake, and Grover Hot Springs areas. Alpine Watershed Group began Arbor Day tree planting events in 2023 with trees donated by the Sugar Pine Foundation and continues to host tree planting events since the fire. A USFS contractor began planting trees in Alpine County in 2024.

Figure 52: Grovers Hot Springs before the Tamarack Fire. Alpine Watershed Group is working to revegetate and plant trees in Alpine County.

3.1.5. EXTENDED PERIODS OF HIGH FLOWS

In years when there is an uncharacteristically high snowpack, the duration of spring runoff is prolonged. Riverine floods caused by unusually long periods of high flows are worsened by heavy winter precipitation and spring rains. Sustained high velocity flows scour riverbanks and cause the river to incise, especially if the flows do not overtop the banks and access the floodplain. Sediment is carried by this fast-moving water to downstream areas, causing more damage. This cycle can lead to greater incision which further limits runoff from accessing the river's floodplain. Every new high flow incident repeats the cycle in each downstream reach until the entire river is channelized and cut off from its floodplain. When the river is cut off from its floodplain, we undermine the goals of the living river approach espoused in this plan. As more of the river becomes incised, the costs to rehabilitate it and reduce flood damage grows exponentially. Regular floods emphasize the importance of maintaining the river and ensuring the floodwaters have access to the floodplain to slow flows, and allow them to spread out and sink in. Protection of the floodplain from development and maintaining the river's ability to access it is critical to protect property and life in the Carson River Watershed. A geomorphological and sediment transport study has been proposed to inform a project prioritization plan. CWSD has applied for Conserve Nevada funding and is awaiting budget approval by the Nevada legislature.

Figure 53: A flooded Carson River in Spring 2017, Brenda Hunt

3.2 FEMA REPETITIVE LOSS AREAS

According to FEMA, a Repetitive Loss (RL) property is any insurable building for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978.

The history of the loss includes all flood claims paid on the property, regardless of any change(s) in ownership since the building's construction, or back to 1978. It is important to know about such areas as they affect the credits awarded under the CRS. The repetitive loss properties recorded by the CRS communities in the Watershed are listed in Table 12. Alpine County, Lyon County and Churchill County do not participate in the CRS program.

Table 14. Repetitive loss areas within CRS communities in Carson River Watershed (2024)

JURISDICTION	REPETITIVE LOSS PROPERTIES:
Alpine County	The only repetitive loss property is in Bear Valley, which is not in the Carson River Watershed.
Carson City	6 repetitive loss properties
Churchill County	1 repetitive loss property
Lyon County	1 repetitive loss properties
Douglas County	Within Douglas County, there are 4 repetitive loss properties in Genoa, 3 repetitive loss properties in Gardnerville, and 5 repetitive loss properties in Minden.
Storey County	0 repetitive loss properties

3.3 RISK ASSESSMENT (HAZUS)

HAZUS is a nationally applicable standardized methodology that contains models for estimating potential economic losses from disasters such as floods, earthquakes, and hurricanes. HAZUS uses Geographic Information Systems (GIS) technology to estimate physical, economic, and social impacts of disasters. It graphically illustrates the limits of identified high-risk locations, and users can then visualize the spatial relationships between populations and other more permanently fixed geographic assets or resources for the specific hazard being modeled, a crucial function in the pre-disaster planning process.

At the current time, there is one HAZUS analysis conducted along the Carson River in Carson Valley, but it will be superseded when the Physical Map Revision becomes effective in June 2025. This tool can provide valuable economic loss data to help guide floodplain management decision making, gauge the effects of future changes, and provide

input into a community's capital improvement projects on a much broader basis. HAZUS data can be used in conjunction with the two-dimensional hydraulic modeling to generate baseline economic loss data. With much of the watershed studied using 2D modeling, communities should take advantage of these existing data sets and HAZUS to fully understand the potential impacts of future flood events. An analysis of potential economic losses from multiple return interval flood events could be either a FEMA or community funded effort. It could provide local agencies with an understanding of the cost versus benefit of capital improvements and the overall cost of flooding. New data and statistics could provide a comprehensive hazard analysis that includes urban areas and floods that originate on federally managed lands.

3.4 PUBLIC AND PRIVATE INFRASTRUCTURE

The Carson River Watershed is typical of many irrigated watersheds in the western United States comprised of a large land mass through which a river traverses. The Carson River serves irrigation water through a distribution system of canals and ditches to farm and ranch land that extends the reach of the river water to areas which did not naturally have access to Carson River water for irrigation. Agriculture is a vital part of the local economy; however, many of the developed areas discharge their stormwater into irrigation canals. This results in an array of infrastructure owned by public and private entities. Conservation Districts or local municipalities periodically conduct routine maintenance to ensure conveyance capacities. Some jurisdictions also maintain stormwater inventories to monitor, inspect, and maintain facilities; these actions provide credit in CRS (540) actions. While public infrastructure may have some funding associated with maintenance costs, private irrigation infrastructure may not. It is equally important to maintain the private infrastructure, as it is usually the secondary receiver of the floodwaters. When private ditches do not properly function or are clogged, flood flows may back up onto

Figure 54: Diversion Structure in Dayton damaged by 2017 flood. *Ed James*

neighboring properties or public infrastructure. There is a need to better understand the interaction of these systems and how they affect community risk, and potentially harm people and property if they are overlooked.

There is a need to create an inventory of public flood control infrastructure and private drainage on the river, categorize ownership as public or private to establish baseline conditions in the Watershed. An inventory of these facilities could provide stakeholders and end users with a database of conveyance features to begin prioritizing maintenance and improvements and identify deficiencies in the system.

In early 2025, all Nevada jurisdictions subject to the State of Nevada's Small MS4 are reviewing an update to the MS4 permit, which regulates stormwater discharges. Changes include keeping an inventory of all private and public post-construction or permanent stormwater collection and conveyance facilities. While this will help to ensure maintenance activities occur, the cost burden that would be imposed on each jurisdiction could be substantial. This is particularly concerning since most jurisdictions do not have dedicated stormwater funding to implement their programs.

3.5 FUTURE CONDITION CONSIDERATION AND IMPACTS TO FLOODPLAIN

Figure 55: Consider critical facilities to ensure effective disaster response. Image used located on Carson Valley Heath website.

There is ongoing discussion at CRC working group meetings about the importance of outreach and education to residents outside of the federally regulated Special Flood Hazard Areas (SFHAs). Many people think that flooding is exclusive to the SFHA; rather, the SFHA is just a mapped delineation of the floodplain and floodway. It can still flood outside FEMA's mapped flood zones, and while these floods are not as deep, they can be equally

dangerous. It is also important to consider critical infrastructure (hospitals, schools, fire stations) to ensure they are protected at higher levels. For example, Carson City requirements to elevate critical structures 1' above the 500-year water surface level exceeds FEMA standards is a proactive flood regulation ensuring that critical infrastructure is out of harm's way. As we relate flood risk to residents, we need to explore the flood hazards which exist beyond the 100-year floodplain. Flood insurance in the 500-year floodplain is prudent and is much less expensive than for properties within the 100-year floodplain. In addition, climate variability has changed storm patterns, rainfall amounts, and snow levels, which adds uncertainty to future conditions. Sound floodplain management in the Watershed should include a margin of error in all decisions that account for this uncertainty.

4.0 FLOOD RISK REDUCTION AND FLOODPLAIN STRATEGIES

As stated in Section1, the long-term vision and strategies for regional floodplain management are categorized as follows:

1. PROTECT NATURAL FLOODPLAIN FUNCTION AND VALUES
2. SET HIGHER REGULATORY STANDARDS
3. COLLECT FLOOD DATA INFORMATION AND MAINTENANCE
4. BALANCE CHANNEL MIGRATION AND BANK EROSION MONITORING
5. INCREASE FLOODPLAIN AND FLOOD HAZARD OUTREACH AND EDUCATION
6. REDUCE INFRASTRUCTURE IMPACT
7. MAP/STUDY ALLUVIAL FANS
8. MINIMIZE STORMWATER MITIGATION

The table below provides a summary of the suggested actions for each strategy presented in this section. Suggested actions are desirable actions to be completed within staffing and budgetary limitations to achieve local jurisdiction and Watershed Regional Floodplain Management Plan goals. Since this CRFMP and its suggested actions are elements of the Watershed Adaptive Stewardship Plan (CRASP), its actions align with the CRASP. The table also includes suggested responsible parties and potential sources of funding for specific actions. Finally, it correlates suggested actions to FEMA Community Rating System (CRS). Refer to Table 8 for a description of each CRS activity, defined objective, and listed activity elements.

As part of this update each jurisdiction reviewed the suggested actions to assess progress made, prioritize, and identify any new hazards or strategies for which additional suggested actions should be implemented. During the 2018 CRFMP revision process, and in conjunction with the CRASP (Stewardship Plan, Table 8.8), two new sections of suggested actions were added in 2018: reduce alluvial fans hazards and minimize stormwater impacts. Refer to Table 13 for a summary of the strategies and suggested actions for watershed flood risk reduction. Progress made since 2018 in each Watershed county is provided in Appendix E.

Table 15. Suggested Actions for Floodplain Management in the Carson River Watershed

SA #		CRS	SUGGESTED ACTION	Responsible Party	Existing or Potential Funding Partner
PROTECT FLOODPLAIN NATURAL FUNCTION AND VALUE (1-8) - Refer also to Stewardship Plan Table 8.8					
PROTECT FLOODPLAIN NATURAL FUNCTION AND VALUE (1-8)	1	320 420 510	Maintain Living River approach to retain river system in a more natural state that allows the river to access its floodplain. Recognize that not all areas of the river system can be allowed to migrate freely due to special designation (i.e. Superfund area) and/or existing infrastructure.	All entities	N/A
	2	350 410	Develop, support and implement a good neighbor floodplain management policy that recognizes cumulative impacts and actions by one property owner can impact upstream, adjacent and downstream property owners.	All entities	N/A
	3	420	Investigate, identify, and implement areas where stream zone buffers would provide multi-objective benefits for river system and downstream communities.	Local and tribal governments	NDWR Clearing and Snagging Fund; FEMA; State Lands; NDEP
	4	310 410 530	Manage development in special flood hazard areas and other flood hazard areas (those known flood hazard areas not included on most current FIRMs) to provide public safety and protect the natural functions and benefits of floodplain lands.	Local and tribal governments; CWSD	Local Governments
	5	320 450	Promote and utilize best management practices as a means of protecting riparian habitat.	All entities	NDEP, FEMA, USBR, Local Governments
	ECOSYSTEM SERVICES IMPORTANT to MAINTAINING LIVING RIVER APPROACH				
	6	350 420	Consider Floodplain and flood hazards ecosystem service objectives which preserve open floodplain lands when selecting acquisition targets and establishing management strategies for open spaces.	Local and tribal governments, NGOs, CWSD	FEMA, Local Governments, NDEP
	7	520	Identify and promote options for landowner incentive programs, such as floodplain leasing program and conservation easements that provide compensation to landowners providing ecosystem services and seek funding mechanisms.	Local & tribal governments, NGOs, CWSD, CRC, landowners	Federal, State and local sources, Conserve Nevada, SNPLMA
	8	420 520	Retain lands that preserve floodplain storage which maintain and/or restore connection of river with floodplain through land acquisition, conservation easements, local open space programs, TDR and PDR Programs, and other protection methods. Pursue protection of additional acreage in flood prone areas (See UNCE 2015, Floodplain Protection Inventory for the Carson River)	Local and tribal governments, NGOs, landowners	Conserve Nevada; SNPLMA; NGOs; local governments

			HIGHER REGULATORY STANDARDS (9-11)		
HIGHER REGULATORY STANDARDS (9-11)	9	430	Periodically review county ordinances that include floodplain protection as a purpose, account for the loss of floodplain storage volume, and mitigate losses through a variety of methods.	Local governments	FEMA, Local Governments
	10	430	Investigate, promote, and implement of additional flood protection measures that go beyond minimum FEMA requirements, such as improving community rating system.	Local governments	Local Governments
	11	430	Development and adoption of consistent floodplain management ordinance language and consistent use of hydraulic model of Carson River system.	CWSD, CRC, local governments	FEMA, CWSD, Local Governments
FLOOD DATA INFORMATION AND MAINTENANCE (12-21)					
FLOOD DATA INFORMATION AND MAINTENANCE (12-21)	12	410 440	Establish and adopt funding source, and protocol / procedures to consistently update watershed-wide unsteady state modeling to identify flood water storage requirements and to look at the cumulative effects of watershed development.	Local & state governments, CWSD	FEMA, CWSD, NDEP, other local & state entities
	13	440	Support FEMA's Map Modernization Program and encourage FEMA to update FIRMs with current and future conditions. Significant verification of topography and other variables should be conducted prior to release of draft FIRMs.	Local governments, FEMA, CWSD	FEMA, CWSD, Local Governments
	14		Participate in FEMA's Cooperating Technical Partner Program.	CWSD, FEMA	CWSD
	15	410 440	Collect and maintain up-to-date and consistent data collection which includes updating flood studies as needed and conducting new studies for significant water courses and alluvial fan areas. This data should be used to update FEMA maps and/or fill local data gaps. Complete delineation of the floodway throughout river system and incorporate into FIRMs.	Local governments, CWSD, FEMA	All Federal, state and local funding sources
	16	410 440	Update flood studies and maps after significant flooding events.	Local governments	FEMA, CWSD, Local Governments
	17	410 440	Update and maintain Elevation Reference Marks (ERM) should be as permanent monuments using NAVD88 Datum which matches base flood elevations on FEMA FIRMs.	Local governments	All Federal, state and local funding sources
	18	410 440	Develop and maintain master list of ERMs and provide them to interested parties.	Local governments, CWSD	All Federal, state and local funding sources

FLOOD DATA INFORMATION AND MAINTENANCE (19-21)	**FLOOD DATA INFORMATION AND MAINTENANCE (12-21)**				
	19	350 410 440	Develop and coordinate photo-monitoring program (on-the-ground and aerial) on a watershed level to consistently document flooding and flood hazards.	Local governments	All Federal, state and local funding sources
	20	350 410 440	Establish and maintain rain gage data network in each local jurisdiction.	Federal, State and Local governments	All Federal, state and local funding sources
	21		Evaluate potential impacts due to climate variability which could include changing storm patterns, rainfall amounts, and snow levels, adding uncertainty to future conditions.	Federal, State and Local governments, CWSD	All Federal, state and local funding sources
	CHANNEL MIGRATION AND BANK EROSION MONITORING (22-29)				
CHANNEL MIGRATION AND BANK EROSION MONITORING (22-29)	22	410	Document/map and update known and projected hazard areas including channel migration hazards and incorporated into planning processes.	Conservation Districts, CWSD, NDEP, FEMA, local & tribal governments	FEMA, CWSD, NDEP, NDWR, BIA, Conservation Districts, local & tribal governments
	23	440	Conduct LiDAR and/or aerial photography (on a watershed level) on a 5-year basis, or as needed, to provide updated information on channel movement and floodplain condition.	CWSD, NDEP, CVCD, DVCD, NGOs, BOR, local governments	All Federal, state and local funding sources
	24	430	Conduct research and establish appropriate building set-backs in flood hazard areas to reduce severe hazards from channel migration.	Local and State entities, CWSD	All Federal, state and local funding sources
	25	410 440	Conduct and document channel cross-sectional surveys to track long term changes in river channel.	CWSD, Conservation Districts	All Federal, state and local funding sources
	26	410 440	Identify unstable stream banks and areas with high potential for erosion.	Conservation districts, NDEP, CWSD	All Federal, state and local funding sources
	27	510	Promote the use of non-structural, bio-engineering (soft-engineering utilizing natural materials) techniques in river restoration projects in combination with other proven methods.	All entities	FEMA, NDEP, CWSD
	28	440 510	Update the 1996 Fluvial Geomorphic Assessment and create a sediment transport model of the Carson River.	CWSD, NDEP, Conservation Districts	FEMA Pre-Disaster Mitigation grants; USACE: UNR Graduate Grants; DRI; NSF
	29	440 510	Create a baseline study that informs management and project decisions regarding flood risks, damages, and ecosystem impacts.	CWSD, NDEP, Conservation Districts	FEMA Pre-Disaster Mitigation grants; USACE: UNR Graduate Grants; DRI; NSF

FLOODPLAIN AND FLOOD HAZARD OUTREACH AND EDUCATION (30-34)					
FLOODPLAIN AND FLOOD HAZARD OUTREACH AND EDUCATION (30-34)	30	330	Continued implementation of watershed-wide outreach and education program about floodplain importance and flooding hazards.	CRC Working group which includes CWSD, Federal, State and Local Jurisdictions	FEMA; NDWR, and Federal, state and local partners
	31	330	Promote and participate in Annual Flood Awareness Week (FAW) and events throughout the year with the objective of providing information about protection of floodplains, flooding and flood hazards to the general public.	CRC Working group which includes CWSD, Federal, State and Local Jurisdictions	All Federal, state and local funding sources
	32	330	Develop and update media in conjunction with FAW working group (social media, videos, brochures, web content, press releases etc.) for distribution throughout watershed with consistent messages and information for the general public.	CRC Working groupwhich includes CWSD, Federal, State and Local Jurisdictions	CWSD, NDWR, USACE
	33	330	Promote FAW partner websites (e.g., NevadaFloods.org, National Weather Service, CWSD, and county websites) which provide information on the Regional Floodplain Management Plan, floodplain protection, flood risk, emergency preparedness, and emergency contact information. Link to one another's websites and social media sites to amplify message.	In conjunction with Flood Awareness Campaign led by NDWR, CWSD, NOAA -NWS Reno specifically address flood risk and local jurisdictions have websites as well which also link to these websites.	CWSD, NDWR, NOAA -NWS Reno
	34	330	Utilize special events, River Work Days, and other outreach opportunities in conjunction with FAW working group to raise awareness of flooding hazards and importance of floodplains.	CRC Working group which includes CWSD, Federal, State and Local Jurisdictions	All Federal, state and local funding sources
REDUCE INFRASTRUCTURE IMPACTS (35-39)					
REDUCE INFRASTRUCTURE IMPACTS (35-39)	35	510 540	Investigate opportunities and implement actions when feasible to remove existing restrictions, such as berms or uncertified levees, to allow flood waters to access floodplain.	Local & tribal government organizations, landowners	All Federal, state and local funding sources
	36	510	Limit the use of future management measures such as dams, levees, and floodwalls.	Local & tribal government organizations, landowners	All Federal, state and local funding sources
	37	540	Design future bridges and roads to protect floodplain and accommodate rather than restrict river course changes, and minimize back up of flood water.	Local governments, NDOT	All Federal, state and local funding sources
	38		Investigate opportunities to enhance grade control structures.	Local governments, NDOT	FEMA, NDEP, CWSD, and local governments
	39		Inventory, categorize, and house data regarding public and private drainage and flood control infrastructure in the Carson River Watershed.	Local governments, CWSD	FEMA, NDEP, CWSD, and local governments

ALLUVIAL FAN HAZARD REDUCTION (40-43)					
ALLUVIAL FAN HAZARD REDUCTION (40-43)	40	440	Investigate extent of potential alluvial fan flood damage and include on maps.	Local governments, CWSD	FEMA, USACE, CWSD, and all other Federal, state, and local funding sources
	41	440	Conduct Area Drainage Master Plans for alluvial fans which examines infrastructure, land use, sediment transport to identify & identify alternative to mitigate and/or reduce risk.	Local governments, CWSD	FEMA, CWSD, and all other Federal, state, and local funding sources
	42	440 530	Implement studies to inform and motivate land use planning & development which protects high risk areas, and/or allows flood waters and debris flows to safely move through fan flood zones;	CWSD, Local governments	FEMA, CWSD, and all other Federal, state, and local funding sources
	43	440 530	Define and implement means to protect existing open alluvial fans from development and where development exists, implement recommendations associated with SA#'s 40-42 to limit further development and/or alleviate hazards in high risk areas.	CWSD, Local governments	FEMA, CWSD, and all other Federal, state, and local funding sources
MINIMIZE STORMWATER IMPACTS (44-49)					
MINIMIZE STORMWATER IMPACTS (44-49)	44	450	Retain and infiltrate stormwater to reduce flood risk, capture groundwater, and improve water quality.	State, CWSD, Local Governments	FEMA, CWSD, and all other Federal, state, and local funding sources
	45	450	Plan for and mitigate cumulative effects of watershed urbanization, including stormwater runoff, to reduce flood hazards.	All entities	FEMA, Local Governments, NDEP
	46	450	Incorporate GI/LID methods to reduce stormwater flooding on site in all development and redevelopment proposals.	Local governments	Incentives to Development (i.e. fee waviers, credits)
	47	450	Adopt model LID ordinances created for Watershed.	CWSD/Local governments	Local Governments/CWSD
	48	320 450	Utilize best management practices to reduce-stormwater/urban runoff and mitigate stormwater flooding.	All entities	NDEP, FEMA, USBR, Local Governments
	49	320 450	Protect and buffer natural drainage ways (existing green infrastructure) from development to ensure historic and natural flows are maintained.	All entities	NDEP, FEMA, USBR, Local Governments
2023 Supplemental Update changes: Removed references to former suggested actions. Changed wording to Stormwater Impacts sections and added Suggested Action 49.					

4.1 PROTECT FLOODPLAIN NATURAL FUNCTIONS AND VALUES

The Carson River system is fortunate to still have undeveloped floodplain that provides ecosystem services to our communities. Agricultural and open space lands adjacent to the river allow flood waters to spread out, slow down, and sink in. These lands reduce flood velocities, give emergency managers more time to respond and lower cumulative impacts of flooding in the river system and adjacent communities. When the river can access its floodplain, every community reaps the benefits. The following sections summarize the watershed-wide progress accomplished through protecting natural floodplain function and values.

The CRC Guiding Principles and CRFMP promote the protection of natural open floodplain and land uses that are compatible with floodplain form and function. This approach acknowledges the open floodplain is the best flood hazard protection. FEMA and the Association of State Floodplain Managers (ASFPM) consider the protection of the natural functions and values of a floodplain as a priority in floodplain management. FEMA's CRS program has increased the amount of credit available for communities that implement these types of strategies. As stated in *Natural Hazard Mitigation Saves: 2017 interim Report*, "...mitigation funding can save the nation $6 in future disaster costs, for every $1 spend on hazard mitigation".

SUGGESTED ACTIONS 1-8

1. Maintain Living River approach to retain river system in a more natural state that allows the river to access its floodplain. Recognize that not all areas of the river system can be allowed to migrate freely due to special designation (i.e., Superfund area) and/or existing infrastructure.

2. Develop, support and implement a good neighbor floodplain management policy that recognizes that actions by one property owner can impact adjacent and downstream property owners.

3.Investigate, identify, and implement areas where stream zone buffers would provide multi-objective benefits for river system and downstream communities.

4. Manage development in special flood hazard areas and other flood hazard areas (those known flood hazard areas not included on most current FIRMs) to provide public safety and protect the natural functions and benefits of floodplain lands.

5. Promote and utilize best management practices as a means of protecting riparian habitat.

6. Consider floodplain and flood hazards ecosystem service objectives when selecting acquisition targets and establishing management strategies for open spaces.

7. Identify and promote options for landowner incentive programs, such as floodplain leasing program and conservation easements that provide compensation to landowners providing ecosystem services and seek funding mechanisms.

8.Retain lands that provide floodplain storage and maintain or restore connection of river with floodplain through land acquisition, conservation easements, local open space programs, TDR and PDR Programs, and other protection methods.

4.1.1 LIVING RIVER APPROACH

The Living River approach recognizes the importance of balancing the river's natural floodplain form and function with various land uses to reduce flood damage impacts in the Watershed. Utilizing the living river approach seeks a more natural riverine state that balances between an undisturbed meandering channel and a channelized river in a concrete ditch. While development may occur, this approach focuses on maintaining a river that functions as naturally as possible given existing constraints. Benefits to the river from this approach:

- Enhance the human environment;
- Provide Continuity (unhindered flow conditions);
- Connect the river to its floodplain;
- Preserve and restores habitat in the floodplain;
- Minimize disruption and alteration of the river and riparian habitat;
- Convey variable flows;
- Improve water quality;
- Allow the river to meander to balance sediment input with sediment transport;
- Provide fish and wildlife habitat;
- Sustain water supply; and
- Maintains aesthetic and recreational qualities.

When development occurs in natural floodplain areas, there benefits are minimized at best, or eliminated at worst. Public expenditures to manage and repair flood damage increases in developed floodplains. Communities that adopt policies to conserve open floodplain lands and support the living river concept protect the lives and property of their residents and save money because it costs much less to recover from floods. Retaining undisturbed natural areas adjacent to waterways is also unparalleled for water quality improvement. Policies that support the living river concept include limiting growth within the floodplain and/or clustering growth outside the floodplain, implementing low impact development (LID)/green infrastructure (GI) practices, adopting nature-based solutions, incentivizing conservation easements or floodplain leasing, and adopting a Good Neighbor Policy.

"Building on the floodplain is like setting up your tent on a freeway when no cars are coming."

Dr. Vicki Martin, University of Montana

4.1.2 GOOD NEIGHBOR POLICY

A Good Neighbor Policy of floodplain management recognizes actions by one property owner can impact adjacent and downstream property owners. This good neighbor policy applies to arroyos of alluvial fans and playas, or dry lake beds, as well as river systems. Adoption of this CRFMP includes a good neighbor floodplain management policy as one of its main goals. A good neighbor policy is also known as or "No Adverse Impact." The first step of implementation of a No Adverse Impact policy is to identify where the water is coming from and where it is going to. Sections 4.3.2 and 4.3.6. describes the maps and models used to assess impacts of potential watershed urbanization, tracks the cumulative impacts of land use changes, and evaluates drainage projects and development in the Watershed. These tools evaluate how a structure may increase flood stage, flood velocity, and peak flows in other parts of the river. When planners or other county staff understand the likelihood a house or a subdivision will increase erosion and sedimentation, degrade water quality, or increase cost of public services, they can make better decisions. Maps include regulatory maps and non-regulatory maps like Area Drainage Master plans (ADMPs) that map alluvial fan channels and flood hazards. The next step of a good neighbor policy reduces or eliminates adverse and often unintentional consequences. For instance, by developing and implementing county ordinances to lower flood velocities, risk is reduced for neighboring communities.

Figure 56: This photo is taken in Carson City but viewing the flood waters flowing from Douglas County. Floods do not honor county boundaries. *2017 Courtesy of Shane Fryer*

4.1.3 METHODS TO CONSERVE FLOODPLAIN FUNCTION

Farm and ranch lands are consistent with the living river approach and are appropriate land uses in critical floodplain lands. Providing ways to protect and sustain these lands remains a top priority for the CRC.

Throughout this document, the benefits of the floodplain to protect residents and structures from flood hazards are described. The Carson River floodplain is still open because of the ranches and farms near the river. In Carson City, those ranches and farms and other floodplain areas have been acquired by the city with open space funding. Natural floodplain function is integral to the health and safety of the Watershed and its residents. This section lists ways to retain lands that provide floodplain storage. In 2018, the Rapid Assessment of the River System was updated and has been made accessible (Appendix B). The Rapid Assessment catalogs flood hazard areas by county. Based on the UNCE's *Floodplain Protection Inventory for Carson River* (UNCE 2015), 31% or 12,315 acres of floodplain land in Douglas and Lyon Counties, and Carson City have been protected. Ongoing partner collaboration is essential to implement this plan and suggested actions. By working together, we can strive to increase conserved floodplain acreage over the next 10 years. CWSD is working with partners to update the floodplain protection inventory for the Watershed to determine our progress in protecting additional floodplain since the baseline study in 2015. Tracking this progress is important and challenging as these tools are used by multiple entities. No one entity is compiling this data at present beyond the discussed floodplain protection inventory. The land use tools outlined in the next section were, and continue to be, employed to protect Carson River Watershed floodplain lands.

Figure 54: Carson Valley Floodplain, Laura Crain, TNC

FLOOD PROTECTION MECHANISMS:

The most common land use tools use as mechanisms to protect floodplain lands include conservation easements, transfer of development rights (TDR), land acquisition, and open space programs. Communities can choose to pursue these mechanisms to maintain or restore connection of the river to its floodplain. Other mechanisms may be discussed in a future CRFMP updates.

CONSERVATION EASEMENTS

Conservation easements are legal agreements between property owners and another entity, usually a land trust or a government body. The easement restricts land uses to allow for protection of an array of conservation values. The land remains in the property owner's possession, and they can continue to use it, sell it, or pass it onto their family/heirs. Flexible in nature, conservation easements can be negotiated to limit development on all or a portion of the property. They do not necessarily provide for public access and often prefer the continuation of the existing land use, such as farming or other open space uses. The holder of the easement is responsible for ensuring the terms of the agreement are followed. (Land Trust Alliance website 2013) Conservation easements in the Carson River Watershed are administered by a myriad of entities including Bureau of Land Management, The Nature Conservancy, and the Nevada Land Trust.

TRANSFER OF DEVELOPMENT RIGHTS (TDR) PROGRAMS

According to the Center for Land Use Education, the Transfer of Development Rights (TDR) is a voluntary, incentive-based program that allows landowners to sell development rights from their land to a developer or other interested party who can then use these rights to increase the density of development at another designated location (Miskowiak and Stoll 2006). The landowner who sold the development right maintains ownership of the property and a conservation easement or other restrictive covenant is placed on the property to limit or prevent development. TDR programs are useful to protect land uses and land areas such as farmlands, open spaces, floodplains, habitat areas and/or places of historical significance. The program is an equitable market-based program that protects natural/historical values while providing incentives to both the seller and the buyer. Douglas and Churchill Counties currently have TDR programs.

4.1.4 STATE QUESTION NO. 1 & CONSERVE NEVADA

Monies have been awarded to fund projects in the communities to help mitigate flood risks. These included plans to preserve acreage adjacent to the Martin Slough in Douglas County through purchase of private lands, construction of a trench, and creation of a

floodway. These activities have been ongoing since the early 2000's. Additionally, the State Question 1 fund supported the acquisition of approximately 1,400 acres of Open Space property in Carson City.

CARSON CITY QUESTION 18 QUALITY OF LIFE INITIATIVE

In 1996, Carson City voters approved the Quality-of-Life Initiative, or Question 18, that provided fund through a sales tax increase of ¼ of a percent to acquire and maintain open space (40%), develop community park facilities and trails (40%), and maintain and operate the park facilities developed through Quality-of-Life Initiative (20%). (CCPRMP 2006) This program and tax initiative is completely unique in Nevada. Other watershed communities adjacent to Carson City have tried to enact similar funding mechanisms, such as a quarter percent tax to conserve agricultural lands or special districts but have not been successful to date.

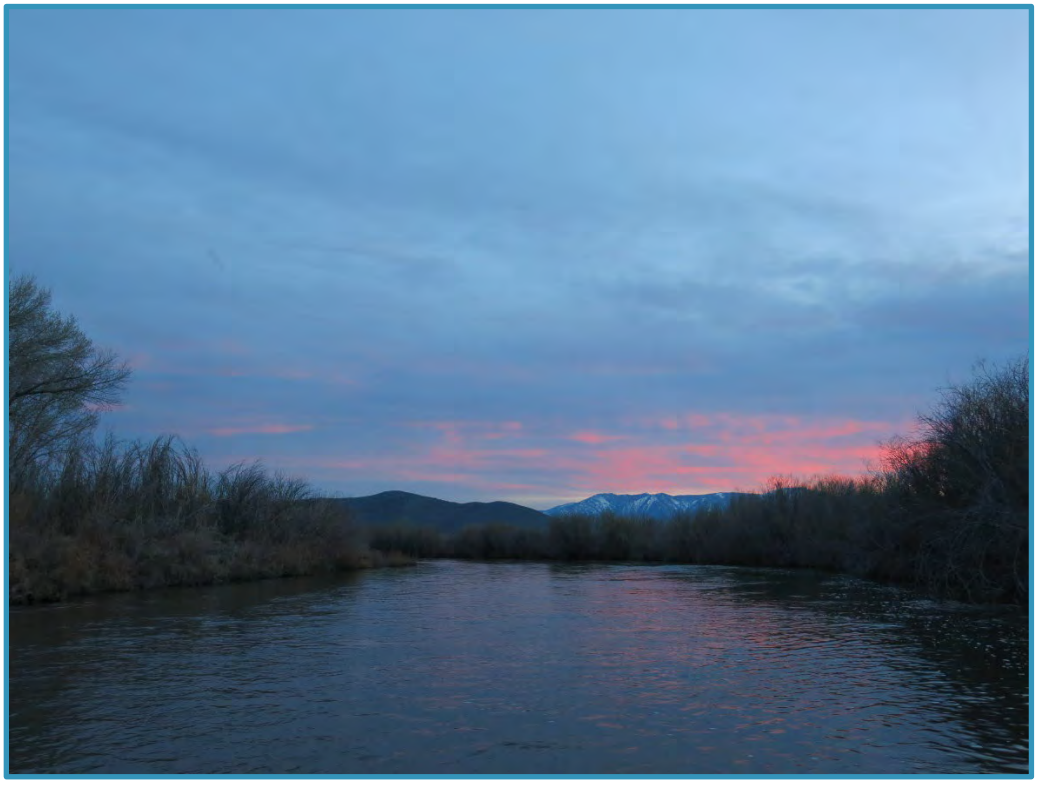


Figure 57: Carson City's Quality of Life dollars has made moonlight summer floats possible with the construction of boat ramps to enter and exit the river. *Shane Fryer 2016*

CARSON CITY OPEN SPACE PLAN

The Open Space Plan, which is an element of the Carson City Master Plan affirms the importance of open space to public health and safety (e.g., watersheds, drainage ways, flooding). Carson City residents listed their number one priority as preserving open space in the river corridor when surveyed. Since its inception in 1996, Carson City's Open Space Program has protected its open lands of the Carson River Floodplain and other drainage ways. As of 2025, over 7,400 acres of Open Space lands have been acquired by Carson City for the purpose of floodplain protection, wildlife habitat conservation, passive recreation, agricultural preservation and viewshed protection. 5,000 contiguous acres and 11 miles of protected floodplain have been conserved in the Carson River corridor through Carson City. The City has developed a robust management plan for its parks and Open Space properties in the river corridor and is also in the process of updating the Carson River Master Plan, originally authored in 1996. The updated plan should be revised and adopted in late 2025 or early 2026.

THE DOUGLAS COUNTY ECONOMIC DEVELOPMENT AND CONSERVATION ACT OF 2018

The counties and federal representatives introduced this bill to Congress, but it has yet to be enacted. It will allow for (1) the disposal of certain excess and difficult to manage federal lands, ensuring that the sales proceeds are used to acquire conservation easements in the floodplain from willing landowners in Douglas County; (2) transfer federally-owned flood control management areas and important water resource infrastructure parcels to Douglas County; (3) transfer of important federally-owned cultural sites to the Washoe Tribe; (4) dedicate Burbank Canyons Wilderness Area while maintaining vehicular use of historic and existing roads; and (5) improve management of certain federally-owned public recreation parcels (Etchegoyhen 2013). This program could increase the amount of alluvial fans and riverine floodplain lands conserved in Douglas County in both upper and lower reached of the Floodplain. -

Figure 58: Dangberg Home Ranch Historic Park is a beautifully preserved property in Douglas County. Shane Fryer during the 2018 bus tour.

4.2 HIGHER REGULATORY STANDARDS

SUGGESTED ACTIONS 9-11

9. Periodically review county ordinances that include floodplain protection as a purpose, account for the loss of floodplain storage volume, and mitigate losses through a variety of methods

10. Investigate, promote, and implement of additional flood protection measures that go beyond minimum FEMA requirements, such as improving community rating system.

11. Development and adoption of consistent floodplain management ordinance language and consistent use of hydraulic model of Carson River system.

FEMA's National Flood Insurance Program (NFIP) established minimum regulatory standards for communities that participate in the NFIP. Communities that participate must adopt floodplain ordinances to meet minimum federal requirements before residents are qualified to buy flood insurance. Minimum regulations provide communities and their residents with limited protection when floods occur. Enacting higher regulatory standards is the best way to build resilience in a community. Higher standards also provide more points to CRS communities. The CRFMP promotes adoption of higher standards that reduce flood hazards in each community. The CRPMP also encourages communities to add language, so neighbors and downstream properties are not adversely affected. Adopting an ordinance to require structures be built at least a foot above the base flood elevation is an example of a higher standard.

4.2.1 REVISED ORDINANCES

If development is allowed to occur within identified SFHAs, construction of buildings must be regulated to provide for increased flood protection. Local jurisdictions support actions that go beyond the minimum requirements and provide additional protection for residents and for the natural resources. In support of this, FEMA CTP founded CWSD to develop a model floodplain ordinance for Alpine County, California and Carson City, Douglas, Lyon, and Churchill counties in Nevada.

Figure 59: Thoughtful flood ordinances avoid flood scenarios where new development does not flood existing structures.

Floodplain ordinances drafted aligned with the needs and opportunities identified within each jurisdiction. The model ordinance project assisted each jurisdiction in the review and future amendment of their floodplain ordinances. The model ordinance incorporated the Carson River Hydraulic Model and the Model Management, Distribution, and Update Guide to accommodate the new regional floodplain mapping and Flood Insurance Rate Maps (FIRMs). These comprehensive ordinances provide consistency across the jurisdictions for building and construction standards and include enforcement by a regulatory agency such as each community's building or zoning department. The 2016 Floodplain Ordinance Draft Report and Mitigation Plan Table can be accessed in Appendix D in the CWSD projects table, MAS 4 section.

Lyon County updated their floodplain ordinances in 2019. Alpine County updated its floodplains ordinances in 2023. Douglas County and Carson City adopted some of the proposed ordinances in 2023. Storey and Churchill County may consider ordinance updates in the future. In the Watershed, these draft ordinances included language that outlined how they should be implemented or enhanced to:

- Include protection of floodplain function as a purpose of the ordinance.
- Be based on a good neighbor policy.
- Require mitigation for the loss of floodplain storage capacity; and
- Account for the cumulative impacts associated with floodplain development.

Figure 60: Beautiful Carson River upstream of Fort Churchill State Park, *Shane Fryer*

SUGGESTED ACTIONS 12-21

12. Establish and adopt funding source, and protocol / procedures to consistently update watershed-wide unsteady state modeling to identify flood water storage requirements and to look at the cumulative effects of watershed development.

13. Support FEMA's Map Modernization Program and encourage FEMA to update FIRMs with current and future conditions. Significant verification of topography and other variables should be conducted prior to release of draft FIRMs.

14. Participate in FEMA's Cooperating Technical Partner Program.

15. Collect and maintain up-to-date and consistent data collection which includes updating flood studies as needed and conducting new studies for significant water courses and alluvial fan areas. This data should be used to update FEMA maps and/or fill local data gaps. Complete delineation of the floodway throughout river system and incorporate into FIRMs.

16. Update flood studies and maps after significant flooding events.

17. Update and Maintain Elevation Reference Marks (ERM) as permanent monuments using NAVD88 Datum which matches base flood elevations on FEMA FIRMs.

18. Develop and maintain master list of ERMs and provide to interested parties.

19. Develop and coordinate photo-Monitoring program (on-the-ground and aerial) on a watershed level to consistently document flooding and flood hazards.

20. Establish and maintain a rain gage data network in each local jurisdiction.

21. Evaluate potential impacts due to climate variability which could include changing storm patterns, rainfall amounts, and snow levels, adding uncertainty to future conditions.

4.3 FLOOD DATA INFORMATION AND MAINTENANCE

Technical information that can be used for flood risk analyses and risk reduction is critical data for local jurisdiction planning and management. This information includes hydrologic and hydraulic studies, floodplain and channel migration zone maps, LiDAR surveys, geologic studies, geographic information system (GIS) land use data, habitat studies, risk assessments, flood hazard management maps, and FIRMs. To the extent possible, flood data and other related information should be updated and managed in a manner that provides the most current information to all users in a timely and useful manner. CWSD continues to coordinate with FEMA and all watershed jurisdictions to identify, prioritize, and mitigate flood risk reduction projects. This partnership motivates strong interjurisdictional partnerships, provides leverage, and maximizes federal, state, and local funding opportunities to complete new or revised FIRMs and flood hazard projects. A major accomplishment was the development of one Carson River Hydraulic Model through four watershed counties upstream of Lahontan Reservoir.

FEMA encourages the following programs to ensure data consistent maintenance CWSD incorporates these everyday implementation activities in its FEMA grants.

Figure 61: Public meeting in Stagecoach describing how an Area Drainage Master Plan will measure water and map how it flows through the community. These plans also offer alternatives to reduce flood hazards.

4.3.1 UP-TO-DATE AND CONSISTENT DATA COLLECTION

It is essential to maintain current data and information to effectively manage our floodplains and any development that may occur. Reliable data is vital to base and defend land use planning decisions. For example, the location of the river and floodplain initially mapped over 30 years ago may not represent today's conditions. Unreliable data may leave potential hazard areas unidentified and expose local governments if they use inaccurate maps for planning and emergency management purposes. CWSD has conducted numerous technical data updates of flood studies and updated FIRMs with FEMA funds. Additional analyses such as Area Drainage Master Plans (ADMPs) have identified flood hazards outside floods zones. ADMPs can be used as tools to help identify priority areas for data collection or improvements. CWSD plans to continue to collaborate with communities to find solutions and to identify data gaps, maintain and collect up-to-date data, and seek funding to help reduce flood risk and community hazards.

4.3.2 RISK MAPPING ASSESSMENT AND PLANNING (RISK MAP)

The FEMA Risk MAP (Risk MAP) Program provides communities with flood information and tools they can use to enhance their mitigation plans and act to better protect their citizens. Through Risk MAP, FEMA is engaging communities to accurately map, communicate, and mitigate flood risk. The Risk MAP program focuses on providing flood prone communities across the nation with tools and data that can be used to mitigate the risk and impact from flooding and communicate with residents and businesses about that risk. Those tools include flood hazard mapping studies and risk identification products and risk assessment tools (e.g., HAZUS a FEMA GIS tool to estimate economic losses) help communities make informed decisions about reducing flood risk.

This program assists communities in hazard mitigation planning, education, and outreach about flood risk, flood insurance, and flood hazards. Flood risk information can be used to enhance hazard mitigation plans, make informed decisions to improve resilience after floods, protect the beneficial functions of floodplains, and raise awareness about local flood risks.

FEMA's Risk MAP Charter (Appendix F) with CWSD in 2011/2012 was the first to be signed in FEMA Region IX. The agreement formalized the collaborative flood management

Figure 62: Charter Partners include Army Corps of Engineers and Nevada Division of Water Resources. Here, Danae Olsen, USACE and Sarah Fichtner, NDWR, receive recognition from Senator Jackie Rosen's office for High Water Mark at Lahontan

efforts between CWSD; Alpine County in California; Douglas, Carson City, Lyon, and Churchill Counties in Nevada; FEMA Region IX (FEMA); U.S. Army Corps of Engineers (USACE); U.S. Geological Survey (USGS); U.S. Department of the Interior Bureau of Reclamation (USBR); National Flood Insurance Program (NFIP) Coordinator; State Hazard Mitigation Office; and other partners. Storey County joined the Charter in 2016. The Charter outlines the process to identify, assess, communicate, and plan for flood risk within the Watershed. All Counties are members of this Risk MAP Charter. CWSD actively pursues CTP projects and programs that are consistent with and implement suggested actions under the collection and maintenance of flood data information category. The Washoe Tribe of Nevada and California and the Fallon Paiute-Shoshone Tribe work directly with FEMA Region IX on tribal projects and studies. Knowledge of these projects is shared through their participation in CRC meetings.

Figure 63: High Water Mark at Dayton State Parks

4.3.3 UPDATING AND MAINTAINING DIGITAL FLOOD INSURANCE RATE MAPS (DFIRM)

To fully utilize FEMA programs, a process was developed to provide procedures for coordinating with FEMA on how county GIS, planning and engineering departments, and floodplain administrators can best utilize and update DFIRMs. A common challenge faced by the counties is that base maps change much faster than the FEMA process. A consistent watershed-wide process is beneficial and allows for easier data sharing and up-to-date map maintenance.

4.3.4 ELEVATION REFERENCE MARK MAINTENANCE

Elevation reference marks (ERMs) provide a baseline for ground elevation reference. This is important for surveyors when determining specific site information such as building elevations, cross sections, or topography, and is critical to determine lowest floor elevations in flood-prone areas. ERM data should be collected in NAVD88 format, so it is consistent with FIRMs. Some counties (e.g., Carson City) have ERMs publicly available, while others have yet to complete this suggested action.

4.3.5 FLOODWAY DELINEATION

The river channel is the area to avoid during flood events because the water is deepest and flows fastest during floods. On FIRM maps, a floodway is delineated with a computer program that squeezes the floodplain toward the channel and causes the flood level to rise. At the point where the water level is a maximum of one foot above the base flood elevation the floodway boundaries are drawn. Some states and communities use more restrictive standards for delineating floodways. Some require less than one-foot rise (e.g., 0.5); this results in a wider floodway and less area in the flood fringe. This approach provides the community with a higher level of protection during flood events. FEMA suggests that development is not allowed in delineated floodways due to their hazardous nature. However, if development is being placed within the boundary of the designated floodway this usually results in some improvements having to be made to the channel section to ensure there is no rise in the floodway.

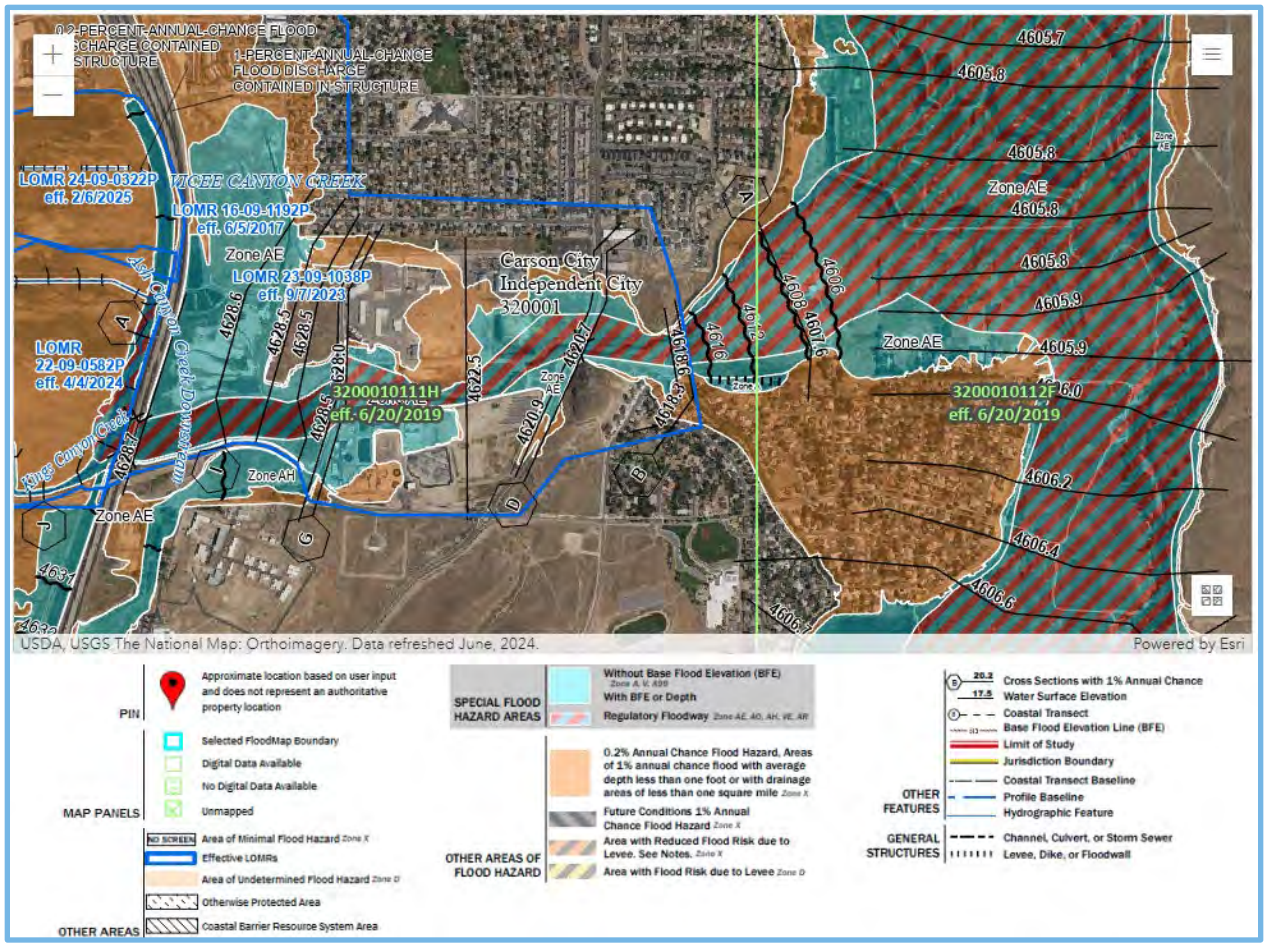
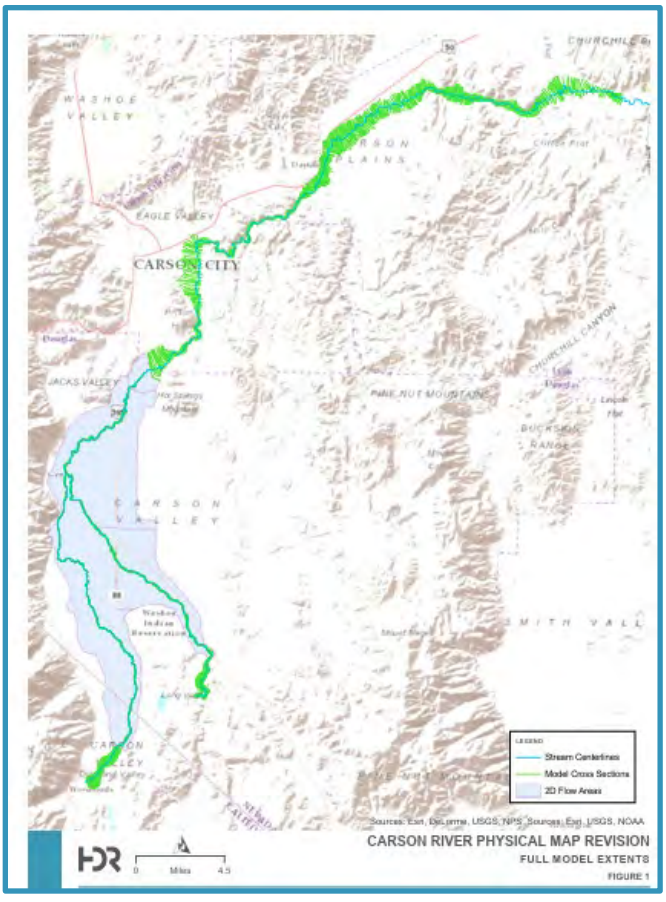


Figure 64: The Floodway in Carson City is delineated by red and blue hatched lines.

As part of the FEMA Risk MAP Program, floodway delineations were successfully incorporated in 2016 on the Carson River for portions of Douglas County, Carson City, Lyon County, and on several tributaries to the Carson River (Clear Creek, Goni Canyon Creek, Kings Canyon Creek). Floodway delineation continues to be a priority in the remaining sections and should incorporate appropriate data verification and address any inconsistencies.

4.3.6 UNSTEADY-STATE MODEL FOR THE CARSON RIVER

The development of an unsteady-state hydraulic model for the Carson River under FEMA MAS 1-4 was a major accomplishment in attempts to identify flood water storage requirements, and to look at cumulative effects of watershed development to the floodplain corridor. One of the main modeling objectives was to track the hydraulic and hydrologic impacts of land use changes, civil drainage projects, and development throughout the entire Carson River Corridor. Floodplain ordinance revisions are ongoing. Draft language suggests use of this model to incorporate changes and assess hydraulic impact for all areas within the newly established Special Flood Hazard Areas. Ordinance revisions will include all Zones A, AE, AH, AO, and Floodways. Using the model to assess and map the timing, volume, and peak flow impacts of proposed projects inform the evaluation and mitigation of flood hazards to downstream communities. The maps also identify areas which could degrade water quality and where riparian habitat, and floodplain function have been lost. This hydraulic model will be utilized to evaluate potential projects. It provides a single tool to help planners, floodplain managers and public works engineers in the public sector comply with NFIP guidelines and regulations. It also achieves local floodplain management objectives for the multiple communities that are impacted by floods on the Carson River. The following documents have been prepared to supplement the use of this model and are linked Appendix D, CWSD project report table, MAS 4 section.



In 2011, Hydraulic Modeling and Floodplain Mapping Guidelines were developed to provide criteria, standards, and modeling guidance for future hydrologic analysis, hydraulic modeling, and flood hazard mapping studies on the Carson River within Lyon, Carson City, Douglas, and Alpine Counties. It provides technical information specifically tailored to the unique hydrologic and hydraulic characteristics of the Watershed. This is a best management practice for land use planners to have practitioners use a

consistent set of criteria that will result in uniform modeling practices throughout the watershed. Just like the river, it crosses jurisdictional boundaries and is meant to reduce conflict between regulatory agencies and the land development community. The Guidelines only apply to the floodplains and floodways associated with the East Fork, West Fork, and mainstem of the Carson River. It is not intended to provide modeling direction for tributaries or alluvial fans associated with the Carson River. Draft Floodplain ordinance language was provided to counties that included adopting these best practices but have not been adopted. The Model Management, Distribution, and Update Guide (2017) has been prepared to set up standard protocols for updating the model as new development occurs in the floodplain. This unsteady state hydraulic model of the Carson River, which spans from Alpine County to Fort Churchill School in Lyon County, can help answer all these questions. However, the key is to keep this tool updated to accurately track development impacts.

4.3.7 PHOTO MONITORING

Photographs of floods are an invaluable tool to monitor flooding impacts and ground truth model predictions. The development of a photo-monitoring program with individuals and/or organizations assigned as photo-monitors during events would provide historical documentation and data for tracking flooding trends. The need for consistent photo-monitoring continues to be discussed, including a systematic plan to track flood events at specific sites. There is potential in working with county Community Emergency Response Teams (CERT) to develop a safe protocol for monitoring high water marks and identifying beneficial locations to monitor.

Figure 65: February 9, 2017, saw high flows on the river. By February 10, the top of tables were about a foot below the surface, based on trees and other structures. ***Brenda Hunt***

4.3.8 RAIN GAGE NETWORK

In 2018, the CRC Floodplain and River Management Working Group identified the need for rain gage data. Watershed counties would benefit from precipitation data levels which could cause flooding in localized areas of the river or above/within alluvial fans. Rain gage data can be used to predict flooding, inform response, and help communities reduce hazards for watershed residents. Carson River gages are monitored by the USGS, and data is available on their website (West Fork Carson River near Woodfords, East Fork Carson River below Markleeville Creek near Markleeville, Carson River near Carson City).

Figure 66: Rapidly reporting rain gauge and weather station deployed to the Davis Fire burn area to help improve warnings for potential flooding or debris flows. *Courtesy of Tim Bardsley, NWS*

Figure 67: The challenge of rain gages in the arid west is catching localized storms which dump a lot of water in a short time. *East Fork Carson River Float, Brenda Hunt*

4.4 CHANNEL MIGRATION AND BANK EROSION MONITORING

SUGGESTED ACTIONS 22-29

22. Document and update known and projected hazard areas including channel migration hazards and incorporated into planning processes.

23. Conduct LiDAR and/or aerial photography (on a watershed level) on a 5-year basis, or as needed, to provide updated information on channel movement and floodplain condition.

24. Establish building setbacks in flood hazard areas, where appropriate, to reduce severe hazards from channel migration.

25. Conduct and document channel cross-sectional surveys to track long term changes in river channel.

26. Identify unstable stream banks and areas with high potential for erosion.

27. Promote the use of non- structural, bio-engineering (soft- engineering utilizing natural materials) techniques in river restoration projects in combination with other proven methods.

28. Update the 1996 Fluvial Geomorphic Assessment and create a sediment transport model of the Carson River.

29. Create a baseline study that informs management and project decisions regarding flood risks, damages, and ecosystem impacts.

The Carson River tends to change course or move laterally in places during flood events due to the wide, flat, and almost unrestricted floodplain. Areas with high potential for channel migration (movement) are extremely hazardous areas for development. Long-term monitoring of the river system can help to identify areas with high potential for excessive erosion and channel migration. Building setbacks or buffer zones are effective to provide public safety in these hazardous areas.

The flood history of the Carson River indicates that floods have been altering channel alignments and stability every five to twenty-five years but was not tracked before the turn of the 20th century. Channel movement that has occurred in Carson Valley from 1907 to 2003 is shown in Figure 9. It is important to consider the potential for channel migration when allowing for development to occur. While a flood may not have affected an area 10 or even 50 years ago, changes in the river course, as well as upstream development or impacts, can have an impact downstream. CWSD has created a short,10-min film, *WorkingWorking with the River*, which discusses how and why rivers meander and why it is important to preserve floodplains to allow this channel movement. We encourage our decision makers to watch this video to understand the geomorphic river processes and how their decisions impact the rivers' ability to meander.

Channel migration risks are twofold in the Carson River valleys. Incised rivers are known to widen their gullies, and valley bottom rivers tend to meander. During floods, the river will erode the outer banks of bends, and these bends will also migrate downstream. This happens during extreme flood events but can also happen during long-term (months-long) high flow events, where the banks are saturated and weakened over time, and collapse or erosion occurs. This unexpected erosion and channel migration further validate the need to keep the floodplain free from development.

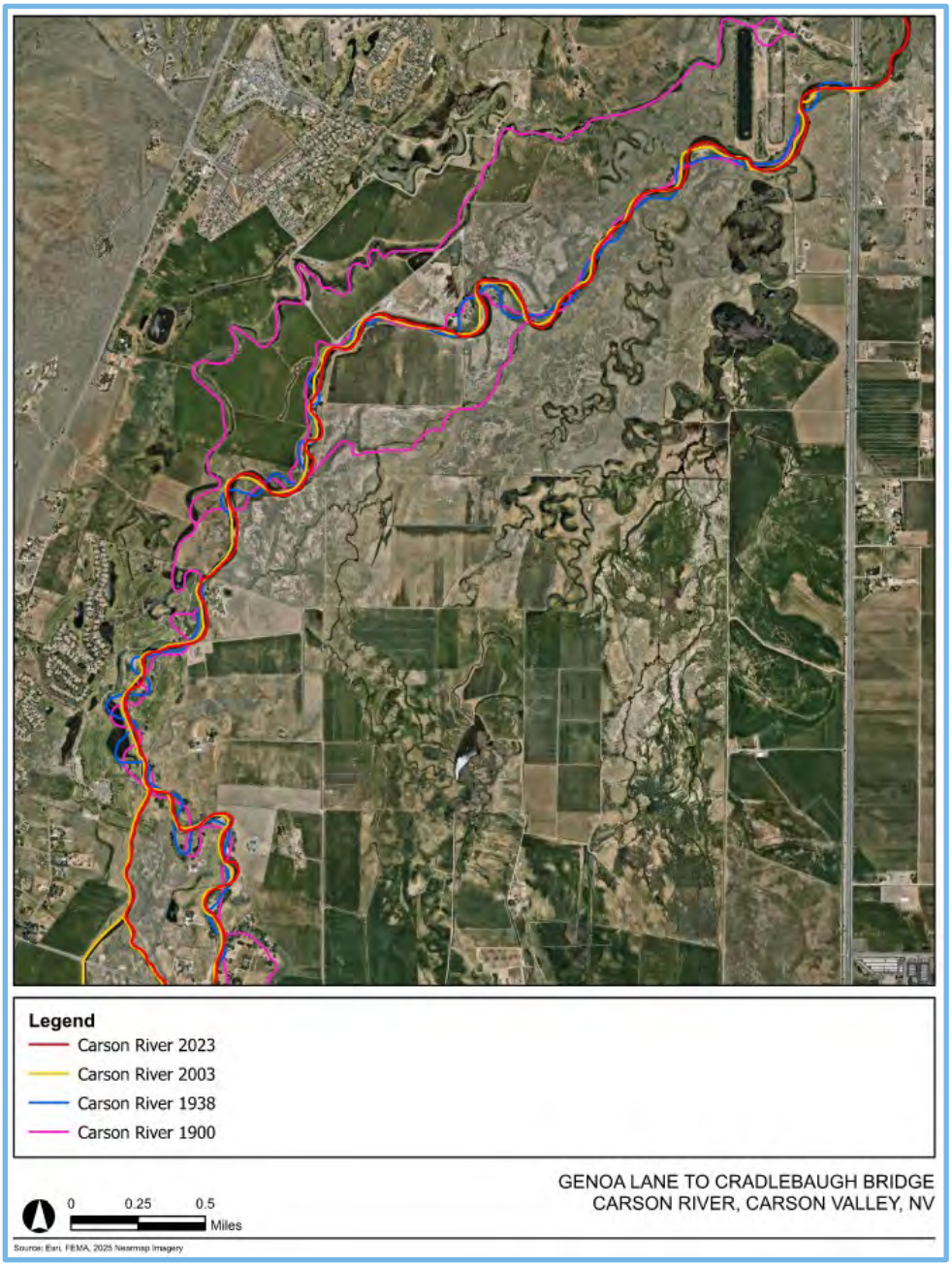


Figure 68: Channel movement from 1906 to 2003 ***(Courtesy Randy Pahl and Jean Stone, NDEP)***

Floodplain managers throughout the nation are urging jurisdictions to consider the risks of allowing urban and residential development near meandering channels. Keeping such areas in agricultural or other open space uses is ideal in terms of avoiding economic losses for property owners and the community. Carson City has purchased all the riverine floodplain lands in Carson City, allowing for the land to retain its floodplain storage capacity and reducing potential risk to life and property. The photo of Hope Valley indicates how the channel migrates over time.

There are multiple sources of funding for river projects along the Carson River. CWSD funds the local conservation districts (Carson Valley Conservation District, Dayton Valley Conservation District, Lahontan, and Stillwater Conservation Districts) to conduct bank stabilization projects that reduce erosion impacts to water quality and habitat. These stabilization efforts may also limit loss of agricultural lands adjacent to the river. The State Clearing and Snagging Fund ($250,000) is available for the conservation districts to undertake clearing and snagging projects throughout the watershed to assist hazard removal. Additional funds to the conservation districts are used to promote the use of bioengineering and non-structural solutions for river restoration and rehabilitation; Friends of Hope Valley and the Alpine Watershed Group actively work to restore and rehabilitate river function in Alpine County. All these actions are important in maintaining the waterway in a condition to ensure unimpeded flows during high events.

Figure 69: Drone Shot of Hope Valley demonstrates channel migration. Notice all the old channels and oxbows. *Shane Fryer, 2017*

4.5 FLOODPLAIN AND FLOOD HAZARD OUTREACH AND EDUCATION

Outreach and education are critical and low-cost tools used to increase public safety, reduce flood risks, and raise awareness of the importance of functioning floodplains. CWSD and its partnering agencies and jurisdictions continue to conduct watershed-wide outreach programs to assist local programs and reinforce flood hazard messaging in a consistent format. These activities are numerous, continuous, and dynamic. A flagship event is the annual Flood Awareness Week, an outreach and education event held since 2014 across northern Nevada. Additional actions include development of watershed-based outreach and educational maps and brochures which include the University of Nevada Cooperative Extension (UNCE) brochures: *The Importance of Floodplains in Our Communities; Agriculture is a Good Fit in the Floodplains; Flood Hazards in Nevada – A Primer; Don't Put Your Home and Family at Risk from Floods!;* and *Floodplain Protection Inventory for the Carson River* . CWSD created short films series to explain how Floodplains are Community Asset for various audiences. The four videos prepared in this series are listed below.

1. Public Service Announcement (PSA) Conserving the Carson River Floodplain as a Community Asset
2. Agriculture is a Good Fit in the Floodplain
3. A Case for Developers to Conserve the Carson River Floodplain as a Community Asset
4. Our Officials Role in Conserving the Carson River Floodplain as a Community Asset

The *Working With the River* video, created in 2020, is a Geomorphology 101 overview. The video imparts earth-science knowledge to county staff and public officials to help them make more informed decisions to improve the health and function of the Carson River. All materials cited support CWSD's overarching objective of informing watershed residents, policy makers, and developers on the importance of conserving the Carson River Floodplain and will be utilized in flood awareness outreach and education efforts throughout the watershed.

Figure 70: CWSD bus tours provide citizens, and staff from all levels of government and nonprofits, to see the floodplains and learn about their benefits. *Hope Valley, California, 2023 Get on the Bus Tour, Brenda Hunt*

Information about the floodplain and flood hazard outreach and education is posted on CWSD and Nevada Floods Websites, as well as local jurisdiction websites. Continuing education and outreach are vital to keep residents and communities aware of the flood hazards faced in the community, how to prevent or reduce damage, and what to do in case of emergency. CWSD provides annual reports to the jurisdictions that participate in the CRS program outlining outreach and education efforts. These include detailed descriptions of the activities conducted each year in satisfaction of CRS crediting requirements (Section 3.5 of the annual report). It is important for each jurisdiction to have a watershed-wide message regardless of differing flooding hazards. The campaigns “Turn around, don’t drown” and “Flood Awareness Week” improve awareness for the public in the watershed. Individual communities may also require additional or specific outreach and education. Activities include monitoring of river channels and restoration projects, river clean-ups, and elementary school curriculum. It is important to maintain the frequency of these events to keep flood awareness on residents’ minds. Other non-profit groups, such as River Wranglers, Sierra Nevada Journeys, and The Nature Conservancy,

provide invaluable education and community outreach that assists in maintaining river function and while reducing flood risk.

Figure 71: Outreach discusses open spaces and local golf courses that are available for recreational use but can be closed for public safety when flooded. *Brenda Hunt*

SUGGESTED ACTIONS 35-39

35. Investigate opportunities and implement actions when feasible to remove existing restrictions, such as berms, to allow flood waters to access floodplain.

36. Limit the use of future management measures such as dams, levees, and floodwalls.

37. Design future bridges and roads to protect floodplain, accommodate and not restrict changing river course, and minimize back up of flood water.

38. Investigate opportunities to enhance grade control structures.

39. Inventory, categorize, and house data regarding public and private drainage and flood control infrastructure in the Carson River Watershed.

4.6 REDUCING INFRASTRUCTURE IMPACTS

Restrictions on the movement of flood waters due to existing infrastructure include:

- Raised roadways and driveways that do not have appropriate drainage to pass flood waters. This can result in a back-up of floodwater affecting not only the landowner but adjacent property.
- Work conducted in the 1960's by various governmental organizations resulted in berms along portions of the Carson River that restrict access of the river to its floodplain. This results in faster, more erosive flows impacting downstream communities.
- Many of the bridges crossing the Carson River have low capacity during flood events and act as constrictions to the passage of flood flows. This can result in increased flood damage and excess streambank erosion.
- Grade control/irrigation structures in the river are frequently damaged during flood events.

Repairs to structures after flooding events has historically returned them to the same pre-flood condition per FEMA requirements. This can result in similar damage to the structures in future flooding events, thereby requiring the same types of repairs. Seeking opportunities to upgrade/redesign these structures after flood damage is beneficial to integrated watershed management objectives and is important to reduce future loss.

Culverts and other drainage structures often fill with sediment and debris that restricts the flow of water; this can lead to ponding and obstruction on roads and in neighborhoods. Often, lack of county resources limits ongoing maintenance which keep these structures

operating as constructed. There are opportunities throughout the watershed for the enhancement and/or design of roads, culverts, grade controls, and bridges to accommodate floodwaters better, protect floodplains, and decrease bank erosion. Each large flood event reveals weaknesses in infrastructure and can lead to plans to repair or replace them. Such identification will lead to funding opportunities to address the known impacts. Rebuilding damaged infrastructure so that it will be more resilient to flooding is a worthwhile investment promoted by FEMA.

Figure 72: Culvert can quickly fill with mud and debris. *Courtney Walker*

Some counties have limited funds for minor stormwater conveyance and culvert upsizing in specific locations that were identified after flood events. Area Drainage Master Plans (ADMPs) conducted by CWSD, such as the Johnson Lane ADMP in Douglas County, serve to identify locations in need of such improvements. While most of these studies are in upland areas that are tributary to the Carson River, some improvements have been identified along the Carson River itself.

The two projects along irrigation system drainages that accept stormwater drainage within the towns have had improvements made to reduce infrastructure impact to flood risk. The Martin Slough crossing under Highway 395 was expanded in 2019 to minimize flooding over Highway 395 during a flooding event. The Cottonwood Slough crossing under State Route 88 was added 200 feet south of the existing crossing for added capacity under the highway to reduce backwater upstream into the homes in Minden so this area does not flood during the 100-year event.

4.7 MAP/STUDY ALLUVIAL FAN FLOOD HAZARDS

SUGGESTED ACTIONS 40-43

40. Investigate extent of potential alluvial fan flood damage and include on maps.

41. Conduct Area Drainage Master Plans for alluvial fans which examine infrastructure, land use, sediment transport, and identify alternative to mitigate and/or reduce risk.

42. Implement studies to inform and motivate land use planning and development which protects high risk areas and/or allows flood waters and debris flows to safely move through fan flood zones.

43. Define and implement means to protect existing open alluvial fans from development and where development exists, implement recommendations associated with SA # s 40-42 to limit further development and/or alleviate hazards in high-risk areas.

Recently, flood damage has resulted from alluvial fan flooding throughout the watershed. Such flooding presents unique problems to federal and state planners in terms of quantifying flood hazards, predicting the magnitude at which those hazards can be expected at a particular location, and devising reliable mitigation strategies. Existing and future development on alluvial fans and other areas subject to flash floods or debris flows is of great concern.

To identify risk of alluvial fan flooding, the USACE (December 2017) prepared an initial alluvial fan classification in the watershed. Alluvial fans were delineated based on aerial imagery, soil, and geological maps, then ranked by relative risk using specified criteria. These criteria can be altered to assess more specific local or regional risk based on each alluvial fan. The mapping results provided by USACE are not intended to be used for community or planning purposes or for informing emergency response decisions.

USACE used the initial report to take a closer look at selected Alluvial Fans in Douglas County and Carson City. This project included field verification of alluvial fan extents,

inclusion of a future development risk factor, weighting risk factors based on the intended application, inclusion of LiDAR data, replacing visual estimations from maps with geo-processes for some risk factors, and adding risk factors such as mining impacts, grazing, slope, and precipitation where applicable. Jurisdictions are encouraged to use the accompanying pilot project maps to identify alluvial fans as flood hazards, develop mitigation strategies, and recommend further studies be conducted to more accurately assess fan hazards based on areal and geographic factors specific to the Watershed. The 2020 USACE Alluvial Fan Map Project can be found online.

Figure 73: Map of Douglas County Alluvial Fan Flood Extents for 100 -year, 6-hour storm, *Courtney Walker*

As part of the planning process, several of the counties are developing ADMPs to identify the flood hazards and which proposed methods are most effective to alleviate these hazards and reduce risk. These methods include maintaining open channels, locating detention basin sites, and improving infrastructure.

Table 16. Area Drainage Master Plans in the Carson River

Area Drainage Master Plans
Douglas County Johnson Lane Area Drainage Master Plan
(North) Dayton Valley Area Drainage Master Plan
South Dayton Valley Area Drainage Master Plan
North Carson City Identification and Mitigation Plan
West Carson City Drainage Study
Ruhenstroth ADMP - Phase 2
East Carson City Area Drainage Plan
Southeast Carson City Area Drainage Study
Virginia City Area Drainage Study
North Silver Springs ADMP
Stagecoach ADMP
Virginia City Area Drainage Study
South Silver Springs ADMP (2026)
Gold Hill ADMP (2026)

Using the information developed in these ADMPs, CWSD received CTP funding to create an online map of local flood hazards not found on FEMA FIRMS. This map allows the county staff to view information and share it with residents to demonstrate flood risk.

Figure 74 Alluvial Fan mud flow covered homes in Johnson Lane in 2014.

Check out the Web Hazard Viewer

4.8 STORMWATER MITIGATION

SUGGESTED ACTIONS 44-49

44. Retain and infiltrate stormwater to reduce flood risk, capture groundwater and improve water quality for and mitigate cumulative effects of existing watershed urbanization, including stormwater runoff, to reduce flood hazards in new development proposals.

45. Incorporate GI/LID methods to reduce stormwater flooding on site in all development and redevelopment proposals.

46. Adopt model LID ordinances created for Watershed.

47. Utilize best management practices to reduce stormwater/ urban runoff and mitigate stormwater flooding.

48. Protect and buffer natural drainage ways (existing green infrastructure) from development to ensure historic and natural flows are maintained.

49. Protect and buffer natural drainage ways (existing green infrastructure) from development to ensure historic and natural flows are maintained.

This CRPMP seeks to implement comprehensive planning and implementation strategies to reduce stormwater. The Carson River Coalition Floodplain Management Working Group (CRC FMWG) steers strategy development.

Figure 62: The top left structure held up during a flood. *Courtesy Robb Fellows*

In reference to stormwater, the goals are to deliver comprehensive, collaborative, and resilient strategies that address stormwater flood risks. CWSD works with our partners to:

- Identify and Map Stormwater Flood Hazard Areas;
- Manage Stormwater Flood Hazards at the Local Level;
- Communicate Stormwater Flood Hazards and Risk;
- Employ Multi-Generational Approaches to Implementing Improvements;
- Identify and Fund Flood Mitigation for Stormwater Inundation Areas;
- Investigate, Identify, and Evaluate solutions;
- Pursue Non-structural, planning & regulatory solutions, such as development of local building standards; and
- Develop strategic implementation plan and community toolbox.
- Install Infrastructure solutions;

CWSD leverages its local money with federal grants to identify and map flood hazards. Stormwater flooding is often hazardous in nature and an important addition to floodplain management planning efforts. While counties and communities manage stormwater at the local level, the CRC FMWG provides a venue to support local efforts regionally. CWSD works with stakeholders to communicate flood hazards and risks including stormwater.

The CRC FMWG worked with stakeholders to identify gaps in their standards and ordinances and created templates for local entities. These templates were used by each watershed county to customize their ordinances. These ordinances strengthen mitigation of stormwater flooding in watershed communities. This floodplain management plan employs a multi-generational approach to implementing improvements. The CRC FMWG works as a group to identify and fund flood mitigation for stormwater inundation areas.

The CRC FMWG also coordinates closely with Nevada's Floodplain Manager and State Hazard Mitigation Officer to communicate a consistent message through the Nevada Floods campaign. Risk communication spans many audiences, so the CRC FMWG is thoughtful in how to best approach the public, school children and educators, local staff and municipal managers, and elected officials.

This plan recognizes stormwater flooding is multifaceted, and solutions also require multipronged approach. As shown in Figure 65, stormwater benefits expand as more individual property owners, neighborhoods, and communities better manage their stormwater. Of course, the cost, the time, and complexity to mitigate stormwater increases in proportion to a project's scale.

Figure 75: Resilient community breakdown and graph.

One approach to implement Stormwater mitigation is to use Green Infrastructure (GI), or Low Impact Development (LID) practices. LID is a land development practice that mimics natural hydrologic processes. These practices can improve stormwater quality and reduce stormwater quantity in urban areas by slowing, holding, infiltrating and evaporating stormwater on site. Onsite infiltration is the critical piece. When GI/LID is implemented as part of a development process, stormwater flood depths and runoff velocity decrease, groundwater is recharged, costs of more expensive stormwater solutions are reduced, and water quality is improved. LID minimizes hard, or impervious, surfaces and reduces the heat island effect. It also

decreses the volume of water and entrained pollutants from being directly delivered to local waterways. LID is most effective when incorporated into development during the planning and design phases of the project before the hydrology of the site has been altered. LID features can be retrofitted into a project, but they are most effective if planned from a project's onset. Other community benefits of using LID practices include enhancing wildlife habitat, air quality, recreation, and neighborhood aesthetics. Incorporation of GI/LID principles into new development and redevelopment is encouraged by this CRFMP and all who contributed to its development.

CWSD's publication "Low Impact Development in the Carson River Watershed" (CWSD 2015) discusses why utilizing LID is important to manage stormwater from a water quality perspective. The document explains LID principles to County decision makers and addresses some methods to overcome implementation barriers. It outlines methods to achieve this goal including conducting training workshops with partners to promote LID benefits and teaching installation techniques to local builders, developers, and landscapers. CWSD reviewed and audited existing LID ordinances to identify any inconsistencies in existing code. A template with suggested codes changes was provided to each county to use as the basis for adoption of a LID ordinance. Those templates are still available, and counties are encouraged to use or modify them to adopt LID friendly ordinances and overcome inconsistencies in codes. LID practices are often straightforward and can be easily incorporated into the fabric of the planning process to ensure effective implementation and long-term maintenance. Community outreach and involvement is an important aspect for LID implementation.

The US EPA underscores several other reasons LID is an important stormwater management tool. According to their website, LID/GI ordinances and other environmental planning may allow a community to claim points toward flood insurance discounts under the Community Rating System (CRS) developed by the Federal Emergency Management Agency (FEMA). A study, *Flood Loss Avoidance Benefits of Green Infrastructure for Stormwater Management (2015)* was conducted by the US EPA in 2015. In relation to this study, the US EPA website states, "results show that, over time, the use of green stormwater infrastructure can save hundreds of millions of dollars in flood losses, when just applying the practices to new development and redevelopment only. If retrofitting were to occur, the avoided losses would be even more significant." The study found that establishing GI throughout a HUC 8 watershed (like the Carson River Watershed) provided direct monetary benefits through flood loss avoidance.

Every community has different types of stormwater concerns, whether it relates to water quality, flooding issues, municipal separate storm water systems (MS4) requirements,

and/or existing regulations. Working together to incorporate LID ordinances and practices into local codes and standards repertoire is an important first step to affect change.

Figure 76: Implementation of LID project at Douglas High School in the Carson Valley. *Courtesy Courtney Walker*

Stormwater flooding and implementation solutions, as previously stated, are required to be addressed by multiple stakeholders ranging from individuals to neighborhoods to entire basins. This CRFMP lists the suggested actions and examples to undertake at different scales of cost and difficulty. Table 16 suggests practices that can be implemented at these various scales.

Table 17. LID and GI practices at Residential, County and Basin Level

LID/ GI Practices	Residential	County	Basin
Buffer Strips/Swales	X	X	X
Bioswales		X	X
Drainage Maintenance	X	X	X
Rain Gardens	X	X	
LID Ordinances and Development Review		X	X
Outreach and Education		X	X
Site Design and Layout	X	X	X
Permeable Pavers/ Porous Pavement	X	X	X

ACTIONS TO CAPTURE STORMWATER ON AN INDIVIDUAL PARCEL:

These actions retain stormwater on properties and allow it to slow down, spread out and sink in. For more ideas on residential actions visit Water Quality section of CWSD's website and watch *Make Your Yard A Sponge* at I Am Carson River.

- Divert downspouts to water your lawn/garden beds/landscaping so stormwater can be on site rather than directly to the street or storm drain.
- Collect roof runoff with a rain barrel and use water on landscaping.
- Create a Rain Garden or plant in depressed areas that capture runoff. This waters your rain garden plants by using the runoff as a resource rather than a waste product.
- Avoid planting on mounds, especially in Nevada's dry climate.
- Maintain drainageways on the property, especially historic washes since that is where the water will naturally flow.
- Incorporate the existing hydrology into your site design and layout whenever possible. If retrofitting, consider recreating drainages that mimic nature.
- Place Buffer Strips along impermeable surfaces to capture sheet flow and along waterways to pretreat runoff.
- Permeable Pavers /Porous Pavement allow water to soak in; however, like all LID methods, maintenance is critical.

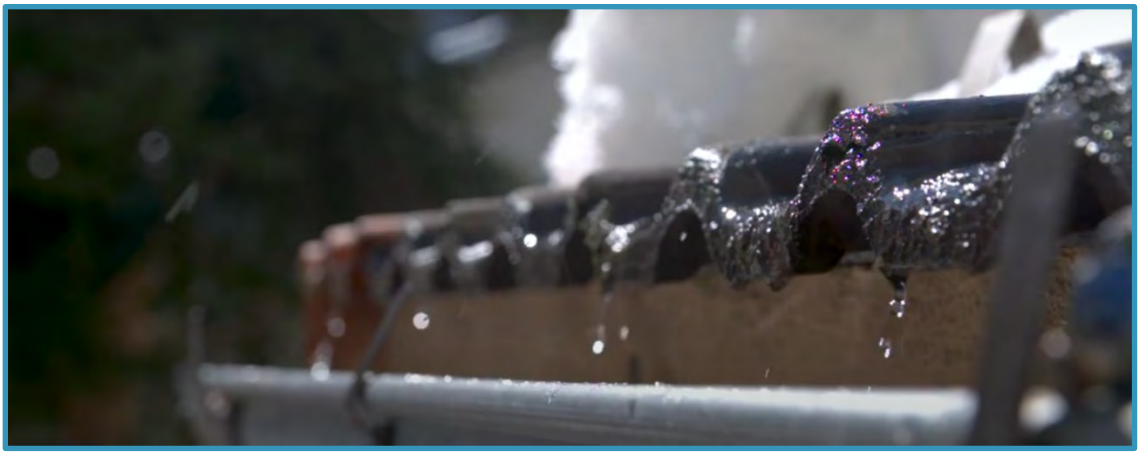


Figure 74: CWSD's "Make Your Yard a Sponge" video explains how to direct water into rain gutters.

NEIGHBORHOODS AND COMMUNITY ACTION TO CAPTURE STORMWATER:

The following actions can reduce stormwater for communities which reduce urban runoff and allow stormwater to slow down, spread out, and sink in.

- Maximize site design and layout by retaining the site's natural hydrologic functions and minimizes impervious surfaces.
- Install parking lot curb cuts so runoff flows into depressed landscape beds.
- Create community rain gardens.
- Add Buffer Strips at the edge of impervious surfaces and along waterways.
- Incorporate bioretention systems including detention basins, tree box filters and stormwater planters.
- Maintain neighborhood and community drainageways on the property, especially historic washes since that is where the water will naturally flow.
- Develop drainage maintenance plan for all stormwater features.
- Conduct outreach and education to inform neighbors of the hydrology of their neighborhood and how each feature functions.
- Adopt comprehensive LID ordinances that include design standards and development.
- Create a development planning checklist to discuss LID project designs.

Examples of these types of projects are prevalent throughout the entire watershed. Douglas County Stormwater Division implemented a LID project at Douglas High School funded by Douglas County and a US EPA/NDEP Clean Water Act Section 319(h) grant (Figure 73). Carson City completed several LID projects at local parks and in the Community Center parking lot. The Maverik gas station in the City of Fallon implemented LID in the form of bioswales and curb cuts. These projects allow for water runoff from hard surfaces to be captured and filtered on site before entering the storm or groundwater system in each community.

Basin Wide Actions to Capture Stormwater: Review and track suggested LID and stormwater management actions when the CRFMP is updated to document progress toward implementation of LID and stormwater management. Inform and promote the importance and benefit of stormwater management to elected and appointed decision makers, the planning community and development community, and residents and business owners.

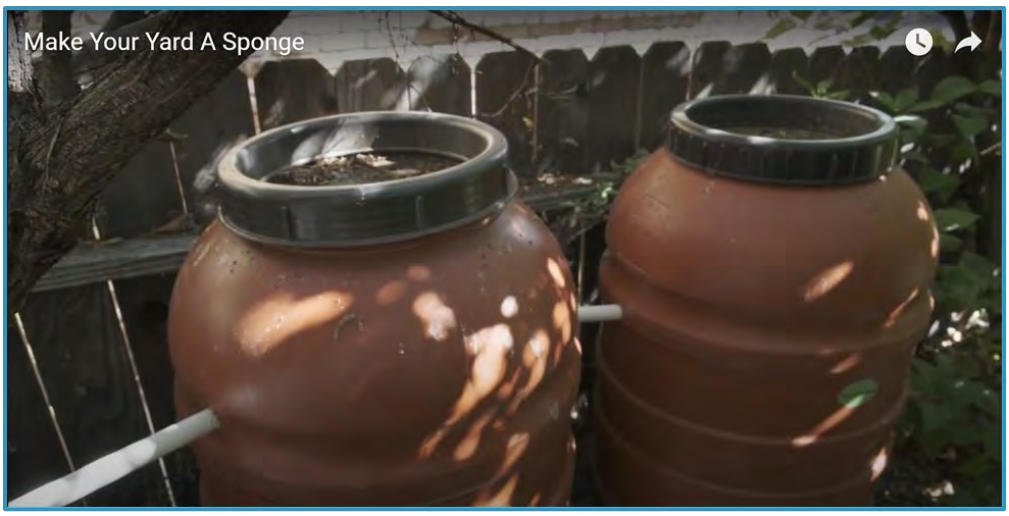
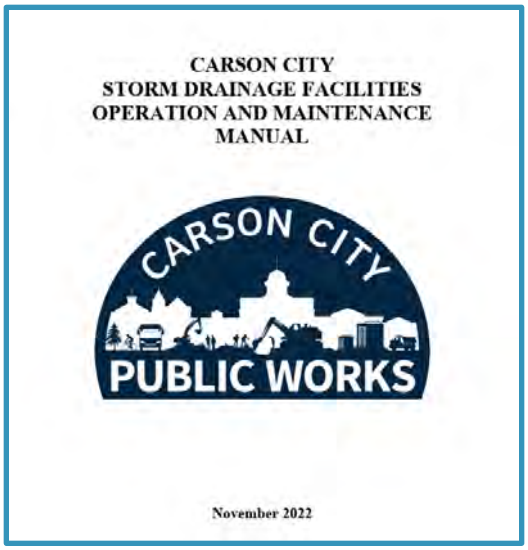


Figure 79: Rain barrels capture run from a roof's hard surfaces.

Figure 77 (R): Direct downspouts to water garden and infiltrate water on site.

Figure 78 (L): Water that flows into rain gutters flow directly to the river and eventually make it to the Carson Sink and evaporate in the desert.

In Carson City, residents pay stormwater fees, and the city developed a 2022drainage manual to address stormwater in a comprehensive manner. Carson City has mandated the use of Low Impact Development Principles in their Drainage Policies for all new development.



Douglas County has adopted a 2023 Stormwater Master Plan and is formulating a long-term approach to fund stormwater projects.

This plan acknowledges that stormwater mitigation requires creative solutions. Implementing the suggested actions in this CRFMP can require additional time and money. Therefore, sometimes these solutions are met with barriers and resistance. Incentive Programs can be used to encourage and incentivize the public and other stakeholders to implement GI/LID such as permit cost reductions, rebates, awards, and planning process support.

Barriers and solutions to those barriers were identified in the LID white paper (CWSD 2015). Steps continue to be taken to engage watershed partners to adopt LID/GI stormwater management practices. There is more technical and institutional knowledge on where, when and how to place and maintain GI/LID features. CWSD and the CRC continue to discuss stormwater concerns and work toward solutions so these practices can be implemented throughout the watershed. Suggested actions 44-49 outlined in this plan are the results of those discussions and will minimize stormwater flooding impacts and enhance watershed health. Pathways of Success to overcome mitigation barriers are addressed in Section 6.

Figure 80: 2017, Inundated storm drain in Carson City, Shane Fryer

5.0 PATHWAYS TO OVERCOME MITIGATION BARRIERS

Outlined in this CRFMP are many actions and practices to reduce flood hazards and conserve the Watershed. However, those responsible for implementing these actions in our local communities encounter multiple barriers that impede hazard mitigation throughout the watershed (Figure 74). When combined, these barriers may seem insurmountable for overworked staff trying to mitigate their community hazards. By outlining these barriers in this plan, the region can work together through the CRC stakeholder process to identify pathways to success that can conquer these obstacles.

5.1 IDENTIFIED BARRIERS TO MITIGATION AND POTENTIAL PATHWAYS TO SUCCESS

Emergency managers are recently valuable additions to the CRC floodplain management working group and were asked to participate in each community interview for this CRFMP update. Their participation added valuable expertise to the planning process and identified multiple barriers to mitigation that CWSD, CRC FPWG and all watershed entities will benefit from learning. Emergency Managers are acquainted with their local departments and view the functions of their community from a high level. Mitigation barriers identified in county interviews are listed in Figure 73 and Tables 16 through 22. However, these barriers are not hierarchical. Instead, they interact and often compound challenges, so solutions also need to be multifaceted. While we have tried to compile a list of barriers and potentials solutions, additional study is needed to develop suggested actions in the future. A narrative of methods to overcome mitigation barriers follow each table.

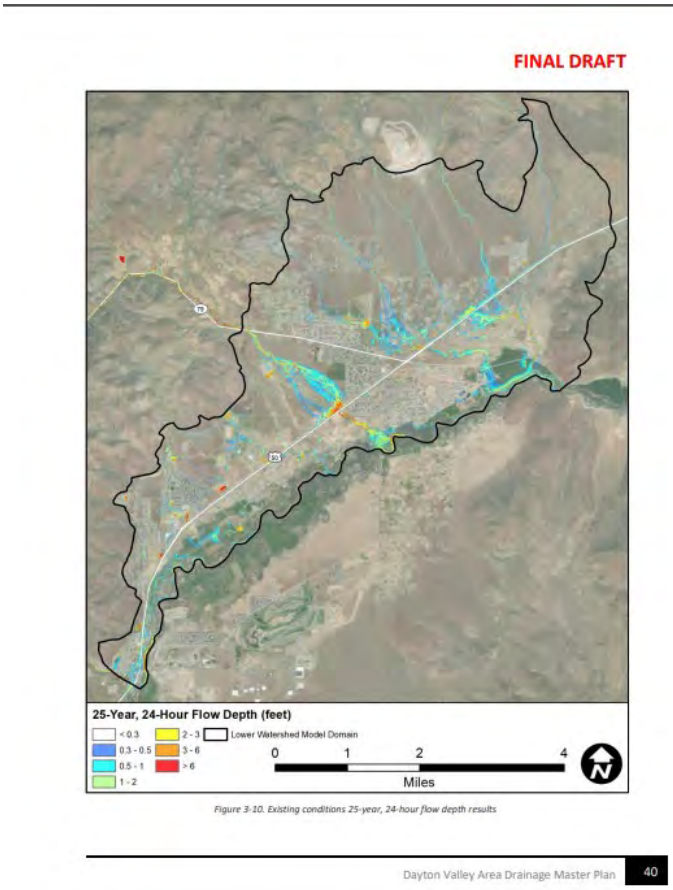
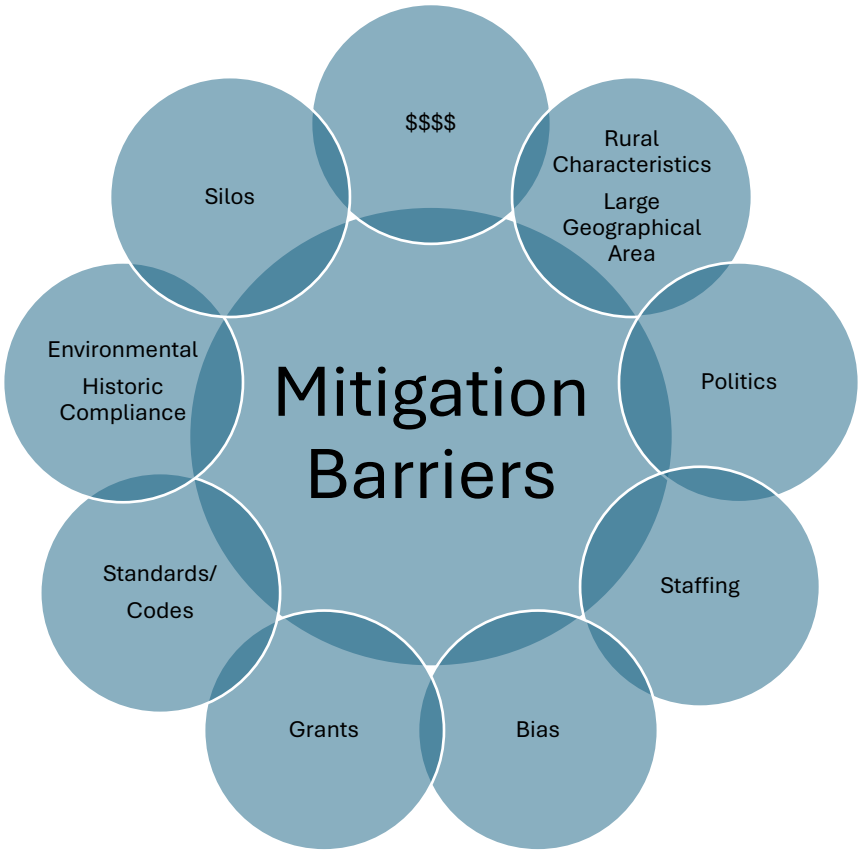


Figure 81: Understanding flood extent is the first step; however, solutions in developed areas involve constructing large basins that cost millions.

Figure 82: Mitigation Barriers



5.1.1 LOCAL FUNDING CONSIDERATIONS

Funding was the number one barrier to mitigation listed by each county. There were many identified causes of funding shortages. Counties are unable to collect revenue on federal lands and much of Carson City land is owned by the state. Low population in rural counties do not generate significant revenue and raising taxes in these areas is not popular. These counties rely on general fund allocations to reduce all risk. These counties do not have flood control or stormwater funding utilities. This poses a challenge for counties who want consistent local drainage and regional mitigation projects that reduce flood losses. The idea of a tax or a flood utility can be met with fierce resistance in many cases. Carson City is the only watershed county that has a stormwater utility that helps fund mitigation projects.

Table 18. Pathways to Overcome Local Barriers to Mitigation

Local Funding Barriers to Mitigation	Pathways to Success Local Funding
Consistent funding source for rural communities	Support efforts to fund mitigation and recovery.
Regional solutions for large detention basin are financially unattainable	Ensure Planning/ Studies consider phasing, ranking, and sequencing alternatives for projects to take smaller bites out of larger projects. Work with partners (such as NDOT) to use their projects for match.
Community Disaster Resilience Zones (CDRZ) do not have enough structures or people to prioritize projects that would get the 10% match.	Work through professional organizations to acknowledge which CDRZ are the most vulnerable.
	Remove structure/population minimums to qualify for projects.
25% match for counties,10% is only available in CDRZ (BRIC)	Design smaller achievable alternatives while seeking out larger match for long-term projects.
Resistance to local tax and fees	Define a plan of action that explains what the strategy is to reduce flood risk before asking for mitigation funds. Outreach - pay now or pay later; communities must repair public infrastructure at a cost that is 6 times greater than the cost of loss prevention.
Easement Acquisitions	Support local application for mitigation construction including multi-beneficial and green infrastructure projects.
Property ownership - (sales)	Develop local and/or state flood disclosures.
Inadequate Flood Ordinances (development and sustainment)	If local government cannot prevent development in flood plains/Alluvial Fans - identify and suggest appropriate action taken by developers to reduce flood risk - both downstream and on property.
Need Cooperating Technical Partner for the Walker and other areas outside of Carson River Watershed to support standardization across the County.	Support developing ADMPs across all areas of Counties – incorporating ADMPs into drainage development guidelines.

Table 8-1. Relative benefit comparison by system

Alternative System	Potential Percent Buildings Removed[1] from Inundation (100-Year Alternatives)	Potential Percent Buildings Removed[1] from Inundation (25-Year Alternatives)	Current Inundated Buildings in System Area[1] (100-Year Alternatives)	Current Inundated Buildings in System Area[1] (25-Year Alternatives)	Construction Cost[2] (100-Year Alternatives)	Annual Maintenance Cost[2] (100-Year Alternatives)	Construction Cost[2] (25-Year Alternatives)	Annual Maintenance Cost[2] (25-Year Alternatives)
	100-year 24-hour	25-year 24-hour	100-year 24-hour	25-year 24-hour				
Gold Canyon	58%	58%	69	66	$960,000	$1,900	-	-
Rose Peak	11%	0%	9	7	$300,000	-	$156,000	-
Six Mile	75%	0%	44	13	$17,500,000	$17,400	$3,800,000	$25,000
Mark Twain	69%	71%	277	213	$28,540,000	$85,000	$20,600,000	$74,000
Rainbow	61%	65%	114	93	$5,500,000	$12,300	$3,600,400	$12,000
Ft. Churchill	100%	100%	1	1	$2,530,000	$15,100	$1,900,000	$15,000
Cardelli Ditch Siphons	-	-	-	-	$1,310,000	-	-	-

1. Flow depth > 0.25 feet. Buildings greater than 600 square feet.
2. Construction and Maintenance costs have been rounded for simplification. See Appendix D for a detailed breakdown of cost estimates.

Figure 83: This figure from the N. Dayton Area Drainage Master Plan lists the cost to construct basins in ranges from $1.3 - $28 million in 2019 when this plan was published by CWSD.

A nationwide trend also seen in Nevada is Americans depend on government aid for a larger percentage of their income. This is reflected in the Watershed as residents who expect more from local government after they relocate from other states that spend more on sophisticated mitigation programs. This government reliance is a contrast to the independent attitude watershed residents once had. Communities must balance competing interests between affordable housing and building in flood hazard areas.

Lack of money creates many limitations. Mitigation grants require current and up-to-date flood maps, but most counties do not have the resources to develop preliminary hydrology and hydraulic data to apply for federal grants. Nor is there money for easement acquisition, design or construction. Most basins are multi-million projects, so local match funding requirement can often seem like an insurmountable hurdle.

Understanding flood risk is the first step to finding solutions. It is important to acquire data needed for hazards areas by developing studies/ plans, like Area Drainage Master Plans (ADMPs), across all areas of counties and incorporate ADMPs into drainage development guidelines. Planning and / or projects need to consider phasing, ranking, and sequencing alternatives for projects to take smaller bites out of larger projects. Projects need to be designed with smaller achievable alternatives while seeking out larger match dollars for long-term projects. It is also important to manage resident expectations when projects are presented to residents in public meetings.

Local government may not be able to completely prevent development in floodplains/alluvial fans, but they can implement standards and measures to enhance floodplain protection and ensure construction does not make these hazards worse. It costs far less to identify actions to reduce flood risk during construction than waiting to implement mitigation after construction. Costly mitigation basins or drainage systems may be unnecessary if each county implements ordinances or before construction occurs. Outreach to inform citizens of risk and classes to teach residents to capture and infiltrate storm waters on individual properties can reduce individual flood hazards, capture groundwater, and filter pollutants. By reducing flood risk on each property, downstream flood impacts to neighborhoods and communities are also reduced. Outreach also needs to include the cost of flooding; explain how with floods, they will pay now or pay later; communities must repair public infrastructure at a cost that is 6 times greater than the cost of loss prevention.

A good understanding of funding on the local, state, and federal level is critical; in the rural west, it is through partnerships that any project gets done. Mitigation is no different; the key to success is to work with partners to identify projects and leverage money to build resilient communities. County staff and other stakeholder must understand how to frame funding requests to demonstrate how your project meets funder objectives; describe how current projects objectives are multi-beneficial; and use requested language to increase their odds of receiving funding.

Figure 84: Pay now, or pay later? In 2017, a series of winter storms inflicted millions of dollars of damage to public infrastructure in the Watershed. Courtesy Storey County

Policy actions include networking between professional organizations to support legislative changes at the local, state and federal levels. Work with professional organizations, like the Association of State Floodplain Managers, to elevate policy challenges like Community Disaster Resilience Zones (CDRZ). While residents of CDRZ are the most vulnerable,

structure and population minimums disqualify funding for rural communities. A unified front by many different mitigation and planning professions may be the key to overcoming these challenges. Find partners (such as NDOT) who are doing work that could be leveraged with local government's time and money.

Before asking for mitigation funds, define a plan of action that explains the strategy to reduce flood risk. A strong case must be built that explains how a little money spent now for mitigation will reduce large costs in future disasters. Long before funding requests come before voters, planning commissions or county boards, support must be garnered from local groups, like agricultural producers, service clubs, and the like. If local champions embrace and support the benefits of mitigation, the likelihood of passing funding mechanisms is more likely. Work with regional, state, and federal partners to develop methods to fund mitigation that takes advantage of economies of scale. By having a plan for mitigation actions and finding local champions, a strong case for mitigation can be made when it is presented to a local board.

Figure 85: Flooding often has unintended consequences. *Ed James*

5.1.2 STATE/FEDERAL FUNDING CONSIDERATIONS

Table 19. Pathways to Overcome Staffing Barriers to Mitigation

State/Federal Barriers to Mitigation	Pathways to Success for State/Federal Barriers
The process to apply, receive, and manage grants is often cumbersome and time consuming	Identify and work with appropriate partners to address state passthrough grants. Coordinate with professional organizations to advocate for mitigation (planners, floodplain managers, emergency managers, etc.)
Wide range of grant requirements across federal agencies, one grant is rarely like another.	Tap into the Governor's office of Administration Grant Office to help navigate these processes. CWSD supports counties with grant management as requested.
Length of time it takes to receive funding	Coordinate with professional organizations to advocate for staff levels to increase in state offices that manage pass through grants (planners, floodplain managers, emergency managers, etc.)
The State does not have a disaster revolving fund	Advocate for State Revolving Fund from FEMA that could loan money to local communities to front costs (this also can be local match).
Reimbursement only grants – entities pay upfront costs	Track all drainage work done in County as future match.
Match requirement on most grants	Build/Strengthen partnerships with other state entities whose work could count as match (NDOT). Track local development built that constructs mitigation - if required by county, may qualify as match.

STATE FUNDING CHALLENGES:

Nevada Division of Water Resources (NDWR) receives Cooperating Technical Partner funding from FEMA. However, they are constrained in the study projects they can take on because of limited staffing. The floodplain manager and NFIP coordinator position is two jobs rolled in to one and has been recently filled after being vacant for over a year.

Nevada Division of Emergency Management (NDEM) is in a similar situation. FEMA has multiple funding streams available for hazard mitigation and disaster response. Mitigation grants include Building Resilient Infrastructure Communities (BRIC), Flood Mitigation Assistance (FMA), High Hazard Potential Dam (HHPD), Hazard Mitigation Grant Program (HMGP), Hazard Mitigation Grant Program Post Fire (HMGP-PF). There are many other grants available through NDEM's website. However, NDEM has a limited number of grant specialists to oversee and facilitate grant awards to communities.

These state agencies do great work but are constrained by the requirement of their departments to have balanced budgets. Approval of additional staff is a long and difficult process. Justifying new positions without guaranteed income can be a hard sell to Department chiefs who are required to submit their budgets to the legislature. In addition to these staffing challenges, it often takes several years resulting in projects costing more than the proposed project budget at the time of the grant application.

CLOSE THE GAP: STATE DISASTER REVOLVING FUND

FEMA offers state grants to create Safeguarding *Tomorrow Revolving Loan Fund Program* fund to address disasters and mitigation. FEMA grants money to the state Emergency Management agency for this revolving loan program; communities can apply to state emergency management for a loan for disaster recovery and mitigation. The community repays Nevada, but the state is not required to repay FEMA. While communities must repay these loans, the benefit of this program is that this money can be used as a match for disaster and mitigation grants. However, Nevada Division of Emergency Management (NDEM) chose not to participate because:

- NDEM does not have regulations for taking in money and giving out loans.
- The state must make a financial deposit into the account to start it.
- NDEM must hire staff to develop and manage the program.

NDEM needed further research to determine what it would take to create an emergency management revolving fund. NDEM has had several working group meetings with NDEP to learn more about their EPA revolving fund program. NDEM will use this information to determine how to set up this fund, the initial program design, and determine what legislative requests are needed. Based on this information, NDEM can decide whether to create Safeguarding Tomorrow Revolving Loan Fund Program.

FEDERAL GRANT CHALLENGES:

Federal grants come with costly and time-consuming mandates, paperwork, and complex processes which can overwhelm a small rural county. The process to apply, receive, and

manage grants is often cumbersome and time-consuming. There is a wide range of grant requirements across federal agencies, one grant is rarely like another. The length of time it takes to receive funding is a constraint when the money is approved but the grant is awarded much later. For example, FEMA mitigation grants require the community to pay costs upfront and get reimbursed once they have proven it has been passed. Even if a community has made it this far, rural communities rarely can front all the costs at the beginning of the projects. If the county is eligible to apply for a grant, the grant match requirement is 25%.

PATHWAYS TO SUCCESS IN OVERCOMING STATE AND FEDERAL MITIGATION BARRIERS

Collaboration is the key to overcoming cumbersome mitigation grant requirements. Together, partners can address challenges posed by state pass through grants. Counties need to keep track of money spent to improve drainage since these projects may meet match requirements. When requested, CWSD staff is available to support counties with grant management. When local governments can leverage the experience of successful projects completed by planners, floodplain managers, engineers, in the watershed, we can leverage success.

Partnerships must be leveraged to move funding requests forward. The actions listed in Tables 16-22 provide outlines for tasks to accomplish through partnership. When one presents policy actions or funding requests to state legislative bodies, others in professional organizations can show up to support requests. As partners work together to build a strong case for mitigation funding. Collaboration moves projects forward, especially in the rural west. Imagine if every emergency manager in the state submitted comments about the need for a disaster revolving fund to the legislature and that message was amplified by the support of planners, floodplain managers, and engineers. When we can underscore how a small investment could provide a state mechanism to help communities mitigate hazards and recover from disasters.

5.1.3 STAFFING CONSIDERATIONS

Table 20. Pathways to Overcome Staffing Barriers to Mitigation

Staffing Barriers to Mitigation	Staffing Pathways to Success
Limited Staff Capacity (Time and People)	Work with community colleges and universities to build pipelines for mitigation professionals. Develop internship programs that plugs students into potential careers.
Turnover/ Retention	Support funding on local, state and federal level to hire and retain competent staff.

Lack of money affects staff capacity. Often, rural counties do not have the resources to hire the number of employees to successfully conduct mitigation. Some communities have not recovered staff levels lost from the great recession. For example, some watershed counties have floodplain managers that are also community development directors and/or planners. Some road departments are also tasked with stormwater maintenance like clearing culverts and roadside ditches that are clogged but are not allocated any money to staff these additional jobs. Emergency managers rely on the subject matter experts in their community departments to identify, address, and respond to all potential hazards. In rural counties, emergency managers may be the only person in their role or do several other jobs; this can lead to a high level of burnout and staff churn. Staffing costs grow each time personnel must be retained for the same position.

Overtaxed county staff may not have the capacity or time to manage state and / or federal grants. Each grant has its own set of idiosyncrasies and a wide range of deadlines and metrics which demands time county does not have. Smaller counties have limited staff who often fulfill many roles to cover the needs of the community. This leaves little room for staff to have time to manage funding sources even if they are provided. Lack of staff capacity is a factor that hinders county applications to fund mitigation projects.

A pool of advocates could be created to support funding requests for local staff. Competent mitigation staff who can correctly obtain, manage, and oversee projects to reduce hazards are loss prevention agents. One avoided disaster will prove the value of

staff on the payroll who can reduce losses (like paying a million dollars for a 15-minute cloud burst). Contractors who provide outside professional services are often more expensive overall if a disaster strikes and their time is often divided by competing interests.

5.1.4 STANDARDS/CODES CONSIDERATIONS

Table 21. Pathways to Overcome Barriers to Mitigation with Standards/Codes Amendments

Standards/ Codes Barriers to Mitigation	Standards/ Codes Pathways to Success
Lack of Statewide building codes	Create and adopt statewide building code
Difficulty updating ordinances	Create and adopt statewide minimum floodplain standards
Lack of Statewide Flood Disclosure	Create and adopt statewide real estate disclosure in Special Flood Hazard Areas

Nevada needs a statewide building code, which is one of FEMA's criteria for competitive national grants. The state has created a workaround but grant applications would still be more competitive if there was a statewide building code. A statewide real estate disclosure form for properties that are in the special flood hazard area (SFHA) is another way to strengthen mitigation. Buyers could make an informed purchase if made aware of flood risk. If a homeowner has a federally backed mortgage for a residence in a SFHA, they are required to purchase flood insurance. In addition, processes to simplify ordinance process and solutions to update challenges need to be developed for county and local use.

5.1.5 ENVIRONMENTAL/HISTORICAL COMPLIANCE

Table 22. Pathways to Overcome Barriers to Mitigation with Standards/Codes Amendments

Environmental/ Historic Barriers to Mitigation	Pathways to Success to Overcome Environmental/ Historic Barriers
Superfund sites (Two in Carson River Watershed)	Facilitate communication between FEMA and EPA to address this challenge.
Historic District Designations	Identify all historic designations in the county
Historic Community Culture	Educate residents on community standards and county abilities.
State Historical Preservation (SHPO) impacts delays decisions	Understand process and prepare information to assist review and/or requirements to accelerate timeline for mitigation projects.
Environmental Historic Preservation Review Process/ Federal Environmental Requirement	Fully understand the requirements; offer training and technical assistance to become effective and nimble to navigate this process with ease. Know the subject matter experts who can be called to assist with this process. Fully understand the requirements; offer training and technical assistance to become effective and nimble to navigate this process with ease. Know the subject matter experts who can be called to assist with this process.

Environmental and historic compliance is another barrier to mitigation. The Watershed contains two EPA superfund sites. It is difficult to acquire funding in these sites during and/ or after disasters. Mitigation on these sites often comes with additional compliance costs to ensure contamination does not spread. Historically significant areas in the watershed require hiring specialty contractors to oversee projects. These compliance requirements are another set of barriers to overcome.

Through the CRC floodplain management working group, conversations between staff from EPA and FEMA planners, floodplain managers, and public works staff have elevated the environmental compliance issues of the Carson River Mercury superfund site. If we could duplicate this process for historic compliance there could be a path forward to surmount regulatory barriers to mitigation. CWSD staff are working to become subject matter experts so that the burden of environmental and historical compliance can be relieved for local communities. It is also important to transparently manage superfund sites and historic districts and communicate the challenges they pose to residents.

5.1.6 PHYSICAL BARRIERS TO MITIGATION

Table 23. Pathways to Overcome Physical Barriers to Mitigation

Physical Barriers to Mitigation	Pathways to Success to overcome Physical Barriers
Rural	Provide more Benefit/Cost Analysis (BCA) points for projects in Rural Areas.
Large Geographic Area	Strengthen regional partnerships and communication pathways.
Multi-jurisdictional property (Federal, Tribal, State, and Local) and the limited ability to work on or with federal land.	Identify and connect or reconnect with appropriate partner to overcome this barrier.

All the counties, except for Carson City, have populations less than 50,000. Douglas County, Churchill County and Lyon County span large geographic areas. Alpine County and Story County are remote and mountainous. These watershed counties contain riverine valleys that are surrounded by alluvial fans; before development, floods could inundate the floodplains of the rivers and ravines without extensive damage. Today the upstream areas of county alluvial fans are in undeveloped federally managed lands. Communities need to be able to work with federal land managers so floods which originate on federal lands do not negatively impact private property downstream of those lands. As population has grown, flooding has also been compounded in areas that lack drainage infrastructure.

Figure 86: Rural counties provide ecosystem benefits with large swaths of agricultural production.

Rural counties provide beneficial ecosystem services through their wide-open spaces; conserving these spaces is the most beneficial and least expensive method to mitigate flood hazards. This message needs to be amplified in all levels of engagement: public outreach, community meetings, and in presentations to planning and executive boards. This plan advocates for the ecosystem value of these open spaces and provide significant benefit cost analysis points to FEMA required for project proposals.

5.1.7 MITIGATION BARRIERS CAUSED BY SOCIAL CONSTRUCTS

Table 24. Pathways to Overcome Barriers to Mitigation Created by Social Constructs

Mitigation Barriers caused by Social Constructs	Pathways to Success to Overcome Social Constructs
Silos	Identify internal silos and work with department heads to break down communication barriers. Attend pertinent CRC meetings. Network and share information with other professional organizations (planners, engineers, floodplain managers, academics, emergency managers).
Bias	High Water Marks are the easiest way to demonstrate flood hazards occur. Understand that more facts do not impact bias. Listen and ask questions. Use demonstrations to start and guide conversations about flooding, safety and long-term solutions.

Silos often exist on many levels. Local, state, and federal staff may not have the time or capacity to check other internal departments or external stakeholders. Economies of scale can be implemented, and duplication of efforts can be reduced when silos are broken down. When silos are removed horizontally and vertically, institutional knowledge can help navigate and streamline these processes. Examples where silos are broken down are the CRC, the Governor's Office of Administration (OFA), and professional organizations. The CRC provides regional network opportunities so staff can share experience and advice to foster success to overcome the mitigation barriers in rural areas of the Watershed. OFA is tasked with moving across all levels of state government to help communities acquire grant dollars. Professional organizations allow isolated staff to network, learn, and grow for the benefit of their counties. Each county may not have the capacity to hire a grant specialist but may be able to find professionals who can share their expertise and possible provide examples of successful grant applications.

Bias is another mitigation barrier to overcome when speaking to residents about hazards. Models demonstrate concepts and provide an opportunity to talk about water, flooding, and safety preparedness in a natural way. Overwhelming audiences with more facts will not change minds that are biased. When we take time to listen and ask questions, we can often have common ground. While further study is needed to better understand specific causes and solutions to overcome these social constructs as mitigation barriers, CWSD will continue to network and provide opportunities to interact and so we can open communication silos.

6.0 IMPLEMENTATING THE CARSON RIVER WATERSHED FLOODPLAIN MANAGEMENT PLAN

As evidenced herein, significant progress has been made watershed-wide to identify existing and new flood risks and implement suggested actions to prevent or mitigate flood hazards. This variety of strategies will require continued progress involving the coordination of the stakeholders and, as always, is dependent upon available funding and staffing resources.

6.1 STEPS FOR PLAN IMPLEMENTATION

CRFMP implementation will be completed by activities of CWSD, the CRC and the Floodplain and River Working Group, local jurisdictions, and the continued actions and support of technical advisory groups. All these partners work together to direct research, acquire funding for planning and construction grants to lessen flood losses throughout the watershed. Some suggested actions have been undertaken. Areas of protected floodplain were mapped in 2015 (See UNCE 2015), and floodway and floodplain maps have been revised and/or created identifying new flood hazards. Area Drainage Master plans have mapped populated portions of the watershed. Carson City created a new drainage manual, and Douglas County created a Stormwater Master Plan. Each county updates their hazard mitigation plans when required to ensure they are not only in step with FEMA and State requirements but meet the needs of their respective communities. CWSD and its stakeholders will continue to work together to implement this CRFMP.

6.1.1 SUMMARY OF SUGGESTED ACTIONS

While suggested actions discussed in this section apply to all jurisdictions and are intended to detail the extent of management actions that have taken place in the watershed, each jurisdiction has accomplished different actions based on their specific needs. Appendix C updates FEMA's Discovery Report and lists the progress and continued suggested actions by county to address flood hazard and mitigation within each jurisdiction. The activities of CWSD as a FEMA CTP to be able to continuously secure and prioritize funding and projects is of great benefit to the stakeholders. Appendix E includes county progress toward implementing suggested actions.

Other Implementation Measures:

Establish coordination procedures for county floodplain administrators and the CWSD to ensure regional coordination as well as local. CWSD has developed a comparison of this plan with the Community Rating System and works with the counties to submit proper

documentation to allow the counties to receive credit for this regional plan and associated activities. This credit is important to potentially lower flood insurance rates for community members and to document cooperative activities.

CWSD will continue to meet with the CRC, the Floodplain and River Management Working Group, floodplain administrators, and other stakeholders to coordinate implementation of the suggested actions and implementation of this plan at the local level. CWSD is dedicated to planning, coordinating, and seeking funds to increase awareness relating to this plan. It also focuses on strengthening and expanding the on-the-ground implementation efforts of our local jurisdiction partners to fulfill the floodplain management goals and suggested actions stated in this plan.

6.2 MONITORING AND REVISION

As described previously, an annual CRS report evaluating progress towards implementing the suggested actions is coordinated and prepared by CWSD and provided to the county floodplain administrators and other interested parties. The most recent Annual CRS report can be found on CWSD's website.

The floodplain management plan and suggested actions will continue to be reviewed and updated on an as-needed basis, not to exceed a five-year time frame. CWSD will work with stakeholders, including the working group and local floodplain administrators, to complete any revisions and updates. All changes will be digitally distributed and presentations to stakeholder boards or staff can be requested at any time.

Success and improvements in the effectiveness of the completed suggested actions and the regional approach to floodplain management can be measured by factors such as reduction in flood damage, enhancement of sediment transport capabilities, protection of additional floodplain acreage, enhancement of water quality, and general awareness of flooding issues by the public.

6.3 LINKING REGIONAL FLOODPLAIN MANAGEMENT WITH OTHER PLANS

This Plan is consistent with the following documents and demonstrates how they link to and complements each entity's floodplain management and hazard mitigation plans.

6.3.1 HAZARD MITIGATION PLANS

A FEMA-approved hazard mitigation plan (HMP) is a condition for receiving certain types of non-emergency disaster assistance, including funding for mitigation projects. Hazard mitigation planning enables actions to reduce loss of life and property, lessening the impact of disasters. It is most effective when implemented under a comprehensive, long-term mitigation plan. State, tribal, and local governments engage in hazard mitigation planning to identify risks and vulnerabilities associated with natural disasters. The plans outline long-term strategies for protecting people and property from future hazard events and are key to breaking the cycle of disaster damage, reconstruction, and repeat damage.

- Developing hazard mitigation plans enables state, tribal, and local governments to:
- Increase education and awareness around threats, hazards, and vulnerabilities.
- Build partnerships for risk reduction involving government, organizations, businesses, and the public.
- Identify long-term, broadly supported strategies for risk reduction.
- Align risk reduction with other state, tribal, or community objectives.
- Identify implementation methods that focus resources on the greatest risks and vulnerabilities.
- Communicate priorities to potential sources of funding.

Local jurisdictions have received FEMA funding to update their hazard mitigation plans. Each plan has a section with a goal to reduce the possibility of damage and losses due to flooding. Alpine County has additional language on landslides and severe weather; both of which are related to flooding.

CWSD was listed as a jurisdiction in Storey County's HMP in 2019. It was added to Lyon County's HMP in 2023. It has been added to Douglas County's HMP which was accepted and approved in April 2025 and is not yet effective. CWSD is participating in Carson City's HMP update. CWSD has requested to be added to Churchill County, Nevada and Alpine County, California's HMPs. CWSD is now eligible to apply for NDEM grants. It applied for and received a drought planning grant in 2020. It applied for and was awarded a Building Resilient Infrastructure Community scoping grant in 2024. CWSD plans to continue to work with counties to apply for grants to develop construction projects in the Watershed.

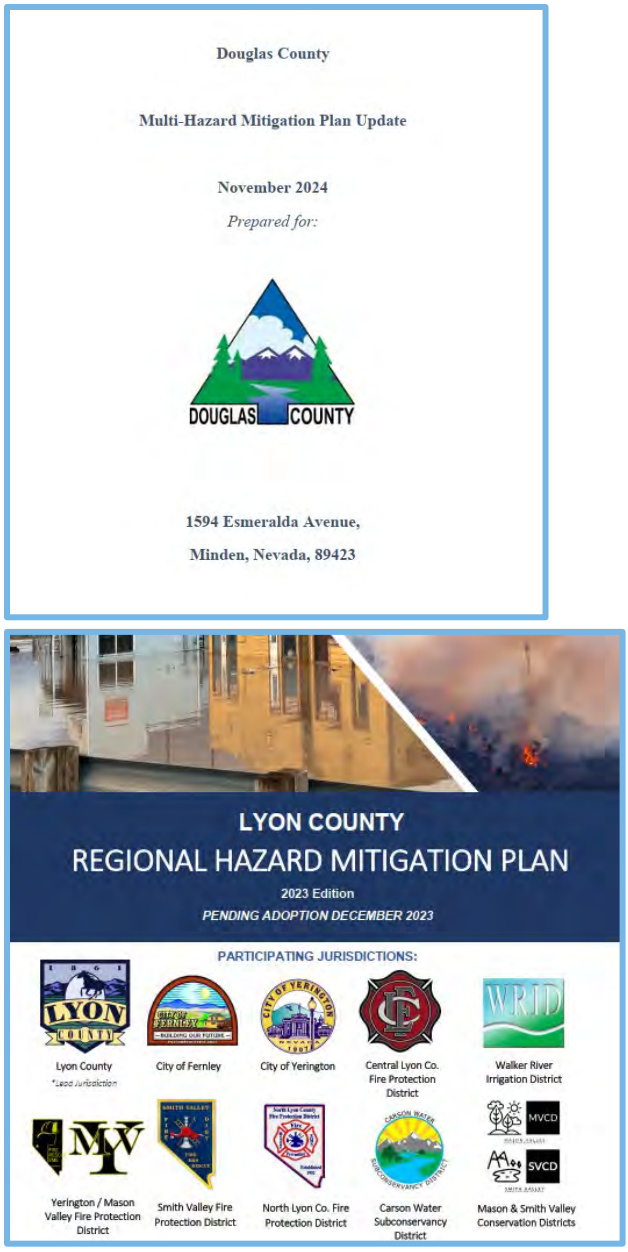


Figure 87: Cover page of Douglas and Lyon County recently completed Hazard Mitigation Plans.

6.3.2 CARSON RIVER WATERSHED ADAPTIVE STEWARDSHIP PLAN

CWSD's Board adopted the original Carson River Watershed Adaptive Stewardship Plan (Plan) in 2007, and an update was adopted.

CWSD's Board adopted the original Adaptive Stewardship Plan (CRASP) in 2007, and an update was adopted in 2017. The main purposes of the Plan are to:

A. Provide an overview of the watershed and its challenges.

B. Identify potential sources of nonpoint source pollution.
C. discuss short and long- Term strategies and actions to address these potential sources.
D. Provide a tracking mechanism for projects and programs.
E. Identify future project and program opportunities; and,
F. Address the nine criteria elements of the Clean Water Act (CWA) Section 319 Program. These criteria elements are provided on page II, Section 1.1 of the 2017 plan.

Many organizations throughout the Watershed rely upon CWA 319 funding for projects and programs. It is the desire of the Environmental Protection Agency (EPA) and the Nevada Division of Environmental Protection (NDEP) that all watershed-based plans meet the EPA s nine criteria elements. EPA and NDEP determined that both the 2007 Plan and 2017 Plan updates meet the EPA criteria to be considered a watershed-based plan in the Nevada portion of the watershed. All projects and programs implemented within the watershed utilizing NDEP/EPA CWA 319 funds are expected to be consistent with this plan.

For organizational purposes, the Plan focuses on seven project categories. One of the goals of the Plan is to present a comprehensive list of projects that fall within these categories to illustrate how the projects and programs are moving in a purposeful and solution-based direction. The seven major project categories listed in the 2017 Plan are:

1. Floodplain Management
2. Water Quality
3. Regional Water Supply
4. River Rehabilitation/Stabilization/Habitat Enhancement
5. Invasive Species
6. Outreach and Education
7. Recreation Use and Management

The Plan lists multiple projects under each project category. Projects associated with Floodplain Management and River Rehabilitation/Stabilization have close links to implementation of the goals and suggested actions in this Regional Floodplain Management Plan. Links with other project categories may be less obvious such as water quality, invasive species, and outreach and education pertaining to water quality.

However, stormwater and GI/LID projects reduce flooding while improving water quality. Flooding impacts river rehabilitation and bank stabilization processes and becomes a potent vector of invasive species. Flood awareness activities are a critical component of CWSD s multi-objective outreach and education efforts.

6.3.3 COUNTY MASTER PLANS

CWSD staff participate in various county planning processes through the watershed coordination program. Section 8.7.2. of the 2017 Carson River Adaptive Stewardship Plan, describes how CWSD staff coordinates cooperative processes in the Carson River Watershed. Recent participation by CWSD staff includes stakeholder input, review, and support on Douglas County's Stormwater Master Plan, updates to Carson City's Master Plan, Carson City's Carson River Master Plan, and the US Forest Services planning for the East Fork Carson Hot Springs area. Staff input, review and support focuses on integrated watershed management categories listed above in Section 6.3.2. CWSD staff will continue to provide input and assistance to counties as needed in their planning processes.

6.4 ADDITIONAL REGULATORY AND PERMITTING AGENCY COORDINATION

Local jurisdictions have their own floodplain ordinances. As FIRMs have been updated in Watershed counties, ordinances must be updated to reflect changes in the FIRMs. Model ordinances were developed for counties to use as a template in their communities. CWSD also created a hydraulic model that begins in Alpine County and terminates above in Lyon County. An update protocol was created and ordinance language to update the model was proposed for counties to consider adopting for model consistently throughout the four counties of the hydraulic model (See Section 4.2.1 Revised Ordinances). In addition to these local ordinances, the following Federal, State, and local permitting requirements are associated with floodplain management and need to be considered when implementing suggested actions (Table 23).

Table 25A. Additional regulatory and permitting agency coordination.

ORDER/ACT	PERMITTING REQUIREMENTS
Clean Water Act of 1972(1)	Section 303: Authorizes States and Tribal governments to establish water quality standards for navigable waterways to protect and enhance water quality. Section 311: Addresses pollution from oil and hazardous substances. Section 401: Provides that no Federal permit or license is issued for activities that might result in a discharge to navigable waters unless a 401 certification is issued. Section 402: The National Pollutant Discharge Elimination System (NPDES) is a permitting system established to regulate point source discharges of pollutants and is under the purview of the U.S. EPA. Section 404: Establishes permitting systems to regulate the placement of dredged or fill materials into waters (including wetlands) under the U.S. Army Corp of Engineers' purview.
U.S. Fish and Wildlife Service Endangered Species Act of 1973	Consultations are required under Sections 7 and 10 of this Act if development is proposed in an endangered/protected species habitat.
U.S. Coast Guard	Project may require a permit if the proposed development includes a bridge or causeway that may affect navigation.

Table 25B. Additional regulatory and permitting agency coordination.

ORDER/ACT	PERMITTING REQUIREMENTS
U.S. Army Corps of Engineers	All projects within a navigable waterway require permits. Section 10 of the Rivers and Harbors Act of 1899(2) requires authorization from the Secretary of the Army, acting through the Corps of Engineers, for the construction of any structure in or over any navigable water of the United States. Structures or work outside the limits defined for navigable waters of the United States require a Section 10 permit if the structure or work affects the course, location, or condition of the water body.
State Permits	Construction in floodways or other designated areas. Stream crossings or projects that affect navigable rivers. Installation of septic systems. Subdivision standards of subdivision plat or lot filling requirements. Manufactured housing (mobile home) park or tie down requirements. Public health facilities, such as hospitals and nursing homes. Operating a landfill or hazardous materials storage facility.
Executive Order 11988	Requires Federal agencies to first assess whether a property will be located within the SFHA or 500-year floodplain, and, if so, to follow an eight-step process to assure all alternatives and guidelines are met before proceeding with the project.
Rescinded by the Trump administration in 2017.	Reinstated by the Biden administration in 2021.Enacted to "Avoid to the extent possible the long- and short-term adverse impacts associated with occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative."

(2)https://www.epa.gov/laws-regulations/summary-clean-water-act#:~:text=33%20U.S.C.%20%C2%A71251%20et,quality%20standards%20for%20surface%20waters.

(2)https://www.spl.usace.army.mil/Missions/Regulatory/Jurisdictional-Determination/Section-10-of-the-Rivers-Harbors-Act/

There are many sources of available funding, as detailed in Table 26. Federal and other funding often requires cash and/or in-kind match. Eligibility for funding sometimes requires being named/listed in state or regional plans.

Table 26. Federal, state, and local funding sources

Funding Source
Federal
U.S. Environmental Protection Agency
Federal Emergency Management Agency
Natural Resources Conservation Service
Farm Service Agency
U.S. Bureau of Reclamation
U.S. Army Corps of Engineers
U.S. Bureau of Land Management
U.S. Fish and Wildlife Service
U.S. Forest Service
State
California State Water Resources
Nevada Division of State Lands -
Nevada Division of Environmental
Nevada Division of Water Resources
Nevada Division of Forestry
Nevada Division of Conservation
Local
Carson-Truckee Conservancy District
Carson Water Subconservancy District
Carson City Question 18 Funds
Private and Non-Profit Organizations

7.0 PLAN UPDATE AND ADOPTION

CWSD and the CRC Floodplain Management Working Group provided oversight and review of this Regional Floodplain Management Plan Revision. Jurisdiction interviews and follow up data requests between 2022 through October 2024 informed this plan update. Appendix A describes this process in detail. CWSD's Board of Directors and Floodplain Administrators and other staff from all six counties along the Carson River provided further guidance in the development of this CRFMP.

Staff informed the CWSD Board of Directors (Board) of the update process and invited the board to attend stakeholder meetings. Staff will present a CRFMP draft to the CWSD board and county staff before it is finalized. This step allows CWSD Board members who represent their six counties along the Watershed to review the plan to ensure acceptance by each county. CWSD staff will present the CRFMP draft for adoption by CWSD's board and each county's executive board. This final presentation offers a final opportunity to make changes. Only after the final CRFMP is adopted by CWSD's Board will it be presented to County Boards for their adoption. Appendix A includes documentation of stakeholders and agency coordination meetings and workshops, public involvement and outreach, and county adoption documents.

8.0 EMERGENCY RESPONSE AND FLOOD WARNING

Each county has an emergency response plan on file but are not deemed public documents due to homeland security concerns (according to the Nevada Attorney General's ruling which cites NRS 239c). First responders in appropriate agencies will receive a copy of a given county or city s emergency response plan.

8.1 EMERGENCY RESPONSE

The following individuals are responsible for emergency response in the event of a flood. Information is also available on the CWSD website at www.cwsd.org and at www.floodsmart.gov. Reference Tables 26A and 26 B.

Table 27A. Emergency response contact information as of 9/2024

JURISDICTION	CONTACT	INFORMATION
Alpine County, California	Emergency Manager: Angela Slais	(530) 721- 6749
	Floodplain Manager: Sam Booth	(530) 694=2140 x 425
	Sandbag Materials Location	Woodfords Fire Station 50 Diamond Valley Road Markleeville, California (530) 694-2922 Markleeville Fire Station #92 860 Hot Springs Road Markleeville, California (530) 694-2223
Carson City, Nevada	Emergency Management Deputy: Jon Bakkedahl	(775) 283-7820
	Floodplain Manager: Karin Peternel	(775) 283-7713
	Sandbag Materials Location	City Corporate Yard 3303 Butti Way Carson City, NV 89701 (775) 887-2355
Churchill County, Nevada	Emergency Manager: Rich Ingram	1175 Wood Dr. Fallon, NV 89406 (775) 423-4188
	Floodplain Manager: Randy Hines (Planning Director)	155 N. Taylor Fallon, NV 89406 (775) 423-7627
	Cliff Van Woert (Building Official)	(775) 428-0264
	Sandbag Materials Location	County Road Department Yard 330 N. Broadway Fallon, NV (775) 423-4133
Douglas County, Nevada	Director of Emergency Management: Kara Easton	1594 Esmerelda Avenue, Minden, NV 89423 775-783-6035
	Floodplain Manager: Tom Dallaire	(775) 782-6201
	Sandbag Materials Locations	Sandbag locations can be found at this link: https://www.douglascountynv.gov/government/departments/emergency_management/douglas_county_sandbag_locations

Table 28. Emergency response contact information as of 9/2024

JURISDICTION	CONTACT	INFORMATION
Lyon County, Nevada	Emergency Manager: Taylor Allsion	27 S. Main Street Yerington, NV 89447 (775) 344-8325
	24-Hour Dispatch:	(775) 463-6620
	Floodplain Manager: Chuck Reno	(775) 463-6535
	Sandbag Materials Locations	Dayton Utilities Yard, 34 Lakes Road Dayton NV 89403 (775) 246-6220 18 Highway 95A Yerington NV 89447 (775) 463-6551
Storey County, Nevada	Emergency Management: Adam Wilson	P.O. Box 7 Virginia City, NV 89440 (775) 634-7443
	Floodplain Manager: Kathy Canfield	P.O. Box 176 Virginia City, NV 89440 (775) 847-1144
	Sandbag Materials Locations	Virginia City Public Works 110 Toll Road Virginia City, NV 89440 Mark Twain Community Center 500 Sam Clemens Avenue Dayton, NV 89403
Washoe Tribe of Nevada and California	Emergency Management Coordinator: Ken Quiner	(775) 265-8600 X 10107

8.2 FLOOD FORECAST AND WARNING SYSTEMS

According to the National Weather Service (NWS) there are three official river forecast points in the Watershed. There are five locations which NWS also monitors and will issue warnings for these locations if needed, but there are no official forecasts. Locations for all systems and stations are shown in Table 29.

Table 29. NWS Flood Forecast and warning systems and weather stations in the Carson River Watershed

National Weather Service River	NUMBER	LOCATION
Forecast Points	1	West Fork Carson River at Woodfords, California
	2	East Fork Carson River near Gardnerville, Nevada
	3	Carson River near Carson City, Nevada
NWS Monitoring Station	1	East Fork Carson River below Markleeville Creek near Markleeville, California
	2	Carson River at Dayton, Nevada
	3	Carson River at Fort Churchill, Nevada
	4	Carson River below Lahontan Dam near Fallon
	5	Carson River at Tarzyn Road near Fallon (Bafford Lane area)
Flood Warning Systems Douglas County	1	Minden – East Fork Carson River
	2	Genoa Canyon – two miles west of Genoa
	3	Lebo Springs – 12 miles northeast of Minden in Buckeye Creek drainage directly east of Johnson Lane/Buckbrush Wash drainage
	4	Pine Nut Creek – 10 miles east southeast of Gardnerville
	5	Fish Springs – 5 miles from Gardnerville
	6	Gardnerville
	7	Spooner Summit
Flood Warning Systems Carson City	1	Upper Clear Creek
	2	Carson City Airport
	3	Upper Ash Canyon
	4	Carson City Fire Station #3
	5	Vicee Canyon
Weather Stations	1	Snow Valley Peak
	2	Lower Ash Canyon
	3	Lower Kings Canyon
	4	North Upper Kings Canyon

9.0 REFERENCES

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APPENDICES

APPENDIX A	2025 CARSON RIVER FLOODPLAIN MANAGEMENT PLAN UPDATE/REVISION PROCESS OVERVIEW
APPENDIX B	2018 RAPID EVALUATION OF THE CARSON RIVER ACKNOWLEDGEMENT AND LINK
APPENDIX C	2018 RISK MAP ACKNOWLEDGEMENT AND 2025 UPDATED FIGURES
APPENDIX D	COOPERATIVE TECHNICAL PARTNER PROJECT SUMMARY (2005 – 2024), CRS ANNUAL REPORTS, AND FIRM LINK
APPENDIX E	2023 COUNTY PROGRESS REPORTS
APPENDIX F	CHARTER AND FEMA CTP AGREEMENT
APPENDIX G	CARSON RIVER FLOODPLAIN MANAGEMENT PLAN ADOPTION DOCUMENTS

APPENDIX A: 2025 CARSON RIVER FLOODPLAIN MANAGEMENT PLAN UPDATE/REVISION PROCESS OVERVIEW

2025 Carson River Floodplain Management Plan Revision Process

Section 6.2 Monitoring and Revision calls for an update of the CRFMP to be completed on an as needed basis, not to exceed five years. CWSD worked with stakeholders, including the Carson River Coalition Floodplain Management Working Group, and county staff. Local floodplain administrators and emergency managers were vital for this revision. The update process is as follows:

- Work with stakeholders to determine format and required revisions/updates to the plan.
- Interview jurisdictions in the Carson River Watershed regarding the floodplain management plan and update their corresponding suggested actions.
- Complete draft revisions and send them to stakeholders for comment.
- Finalize draft of the revised plan based on input from stakeholders.
- Provide final draft to stakeholders for final comment.
- Incorporate stakeholder comments and present final draft revisions to CWSD Board, April 16th, 2025, for adoption by CWSD.
- Present final CRFMP to Counties and other stakeholders for adoption.
- Complete Appendix G post adoption by CWSD and stakeholders to include adoption documents.

2025 CARSON RIVER FLOODPLAIN MANAGEMENT PLAN UPDATE OVERVIEW

As stated above, CWSD staff worked with the CRC Floodplain Management Working Group on the 2024 revision of this plan. The stakeholders decided the 2024 CRFMP update would include the following:

a. Complete reorganization of format, figures, pictures, and appendices.

b. Content of plan updated and rewritten.

c. Incorporation of 2024 County progress into documents and appendices

d. Updated Suggested Actions table and adjusted stormwater section

These sections were added/significantly updated:

- Flood Hazards and Risk: Stormwater
- Flood Hazards and Risk: Flood After Fire
- Flood Risk Reduction Floodplain Protection: Stormwater Mitigation (4.8)
- Implementation: Mitigation Barriers (5.1)

Suggested Action #49 was added and Suggested Actions #44 - #48 were reworded.:

i. SA #44: Retain and infiltrate stormwater to reduce flood risk, capture groundwater and improve water quality.
ii. SA #45: Plan for and mitigate cumulative effects of existing watershed urbanization, including stormwater runoff, to reduce flood hazards in new development proposals.
iii. SA #46: Incorporate GI/LID methods to reduce stormwater flooding on site in all development and redevelopment proposals.
iv. SA #47: Adopt model LID ordinances created for Watershed.
v. SA #48: Utilize best management practices to reduce stormwater/ urban runoff and mitigate stormwater flooding.
vi. SA#49: Protect and buffer natural drainage ways (existing green infrastructure) from development to ensure historic and natural flows are maintained.

This revision reflects best available information through December 2024, all links and references cited were confirmed and updated sources. However, if older references were still valid but no longer accessible online, that information was not changed. Appendices A-F have been changed to reflect current state of progress, projects, and other. Links to the 2018 Rapid Evaluation of the Carson River and 2018 Risk Map Discovery documents are included in the CRFMP. A cover page containing acknowledgements and electronic references are provided. Updated tables and maps of future projects have been updated for the Discovery Report.

The 2024 CRFMP plan has an updated table of contents, list of tables, and list of figures. Draft revisions were sent out to the CRC Floodplain and River Management Working Group in March 2025. Feedback was received and utilized for the second and final version of the draft. The 2024 CRFMP revision will be presented for adoption to CWSD's Board of Directors. Once adopted by CWSD, it will be presented to each County for adoption. Each County's formal actions or resolutions adopting the 2024 Revision will be added to Appendix G.

Section 2.2, Community Rating System, discusses FEMA's 510 Floodplain Management Plan Checklist and describes how the CRFMP meets the FEMA requirement for Floodplain Management Planning. The CRS annual report can be viewed in Appendix D. A CRS crosswalk will be created once this document is approved by each county.

MEETINGS

Stakeholder meetings included a kickoff meeting, community interviews, and a workshop to review county documents, are listed in Table A-1 below. Table A-2 lists attendees for each stakeholder meeting. The agendas and notes for the kickoff meeting and the final workshop are attached thereafter. One agenda for all county interviews is attached since they were the same for each meeting. Notes for these interviews were not specifically taken since the meeting consisted in filling out the questionnaires at the meeting. These interviews were used to update county lists of future projects (Appendix C) and county progress on suggested actions (Appendix E). The project was delayed until CWSD's contractor completed the Walker River Flood Risk Analysis. CRFMP project updates were also provided at CRC Floodplain Management Working Group meetings which are open for anyone to attend. Meetings for the Carson River Floodplain Management Plan.

Table A-1: Stakeholder Meetings for the Carson River Floodplain Management Plan

Date	Stakeholder Meetings
August 30, 2023	CRFMP Kickoff Meeting
October 4, 2023	Carson City Interview
October 25, 2023	CRC Floodplain Management Working Group Meetings
November 3, 2023	Douglas County Interview
November 7, 2023	Lyon County Interview
November 30, 2023	Churchill County Interview
December 11, 2023	Alpine County Interview
December 13, 2023	Storey County Interview
January 24, 2024	CRC Floodplain Management Working Group Meetings
April 24, 2024	CRC Floodplain Management Working Group Meetings
July 24, 2024	CRC Floodplain Management Working Group Meetings
October 23, 2024	CRC Floodplain Management Working Group Meetings
October 24, 2024	CRFMP Workshop to review county portions*

Table A-2: Attendees of Stakeholder Meetings for the Carson River Floodplain Management Plan

Date	Attendees to County Meetings	Title	Email
October 4, 2023	Carson City Interview		
	Brianna Greenlaw, PE, CFM	Carson City Stormwater Program Manager	bgreenlaw@carson.org
	Jon Bakkedahl MS, CEM, NVEM	Carson City Deputy Emergency Manager	jbakkedahl@carson.org
	Amanda Singleton	Carson City Assistant Stormwater Program	asingleton@carson.org
	Ed James	CWSD General manager	edjames@cwsd.org
	Debbie Neddenriep	CWSD Water Resources Specialist 2	debbie@cwsd.org
	Max Robinson	CWSD Water Resources Specialist	max@cwsd.org
November 3, 2023	Douglas County Interview		
	Courtney Walkder	Douglas County Stormwater Program Manager	bgreenlaw@carson.org
	John Erp	Douglas County Road Department Manager	jbakkedahl@carson.org
	Kara Easton	Douglas County Emergency Manager	keaston@douglasnv.us
	Debbie Neddenriep	CWSD Water Resources Specialist 2	debbie@cwsd.org
	Max Robinson	CWSD Water Resources Specialist	max@cwsd.org
November 7, 2023	Lyon County Interview		
	Louis Cariola	Carson City Stormwater Program Manager	bgreenlaw@carson.org
	Taylor Allison	Carson City Deputy Emergency Manager	jbakkedahl@carson.org
	Ed James	CWSD General manager	edjames@cwsd.org
	Debbie Neddenriep	CWSD Water Resources Specialist 2	debbie@cwsd.org
	Max Robinson	CWSD Water Resources Specialist	max@cwsd.org
November 30, 2023	Churchill County Interview		
	Robin Shofield	Community Planning and Liaison Officer	
	Laurie Nicholas	USBR Area Manager: Lahontan Office	lnicholas@usbr.gov
	Ed James	General Manager: CWSD	edjames@cwsd.org
	Gary Fowkes	Road Supervisor	gary.fowkes@churchillcountynv.gov
	Marie Henson	Building Official	marie.henson@churchillcountynv.gov
	Chris Spross	Assistant County Manager	cspross@churchillcountynv.gov
	Ben Shawcroft	General Manager: TCID	ben@tcid.org
	Robert Frank	NAS Fallon EMO	robert.frank8.civ@us.navy.mil
	Steven Endacott	Emergency Manager	endacottsteve@charter.net
	Jack Worsley	USBR Area Manager: Lahontan Basin Area	jworsley@usbr.gov
	Nancy Upham	District Manager at Churchill County Mosquito, Vector and Weed Control District	director@ccmosquito.org
	Christy Sulivan	District Clerk: LSCD	Christy.Sullivan@nv.nacdnet.net
	Dean Patterson	Senior Planner	planning-ap@churchillcounty.org
	Debbie Neddenriep	CWSD Water Resources Specialist 2	debbie@cwsd.org
	Lindsay Marsh	CWSD Water Resources Specialist	lindsay@cwsd.org

Table A-2: Attendees of Stakeholder Meetings for the Carson River Floodplain Management Plan

Date	Attendees to County Meetings	Title	Email
December 11, 2023	Alpine County Interview		
	Sam Booth	Community Development Department Title: Director	sbooth@alpinecountyca.gov
	Alexa Burke	Community Development Department Title: Planner II	aburke@alpinecountyca.gov
	Kimra McAfee	Executive Director: Alpine Watershed Group	awg.kimra@gmail.com
	Isabella Kurtz	Climate Resiliency Fellow	awg.isabella@gmail.com
	Kaitlyn Garber	Climate Resiliency Fellow	awg.kaitlyn@gmail.com
	Rachel Maurer	Headwaters Coordinator	awg.rachel@gmail.com
	Sarah Traiman	Community Development Department Title: Planner II	straiman@alpinecountyca.gov
	Lindsay Marsh	CWSD Water Resources Specialist	lindsay@cwsd.org
	Debbie Neddenriep	CWSD Water Resources Specialist 2	debbie@cwsd.org
December 13, 2023	Storey County Interview		
	Kathy Canfield	Planning Manager: Storey County	kcanfield@storeycounty.org
	Jason Weirsbecki	Director: Storey County Public Works	jwierzbicki@storeycounty.org
	Sarah Fitchtner	State Floodplain Manager & NFIP Coordinator	sfichtner@water.nv.gov
	Adam Wilson	Storey County Emergency Manager	awilson@storeycounty.org
	Mike Northan	Operations and Projects Coordinator	mnorthan@storeycounty.org
	Lyndi Renaud	Planning Assistant: Storey County	lrenaud@storeycounty.org
	Debbie Neddenriep	CWSD Water Resources Specialist 2	debbie@cwsd.org
	Lindsay Marsh	CWSD Water Resources Specialist	lindsay@cwsd.org
October 24, 2024	CRFMP Workshop to review county portions*		
	Kathy Canfield	Planning Manager: Storey County	kcanfield@storeycounty.org
	Sarah Fichtner	Floodplain Coordinator/ NFIP coordinator: NDWR	Soverton@water.nv.gov
	Brenda Hunt	Watershed Program Manager	brenda@cwsd.org
	Debbie Neddenriep	CWSD Water Resources Specialist 2	debbie@cwsd.org
	Ed James	General Manager: CWSD	edjames@cwsd.org
	Lindsay Marsh	CWSD Water Resources Specialist	lindsay@cwsd.org
	Dean Patterson	Senior Planner; Churchill County	planning-ap@churchillcounty.org
	Amanda Singleton	Carson City Assistant Stormwater Program	asingleton@carson.org
	Courtney Walkder	Douglas County Stormwater Program Manager	bgreenlaw@carson.org
	Adam Wilson	Storey County Emergency Manager	awilson@storeycounty.org
	Tom Young	Chief Hydrualic Engineer: NDOT	tyoung@dot.nv.gov
	Tristan Wadsworth	Storey County: Analyst	twadsworth@storeycounty.org
	Richard Black	Env. Manager, Tribal Emergency Response, Commissioner, FPST	richard@enviro-fpst.org

Table A-2: Attendees of Stakeholder Meetings for the Carson River Floodplain Management Plan

Date	Attendees to County Meetings	Title	Email
October 24, 2024	CRFMP Workshop to review county portions*		
	Mitch Blum	P.E. CFM, HDR Inc.	Mitchell.Blum@hdrinc.com
	Christy James	Facilitator	
	Chris Fritsen	Branch Sup. Nonpoint Source Pollution; NDEP	cfritsen@ndep.nv.gov
	Rachel Maurer	Headwaters Coordinator	awg.rachel@gmail.com
	Eric Simmons	Senior Engineer, CFM; FEMA	Eric.Simmons@fema.dhs.gov
	Jason Villerreal	Bureau of Reclamation-Carson City	jvillarreal@usbr.gov
	Julian Pecce	P.E., C.F.M. | Project Manager - Surface Water Planning:	Julian.Pecce@mbakerintl.com

*Finalizing CRFMP was delayed until contractor finished Walker River Flood Risk Analysis.

The public was invited to learn more about the update to the CRFMP at several meetings. Member of public who requested information will receive links to review plans. They are listed below. In addition, the plan will be presented to county executive boards in May, June, and July of 2025.

Table A-3: Public Meetings for the Carson River Floodplain Management Plan

Date	Public Meetings
March 5, 2024	CRC Forum
March 3, 2025	CRC Forum
November 13, 2024	Douglas County Map and Project Outreach
November 13, 2023	Douglas County Map and Project Outreach

Carson River Coalition Meeting

Floodplain Management Plan Update Meeting
Meeting Agenda
Wednesday, August 30, 2023
1:30 -3:30pm

Contact: Debbie Neddenriep (775)887-1260, debbie@cwsd.org

Location: **HYBRID MEETING:**

CWSD Conference Room: 777 E William Street, Suite 209m Carson City, NV 89701
Join Zoom Meeting
https://us02web.zoom.us/j/84419875485?pwd=RitWWXJRUkdsNW04VE5QUS9tM3NVZz09
Meeting ID: 844 1987 5485
Passcode: 706486

Meeting Purpose:
The purpose of this kickoff meeting is to discuss what we want to include in the update of Carson River Floodplain Management Plan (RFMP). The CRC Floodplain Management working group is the steering committee for this process. The RFMP will be updated and presented to each county board for adoption.

Please review documents Before 8/30/2023 meeting:

a. Carson River Watershed Floodplain Management Plan
b. Plan Appendices (especially Appendix C Discovery)
c. Suggested Actions (Attached)
d. CRC Main Message: *Protect the floodplain from future development. Once the floodplain and especially the river's meander belt corridor are impacted by development, the river loses the ability to reestablish its natural functions. Agricultural fields near the channel are critical for floodwater attenuation, ground water recharge, non-point source pollution buffering and providing habitat for wildlife.* This message was crafted in 2003 and reaffirmed in 2013.
e. The *Living River Approach* recognizes the importance of balancing the river's natural floodplain form and function with various land uses.

Agenda

1. (1:30) Welcome (CWSD Staff)

2. Member Introductions (10 minutes)
3. Description of Plan / Update Process Brenda
    a. How it fits in with living river/ integrated ws planning & management (Brenda)
    b. Plan overview – who what where when why how (Debbie)
    c. CRC – **Floodplain management working group is the steering committee for this process.**
    d. Discuss suggested actions (Brenda)
    e. Project timeline (DebN)
4. Discuss Roles and Possible Plan Sections (examples below) that need to be updated (Debbie
    a. County Staff:
        i. We will be coming out September/October to get answers to community questions

ii. Other staff to include: emergency managers, can you invite?
iii. Future Projects Lists Discovery Appendix E (p80-87 of report)
iv. County Progress Updates of Suggested actions (E3-E46)

b. CWSD staff:
i. Plan
ii. Board Approval Appendices

c. Conservation District Staff
i. River rehab / restoration projects?

d. Tribal Staff
i. Washoe -
ii. FPST -

e. Contractor – Michael Baker Inc.
i. Demographics, Discovery Map, etc, finalize …

f. Other – NGOS
i. The Nature Conservancy
ii. Nevada Land Trust

5. Sections that need to be added
a. CWSD staff and CRS counties
i. CRS Crosswalk to Improve Plan Score for CRS communities (would need county staff help on this one)
ii. Updated Floodplain Inventory
iii. Ecosystem Services – add verbiage to plan
1. Data need to keep track of damages as they occur over time

6. Review Work Plan with items added (Max)

7. Discuss Schedule

a. Set county interview dates: Will send out doodle polls to county staff

b. Tentative Project Schedule (Meetings bold)

August 30, 2023	CRC Update kickoff meeting
September /October 2023	County Interviews Alpine: Douglas: Carson City: Storey Lyon Churchill:
December 1, 2023	County Mitigation and Progress due MBI mpas & tables due
February 29, 2024	CRS crosswalk Due; MBI mpas & tables due
March 20 or 27, 2024	**CRC Review Draft Plan Meeting**
April / May	Final Edits/ MBI compose document
July 24, 2024	**Final Draft presented to CRC**
August 2024	**Present Plan to CWSD board**
October – December 2024	Plan presented to County Boards for Adoption
January 31, 2025	Submit to FEMA / MIP

8. **Upcoming meeting reminder:**
    a. **October 25, 2023, 1:30 – 3:30pm CRC Floodplain Management Working Group**
    b. **March 20, 2023 or March 27, 2023? CRC RFMP Document Review Workshop**

CRC Floodplain Management Working Group
Floodplain Management Plan Update Meeting
Meeting Notes
Wednesday, August 30, 2023

In Attendance:

Name	Title	Acronym	Organization
Taylor Allison	Emergency/Communication Manager	Lyon	Lyon County Emergency Management
Polly Boardman	Vice President, CTS PMO Director	MB	Michael Baker, Intl
Mitch Blum	Professional Engineer (PE), Certified Floodplain Manager (CFM)	HDR	HDR, Inc.
Lyndsey Boyer	Open Space Manager	CCPROS	Carson City Recreation, Parks & Open Space
Kathy Canfield	Planning Manager , AICP	Storey	Storey County Planning Department
Louis Cariola	Community Development Director, AICP	Lyon	Lyon County Community Development
Tom Dallaire	Community Development Planner, CFM	Douglas	Douglas County Community Development
Farina Kazi	Project Consultant, Denver Office	MB	Michael Baker, Intl
Sara Fichtner	Floodplain Mapping Coordinator	NDWR	Nevada Division of Water Resources
Chris Fritsen	Branch Supervisor for Nonpoint Source Pollution	NDEP	NDEP, Bureau of Water Quality Planning
Brianna Greenlaw	Stormwater Program Manager, PE, CFM	CCPW	Carson City Public Works
Brenda Hunt	Watershed Program Manager	CWSD	Carson Water Subconservancy District
Ed James	General Manager, PE	CWSD	Carson Water Subconservancy District
Lori Leonard	River Fork Ranch Preserve Manager	TNC	The Nature Conservancy
Mareena Lovejoy	Senior Natural Resource Specialist	CC PROS	Carson City Recreation, Parks & Open Space
Debbie Neddenriep	Water Resource Specialist 2, CFM	CWSD	Carson Water Subconservancy District
Dean Patterson	Senior Planner	Churchill	Churchill County Planning Department
Julian Pecce	Project Manager	MB	Michael Baker, Intl
Max Robinson	Water Resource Specialist 1	CWSD	Carson Water Subconservancy District
Catrina Schambra	Administrative Assistant	CWSD	Carson Water Subconservancy District
Eric Simmons	Engineer, Mitigation Division	FEMA	FEMA Region 9 (DHS Flood Insurance Program)
Chris Spross	Public Works Director	Churchill	Churchill County Public Works
Christy Sullivan	District Clerk and Specialist	LCD	Lahontan Conservation District
Courtney Walker	Stormwater Program Manager	Douglas	Douglas County Public Works

Debbie Neddenriep stated the purpose of this kickoff meeting is to discuss what we want to include in the update of Carson River Regional Floodplain Management Plan. (RFMP) The CRC Floodplain Management Working Group is the steering committee for this process. The RFMP will be updated and presented to each county board for adoption.

Brenda Hunt gave a history brief history of the RFMP. The 1997 flood resulted in a 1998 Carson River Workshop which resulted in the formation of the Carson River Coalition. From this group came the CRC Vision Statement, CRC Guiding Principles. University of Nevada, Cooperative Extension publication UNCE Fact Sheet 04-71 announced the CRC main message in its 2003 newsletter:

> *"Protect the floodplain from future development. Once the floodplain and especially the river's meander belt corridor are impacted by development, the river loses the ability to reestablish its natural functions. Agricultural fields near the channel are critical for floodwater attenuation, ground water recharge, non-point source pollution buffering and providing habitat for wildlife."*

Through the work of the CRC the Carson River Watershed Regional Floodplain Management Plan was developed. It was originally adopted in 2008, updated in 2013 and revised in 2018. The plan's purpose is to create a long-term vision and develop strategies which utilize the "Living River" approach to meet floodplain management objectives to reduce flood damage impacts and conserve the floodplain of the

Carson River. Each county in the watershed has adopted each reiteration of this plan.

The RFMPis updated every five years. There are 48 suggested actions in the existing plan that fall into these categories:

- Protect Floodplain Natural Functions & Values
- Set Higher Regulatory Standards
- Collect Flood Data Information and Management
- Balance Channel Migration and Bank Erosion Monitoring
- Increase Floodplain & Flood Hazard Outreach and Education
- Reduce Infrastructure Impacts
- Map/Study Alluvial Fans
- Minimize Stormwater Impacts

Here are links to the RFMP documents to be updated:

- Carson River Watershed Floodplain Management Plan
- Plan Appendices (especially Appendix C Discovery)

Debbie presented the update process and the project timeline:

August 30, 2023	CRC RFMP Update Kickoff Meeting ✓
September - October 2023	***County Interviews*** Alpine: Douglas: Carson City: Storey: Lyon: Churchill:
November 29,2023	CRC RFMP Update Meeting
December 1, 2023	County Mitigation and Progress due MBI mpas & tables due
February 29, 2024	CRS Crosswalk Due; MBI mpas & tables due
March 20, 2024	CRC Review Draft Plan Meeting (WORKSHOP)
April / May	Final Edits/ MBI compose document
July 24, 2024	Final Draft presented to CRC
August 2024	Present Plan to CWSD board
October – December 2024	Plan presented to County Planning Dept & Boards for Adoption*
January 31, 2025	Submit to FEMA / MIP

*Presentations to Planning Commissions as informational only. Give counties a month notice to get on Board agendas. Planners meet usually within week of Boards: plan to present to both in same month at each county.

Upcoming meeting reminders:

October 25, 2023, 1:30 – 3:30pm CRC Floodplain Management Working Group

November 29, 2023 CRC RFMP Update Meeting

Floodplain Management Plan
County Interview Update Meeting
Agenda

FMP Appendix A Note: Each county was interviewed and asked to complete a spreadsheet with their progress on suggested actions and update potential projects for future flood hazard studies and planning documents. Each Agenda for county interviews was the same. The dates of each county interview are listed above in Table A-1 and the stakeholders who attended each interview are listed above in Table A-2.

Contact: Debbie Neddenriep (775)887-1260, debbie@cwsd.org

Location: In person

Meeting Purpose:

The purpose of this kickoff meeting is to discuss what we want to include in the update of Carson River Floodplain Management Plan (RFMP). The CRC Floodplain Management working group is the steering committee for this process. The RFMP will be updated and presented to each county board for adoption.

Please refer documents:

a. Carson River Watershed Floodplain Management Plan
b. Plan Appendices (especially Appendix C Discovery)
c. Suggested Actions (Attached)
d. CRC Main Message: *Protect the floodplain from future development. Once the floodplain and especially the river's meander belt corridor are impacted by development, the river loses the ability to reestablish its natural functions. Agricultural fields near the channel are critical for floodwater attenuation, ground water recharge, non-point source pollution buffering and providing habitat for wildlife.* This message was crafted in 2003 and reaffirmed in 2013.
e. The *Living River Approach* recognizes the importance of balancing the river's natural floodplain form and function with various land uses.

Agenda

1. (9:00) Welcome (CWSD Staff)
2. Member Introductions
3. Community Questionaire
4. Floodplain Management Plan Questions
5. Emergency Management – what do we need to add for HMP/ more robust plan for this side of house
6. CRS – Process required.
    a. County Staff: We will meet in your county to interview
    b. CWSD staff:
    c. Conservation District Staff
    d. Tribal Staff
7. **Due Date: Please return this information by 12/20/2023**
8. Meeting Reminders;
    a. **January 24, 2024, 1:30 – 3:30pm** CRC Floodplain Management Working Group
    b. **March 20, 2023 or March 27, 2023** CRC RFMP Update Meeting

FEMA Regional Floodplain Management Plan & Discover Update Meeting

Carson River Watershed

1. List any existing planned projects from no longer being considered from previous plans (2007, 2013, 2018)
2. . Provide any feedback regarding potential flood risk projects.
3. Discuss areas of growth in your community and state where new flood hazard analyses is warranted for these areas.
4. Discuss areas where flood risk data may be outdated.
5. Discuss any new flood risk projects you are considering.

<u>Flood Risk Reduction</u>

6. Briefly describe your mitigation capabilities.
7. Briefly describe any hazard risk assessments your community has completed since the last Discovery (2018).
8. Describe any current or future mitigation activities planned in your community.
9. Have county floodplain ordinance been updated since draft language was provided? If so, when? If not, is there a plan to pass new ordinances?
10. Same goes for stormwater, Low Impact Development, or Green Stormwater Infrastructure ordinances?

<u>Data Requests</u>

11. Do you have any high-water marks, photos, videos, flood stories from recent flood events?
12. Will you be providing any storm water or floodplain data generated since the last Discovery?
13. Has your community acquired any new aerial topography or LIDAR data since the last Discovery?
14. Who should we contact for any community demographic data?
15. Has your community recently completed a hazard mitigation plan, and if so, whom should we contact.
16. Please provide contact information for county / city emergency manager. (See emergency

<u>Barriers to Mitigation –</u> we want to add a section that discusses barriers to implementation of RFMP plan and suggested Actions.

17. Please list barriers to implementing suggested actions?
18. Please list barriers to mitigation, such as funding, politics, etc.
    a. Ordinance updates,
    b. Flood insurance,
    c. Studies
    d. Building infrastructure
19. Please list barriers to Disaster recovery

Please note any additional comments or concerns relative to your jurisdiction.

Floodplain and River Management Working Group Agenda

Wednesday, October 30, 2024
9:00am–12:00 PM

Location: ***Ormsby Room, Carson City Sheriff's Office***
911 E. Musser Street, Carson City, NV 89701
We need folks to come in person, but there is a hybrid option for Items #1-5. Zoom link below.

Contact: Debbe Neddenriep, 775-887-1260

9:00 am –12:00 pm Agenda Floodplain Management Plan Update Workshop

1. Welcome & Introductions (15 mins)

2. Project Overview (15 mins)
    A. Purpose and Background
    B. Recent Flood Events – make sure they are captured in plan (show video)
    C. Project Timeline – Lindsay

3. Review New Additions to Plan and what we need from Counties (60 mins)
    A. Plan – we will send this out, please save your comments with initials:
    B. Edits to Suggested actions (SA's)
    C. Introduce and Discuss New Section: Barriers to Mitigation & Pathways to Mitigation Success

4. Data request: (5 mins)
    A. Make sure we have locations of potential projects for Geodatabase maps.
    B. Photos and high-water marks from recent floods – send photos to Dropbox https://www.dropbox.com/scl/fo/d545khn8tvmcwlu2hqghu/ALBMTfEByM2W_oSAvFmrsfs?rlkey=ua5y2161j96z50gy8wv0krj1x&st=fd6ay1dg&dl=0

5. **Next Meeting Date: 1/22/25 3:30-4:30 pm** We have added an hour to the CRC FPMWG meeting. to finalize report and plan final steps for adoption. CWSD plans to take it to our board in February, and to county boards March and April. (5mins)

6. **BREAK - END ZOOM CALL (15 mins)**

7. County Break out Groups (45 mins)
    A. Review County documents (these will be in appendices)
        a. County Questionnaires
        b. County Progress on Suggested Actions
        c. Potential Discovery Projects Updates
        d. Breakout Group Report Out

After this meeting, we will be sending out the following documents: FMP plan, Discovery Update table, Barriers to Mitigation Table and Writer up, Pathways to Mitigation Success Table and DRAFT Write Up

Timeline:

11/15/2024: Comments Due

1/3/2025: Final Draft from MBI/Sent to Group

1/17/2025: Final Comments DUE

2/19/2025: Present to CWSD Board

March & April Present to County Boards for Adoption

Join Zoom Meeting
https://us02web.zoom.us/j/82578213037?pwd=awV4gfzbCdViELjIbUHKsyNGif3sAA.1
Meeting ID: 825 7821 3037
Passcode: 743134
One tap mobile +17193594580,,82578213037#,,,,*743134# US

Floodplain and River Management Working Group Notes

Wednesday, October 30, 2024
9:00am–12:00 PM

Location: ***Ormsby Room, Carson City Sheriff's Office***
911 E. Musser Street, Carson City, NV 89701

This meeting was changed to a hybrid meeting since county staff was unable to meet in person.

See attached list of invited versus attended stakeholders. Each county was also emailed the draft documents for each county and asked to review them.

1. Welcome

2. 9:00 am –12:00 pm **Draft Agenda** Floodplain Management Plan Update Workshop

   Debbie Neddenriep and Ed James provides a project overview that reviewed the purpose and background, discussed recent flood events to ensure they are captured in plan. Lindsay Marsh discussed the updated project timeline and explained the project had been delayed while the Walker River Flood Risk Analysis was completed.

   Next, Mrs. Neddenriep reviewed new additions to plan and what we need from Counties

   1. Plan – we will send this out, please save your comments with initials:
   2. Barriers to Mitigation
   3. Pathways to Mitigation Success
   4. Edits to Suggested actions (SA's)

   Finally, break out groups for each County Break reviewed documents for their county for accuracy. Review County documents. These documents will update for future projects (Discovery Appendix C) and progress on suggested actions (Appendix E).

      i. County Questionnaires
      ii. Progress on Suggested Actions
      iii. Potential Projects

   5. Data request:
      i. Make sure we have locations of potential projects for Geodatabase maps.
      ii. Photos and high-water marks from recent floods – send photos to Dropbox https://www.dropbox.com/scl/fo/d545khn8tvmcwlu2hqqhu/ALBMTfEByM2W_oSAvFmrsfs?rlkey=ua5y2161j96z50gy8wv0krj1x&st=fd6ay1dg&dl=0

   The next meeting was announced for January 22, 2025.
   Draft documents for county review can be provided upon request.

APPENDIX B: 2018 RAPID EVALUATION OF THE CARSON RIVER ACKNOWLEDGEMENT AND LINK

ACKNOWLEDGEMENT:

The 2018 Rapid Evaluation of the Carson River can be viewed in Appendix B of the 2018 CRFMP. The Rapid Evaluation is intended to be updated with every other iteration of the CRFMP update process and now contains outdated information.

Although the document has been moved from this appendix, it can be found for reference on the CWSD webpage Flood Hazard Reduction Plans and Documents at https://www.cwsd.org/wp-content/uploads/2020/02/2018-10-18-RFMP-Adoption-Appendices-Final-compressed.pdf.

APPENDIX C: 2018 RISK MAP ACKNOWLEDGEMENT AND 2025 UPDATED FIGURES

2024 DISCOVERY REPORT

UPDATE TO APPENDIX E
FUTURE MITIGATION PROJECTS

FEMA REGION IX

CARSON RIVER WATERSHED, HUC 16050201, 16050202, 16050203

Alpine County, California

Carson City, Churchill County, Douglas County, Lyon County, and Storey County, Nevada

Figure 1: Stillwater Duck Blind, *Brenda Hunt*

ACKNOWLEDGEMENT:

The 2018 Risk MAP Discovery can be found on CWSD's website. The Risk MAP Discovery is intended to be updated with every other iteration of the CRFMP update process and now contains outdated information.

Although the document has been moved from this appendix, it can be found for reference on the CWSD webpage Flood Hazard Reduction Plans and Documents at https://www.cwsd.org/wp-content/uploads/2020/02/2018-10-18-RFMP-Adoption-Appendices-Final-compressed.pdf.

The 2024 updated tables and maps have been attached to this appendix. The size of this attachment is 80.2 mb; therefore, please link to the One Drive 2024 Discovery Update. The Potential Mitigation Project tables for each county directly provide input for the maps shown further in Appendix C. The maps displayed in this section are updated versions of the 2018 Risk Map Discovery Maps and now show progress as of 2024. If link above does not work, please call CWSD to provide the link to the document.

JURISDICTIONAL POTENTIAL MITIGATION PROJECTS

Alpine County					
NO.	**PROJECT**	**COMMENTS**	**JUR. PRIORITY**	**HMP MITIGATION GOAL**	**LOCATION**
1	Analysis of post-fire (Washington) flood mitigation; along Highway 89			Sec. 8, Goal	38.592, -119.752
2	Analysis of post-fire (Tamarach) flood mitigation; both the West Fork and East Fork Carson River and its tributaries were burned.			Sec. 8, Goal	
3	Erosion Zone Analysis	Between Markleeville and Wolf Creek			38.674587, -119.736088
4	Erosion Zone Analysis	Areas in County that burned during Tamarack fire			
5	Markleeville Creek LOMR			Sec. 8, Goal 2C	38.677836, -119.794713
6	Potential Impact Analysis; Number & Location of residents with flood insurance as way to focus efforts.			Sec. 8, Goal 2A	
7	State Highway 89/4 -Map known flood damage				38.660574, -119.726352
8	Various Mitigation Projects for roads prone to flooding				
9	Woodfords/Highway 88 Bridge - STPUD C-Line blowout			STPUD HMP Plan: Severe Storms Obj. #2: Minimize storm related damage from all types of severe storms that impact district facilities.	38.778781, -119.821539
10	Town Ditch Hazard Analysis				
11	Map Alluvial Fans from Nevada State line South to Mesa Vista Subdivision area.				
12	Hot Springs Road Erosion Study				
13	Shay Creek Drainage Analysis				
14	Drainage within and outside Grover Hot Springs State Park that affects County Road.				

Carson City					
NO.	**PROJECT**	**COMMENTS**	**JUR. PRIORITY**	**HMP MITIGATION GOAL**	**LOCATION**
1	Voltaire Canyon Area Drainage Study	Identify flood risk from Voltaire canyon watershed and potential mitigation scenarios			39.129767, -119.777061
2	Goni Wash Alternatives Feasibility Phase 2	Further evaluate alternatives identified in the North Carson City ADMP. Evaluate impact on each alternative to improve drainage problems downstream to Arrowhead Drive and further downstream where identified. Develop alternatives to more advanced design phase.			39.217972, -119.746011
3	Eagle Valley Alternatives Feasibility Phase 2	Further evaluate alternatives identified in the North Carson City ADMP. Evaluate impact on each alternative to improve drainage problems downstream to Highway 50 and further downstream where identified. Develop alternatives to more advanced design phase.			39.190369, -119.705767
4	Master Flood Study	A master flood study that involves updating the model to include all contemplated revisions and satisfies the City criteria there won't be adverse flood impacts. Master flood study as a "base" for a PMR to be done.			City-wide

Churchill County					
NO.	**PROJECT**	**COMMENTS**	**JUR. PRIORITY**	**HMP MITIGATION GOAL**	**LOCATION**
1	Revised FIRM study for Churchill County and City of Fallon		1	Sec. 8, 6.1	
2	Flood Water control and mitigation study report from V- line weir to Carson Lake		2	Sec. 8, 6.1,6.2	
3	Study to evaluate the Newlands Project infrastructure to increase flood water diversions to Stillwater NWR		2	Sec. 8, 6.1, 6.3	
4	Carson River watershed floodplain model update		3	Sec. 8, 6.1	
5	FIRM impact study of a levee along Casey or Bottom Roads		4	Sec. 8, 6.1, 6.3	39.469347, -118.85361
6	Inundation maps/stormwater area drainage master plan below Lahontan		5	Sec. 8, 6.1	
7	Improve flood control/release from VW to Carson Lake to reduce impact to US Navy Bravo 16 (Fallon NAS Comment)			Sec. 8, 6.4, 6.7	

Douglas County						
NO.	**PROJECT**	**COMMENTS**	**JUR. PRIORITY**	**HMP MITIGATION GOAL**	**STORMWATER MASTER PLAN PROJECT RANKING**	**LOCATION**
1	CRS Consultant Study	Evaluate existing CRS documentation and reporting protocols to improve CRS class or streamline responsibilities	H	Action #1.8.12, #1.8.13, and #1.8.14	1	County-wide
2	Buckeye Wash Feasibility Phase 2	Feasibility/flood hazard mitigation study to potentially route water north instead of large detention basin upstream	H	Action #1.8.17	2	38.985544, -119.712625
3	Complete NEPA for Pinenut Creek Dam	Environmental documentation required to secure permits for construction of dam on BLM land	H	Action #1.8.5	`3	38.885731, -119.676722
4	Pinenut Rd Wash and Sawmill Rd Wash Detention and Flood Control Basin Design	Flood Risk study to determine alternatives such as detention basins upstream to mitigate flood damage to private property, homes and roads	H	Action #1.8.17	4	38.911997, -119.681694 38.923378, -119.675767
5	Big Ditch Study	Flood risk and drainage design study to evaluate improved drainage infrastructure to prevent roadway overtopping on Centerville; high maintenance and sedimentation issues	L	Action #1.8.15	5	38.910225, -119.811778
6	Muller/Virginia Ranch Road Culvert	Flood risk and drainage design to evaluate existing infrastructure that is undersized to convey flow; impacts roads, hospital and other care facilities near this location	H	Action #1.8.17	6	38.921378, -119.715883
7	Stutler Canyon	Watershed flood risk and mitigation study to mitigate high sedimentation and flood risk at Foothill and Centerville; road closures affect travel to Lake Tahoe; uncertain of watershed area causing flood risk	L	Action #1.8.17	7	38.906161, -119.837992
8	Leviathan Floodplain Mapping	Floodplain delineation and flood risk hazard analysis to prevent flooding for future development	M	Action #1.8.17	8	38.797058, -119.612303
9	Holbrook Junction - Penrod	Implement drainage design alternative for which engineering design has been completed; maintenance issue and private property damage to mobile home park	L	Action #1.8.17	10	38.738353, -119.566669
10	Sheena Terrace Wash	Flood risk and drainage design study to identify mitigation alternatives to address roadway overtopping and closures	L	Action #1.8.17	11	38.953472, -119.63005

Douglas County						
NO.	PROJECT	COMMENTS	JUR. PRIORITY	HMP MITIGATION GOAL	STORMWATER MASTER PLAN PROJECT RANKING	LOCATION
11	TREGID ADMP	Flood risk study to mitigate alluvial fan flooding from Minnehaha canyon flooding homes, property and washing out drainage system infrastructure	H	Action #1.8.17	12	38.755872, -119.522422
12	Airport Wash ADMP	Flood risk study to determine alternatives such as detention basin upstream to mitigate flood damage to roads, private property, agricultural fields, airport, and future development	H	Action #1.8.17	13	38.006169, -119.669286
13	Complete NEPA for Smelter Creek Sediment Basin	Environmental documentation required to secure permits for construction of detention basin on BLM land	H	Action # 1.8.5	14	38.889228, -119.657186
14	Holbrook Junction - Highlands	Flood risk and drainage design study to improve drainage conditions in this area that is susceptible to post-fire mudslides; impacts private property and roads damaged/closed	L	Action #1.8.17	15	38.72085, -119.5682

Lyon County					
NO.	PROJECT	COMMENTS	JUR. PRIORITY	HMP MITIGATION GOAL	LOCATION
1	River Road Project		M	Sec. 7, Table 7-1, #1	39.281242, -119.537381
2	Superfund Site resolution		L		EPA Superfund Site Lyon County Exent
3	Silver Springs/Ramsay Canyon Remapping	Study sent to FEMA for review; need planning study for improvements, possibly part of NDOT project	H	Sec. 7, Table 7-2 Item 17; Sec. 7, Table 7-1, #1	39.407934, -119.217702
4	TDR, incentivize floodplain protection deer run to New Empire to Lahontan		M	Sec. 7, Table 7-2 Item 3, 15; Sec. 7, Table 7-1, #1	(39.195333, -119.650097) to (39.337669, -119.143631)
5	Phase 2 re-vegetation Fort Churchill State Park (Houghman Howard Diversion to Bucklands Station)		M	Sec. 7, Table 7-2	37.291661, -119.371158) to (39.293211, -119.251194)

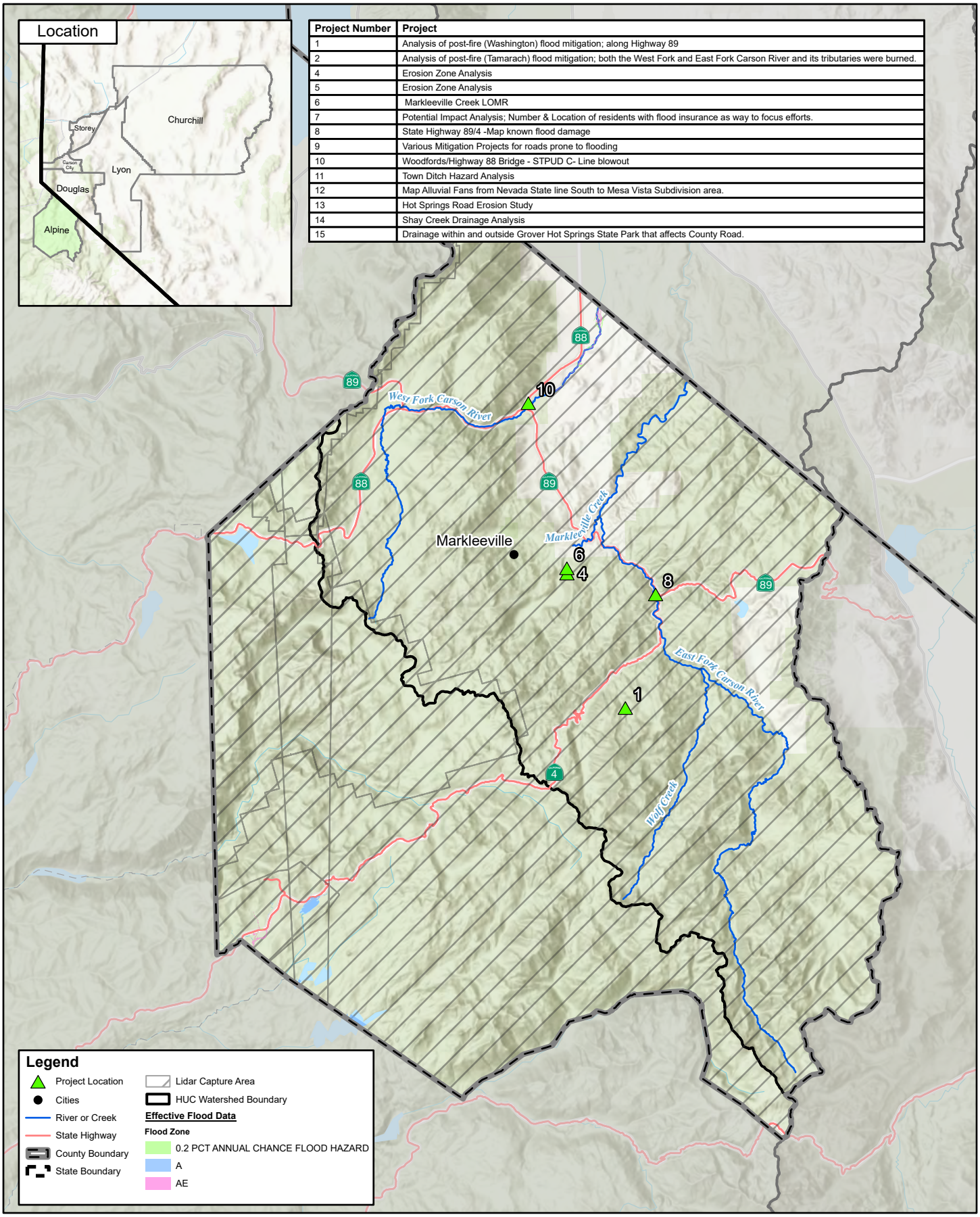
Lyon County					
NO.	**PROJECT**	**COMMENTS**	**JUR. PRIORITY**	**HMP MITIGATION GOAL**	**LOCATION**
6	Phase 3 re-vegetation (Bucklands Station to Lahontan Reservoir)		M	Sec. 7, Table 7-2	(39.293211, -119.251194) to (39.337669, -119.143631)
7	Title 15 - LID standard adoption		H	Sec. 7, Table 7-2	N/A County Wide Code
8	Special Improvement District for Storm Drainage that flows into Carson River along Carson River (design, construct, operate and maintain); ADMP for Highway 50 Corridor from Moundhouse through Silver Springs (future growth)		H	Sec. 7, Table 7-1, #1	39.405824, -119.310962
9	Alluvial Fan ADMP for areas south of river in Dayton Valley (Eldorado Canyon); future growth		H	Sec. 7, Table 7-1, #1	39.235343, -119.58441
10	Bridge alternatives in East Dayton Valley	Flood impact and alignment study needed as a result of development pressure in area	M	Sec. 7, Table 7-2 Item 3, 15, 17; Sec.7, Table 7-1, #1	39.236731, -119.587636
11	Wastewater treatment plant	Pond in floodplain, needs mitigation	L	Sec. 7, Table 7-2 Item 15, 17; Sec. 7, Table 7-1, #1	39.293079, -119.504058
12	East Dayton to Lahontan Physical Map Revision				(39.236783, -119.587761) to (39.337669, -119.143631)
13	Study of Sheep Dam Decommisioning				(39.270994, -119.592581)
14	Further analyze storm drainage along Highway Corridors in Lyon County				High 50 Corridor (Lyon County)

Storey County					
NO.	**PROJECT**	**COMMENTS**	**JUR. PRIORITY**	**HMP MITIGATION GOAL**	**LOCATION**
1	River Road Project		M	Sec. 7, Table 7-1, #1	
2	Superfund Site resolution		L		
3	Silver Springs/Ramsay Canyon Remapping	Study sent to FEMA for review; need planning study for improvements, possibly part of NDOT project	H	Sec. 7, Table 7-2 Item 17; Sec. 7, Table 7-1, #1	39.407934, - 119.217702

COMMUNITY-WIDE		
NO.	**PROJECT**	**COMMENTS (2/2025)**
1	Early warning system to install gages to include a tipping bucket and reverse 911.	System is operational in Carson City with warnings issued by National Weather Service; however, gages are old, may be better systems now. There is still a need for rain gages in watershed counties, especially to provide warnings prior to a flash flood.
2	Floodplain preservation (easements/open areas).	Floodplain and flood hazards should be considered with open space program objectives when selecting acquisition targets and establishing management strategies for open spaces. Still very relevant.
3	Consider Water and Build to Reduce Risk	Implement or enhance county ordinances that include floodplain protection as a purpose, account for the loss of floodplain storage volume, and mitigate losses through a variety of methods. Draft floodplain ordinances were provided to counties as a template to keep water in mind to reduce flood hazards before new construction occurs.
4	Risk Communication and Public Outreach (Flood Awareness Week, etc.)	Ongoing, examples of which are as follows: · Develop watershed-wide risk communication and outreach about floodplain importance. · Share information about non - regulatory flood hazards. · Discuss what to do before, during, and after a flood. (Insurance, Safety, Recovery) · Provide appropriate brochures to distribute on a watershed level with consistent messages and information for the general public. · Synergize with Nevada Division of Water Resources Annual Flood Awareness Week to provide consistent message that Nevada Floods to strengthen resilience of watershed residents. · Attend existing events, River Work Days, and other outreach opportunities should be utilized to help raise awareness of flooding hazards and importance of floodplains. · Install high water mark signs to provide a visual reminder that Nevada Floods.

COMMUNITY-WIDE		
NO.	**PROJECT**	**COMMENTS (2/2025)**
5	Elevation Reference Marks (ERM) should be permanent monuments and updated on a regular basis.	ERMs should be in the same datum as base flood elevations on FIRMs or a datum that is readily convertible to FIRM datum. Move towards FEMA recommended NAVD 88 datum. A master list of ERMs should be developed, maintained, and made available to interested. parties. A gap analysis may need to be conducted throughout watershed. We know Douglas County needs updates and other jurisdictions may as well. This is especially important since this round of discovery will implement alluvial fan plans, so even more important to understand gaps for those reference marks.
6	DFIRM updated procedure	Updating digital flood maps. Support FEMA's Map Modernization Program and encourage FEMA to update FIRMs with current and future conditions. Significant verification of topography and other variables should be conducted prior to release of draft FIRMs.
7	Flood hazard mitigation procedures and understanding how each community has been developing it.	Establish building set-backs in flood hazard areas, where appropriate, to reduce severe hazards from channel migration.
8	Photo monitoring	Photo-Monitoring program (on-the-ground and aerial) should be developed and coordinated on a watershed level to document flooding and flood hazards in a consistent matter. Important to have on record photos of past floods; pictures to see how system reacts. It will react differently now than it did in 1955 for example, as a result of growth, etc. Work with existing CERT communities to select locations to monitor long-term create protocols for safely photographing during floods, database, and training to submit pictures.
9	LiDAR and/or aerial photography (on a watershed level) should be conducted on a 5-year basis, or as needed, to provide updated information on channel movement and floodplain condition.	Explore potential for UAS technology of floodplain mapping.
10	Hazard areas - investigate areas for establishment of setbacks and buffer zones in highly hazardous areas.	Retain lands that provide floodplain storage and maintain or restore connection of river with floodplain through land acquisition, conservation easements, local open space programs, TDR and PDR Programs, and other protection methods. This is ongoing with ordinance planning.
11	Infrastructure design/replacement- coordinate with NDOT and local jurisdictions to ensure infrastructure compatible/consistent with RFMP	Add NDOT to FEMA charter. Add NDOT staff to project teams in study areas that affect regional roads and highways.
12	Groundwater quality impacts - evaluation of groundwater impact due to flooding	Ongoing; still sampling
13	Fluvial geomorphic assessment update (RFMP update 2013)	The last study was done in 1996 so an update is long overdue. Alpine Watershed Group received funding from Lahontan Water Quality Control board to conduct geomorphology studies on the West Fork Carson River and East Fork Carson River. Conserve Nevada has tentatively approved funding for a geomorphology study in Nevada, but that is dependent on the legislature to approve bond funding.
14	Sediment transport study	This information is still needed to understand impacts on water quality; impact flood hazards if changing invert elevation of river. Lateral migration, scour at bridges.
15	Rapid Response Simulation Model	Building on a fluvial geomorphic assessment and sediment transport study would be a rapid response simulation model to capture the constantly changing conditions during floods to improve river forecasts. There are only 3 reforecasting sites on the Carson River.

COMMUNITY-WIDE		
NO.	**PROJECT**	**COMMENTS (2/2025)**
16	Carson River Structure Inventory	Identify, map, and photograph structures along the river and delineate public or private ownership in the Carson River Adaptive Stewardship (CRASP) map viewer.
17	Leviathan mine superfund site monitoring.	There used to be spills from ponds during winter. Beaver ponds were removed that caused heavy metals build up; water quality issues. Some misconceptions about the extent of spills. Public outreach to address concerns if necessary.
18	Carson River Structure Inventory	Identify, map, and photograph structures along the river and delineate public or private ownership in the Carson River Adaptive Stewardship (CRASP) map viewer.
19	Carson River Mercury Superfund Site	Work with FEMA and EPA staff to understand and conduct mitigation within superfund site boundaries.
20	CRS Evaluation	Evaluate ways to improve CRS in Douglas and Storey Counties



NATIONAL FLOOD INSURANCE PROGRAM

Discovery Map: Flood Risk

Carson River Watershed

Alpine County

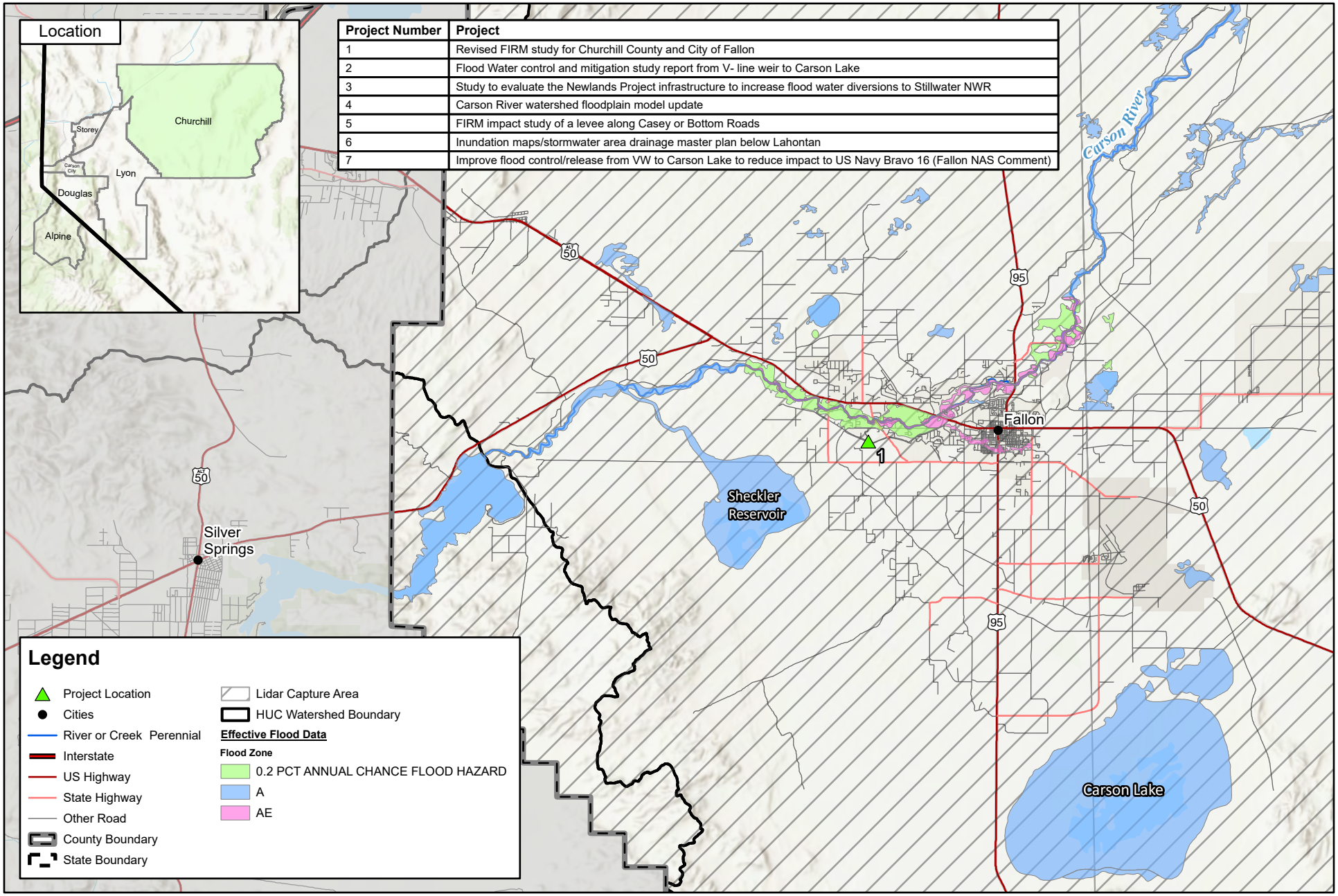
FEMA

0 2.5 5 Miles

Source: Esri, ArcGIS Online, FEMA, USGS, Caltrans, US Census Bureau

Discovery Report Release Date: 11/1/2017

UPDATED FEBRUARY 2025



NATIONAL FLOOD INSURANCE PROGRAM

Discovery Map: Flood Risk

Carson River Watershed

Churchill County

FEMA

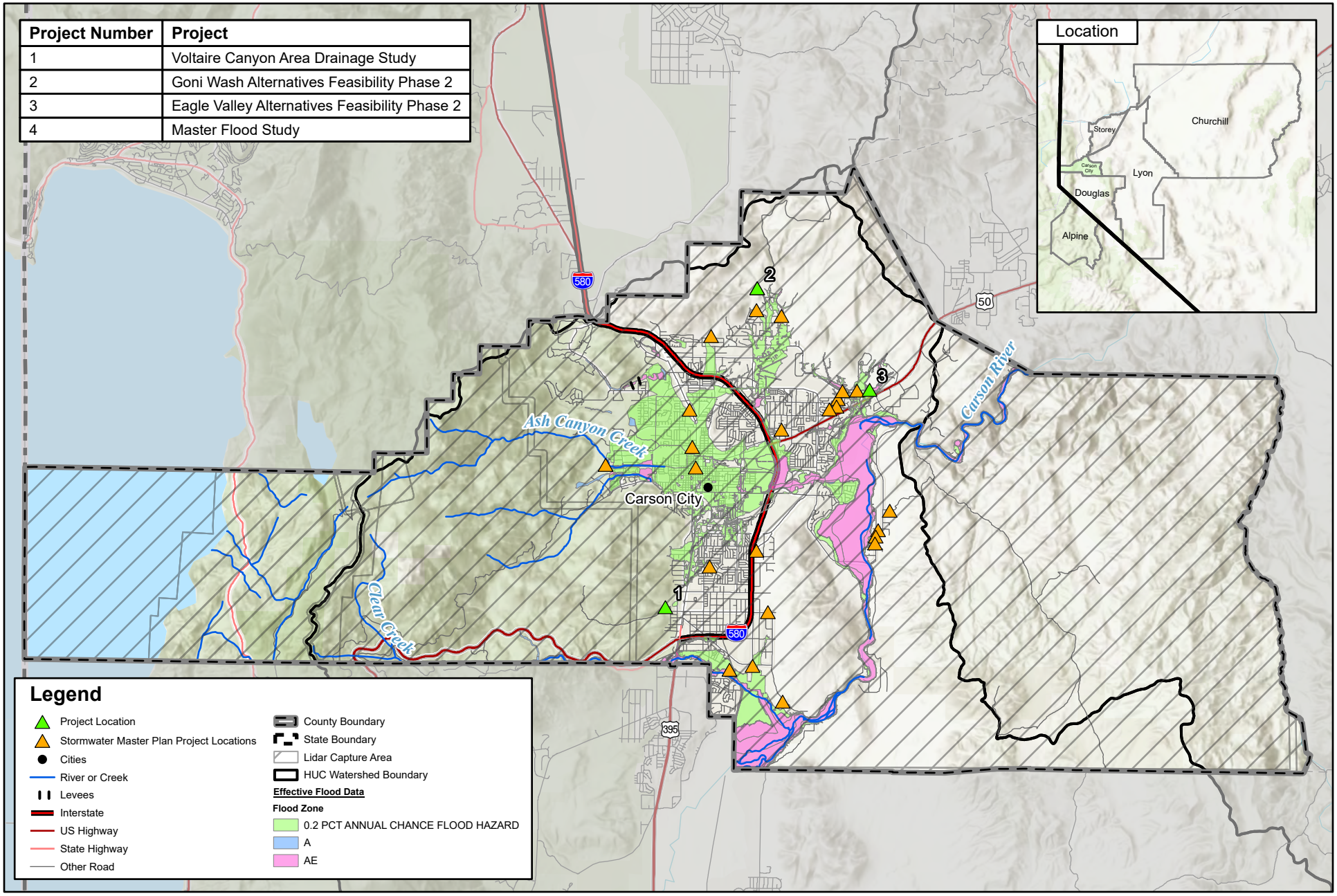
0 2 4 Miles

Source: Esri, ArcGIS Online, FEMA, USGS, Nevada Department of Transportation, US Census Bureau

Discovery Report Release Date: 11/01/2017

UPDATED FEBRUARY 2025

Project Number	Project
1	Voltaire Canyon Area Drainage Study
2	Goni Wash Alternatives Feasibility Phase 2
3	Eagle Valley Alternatives Feasibility Phase 2
4	Master Flood Study



NATIONAL FLOOD INSURANCE PROGRAM

Discovery Map: Flood Risk

Carson River Watershed

Carson City

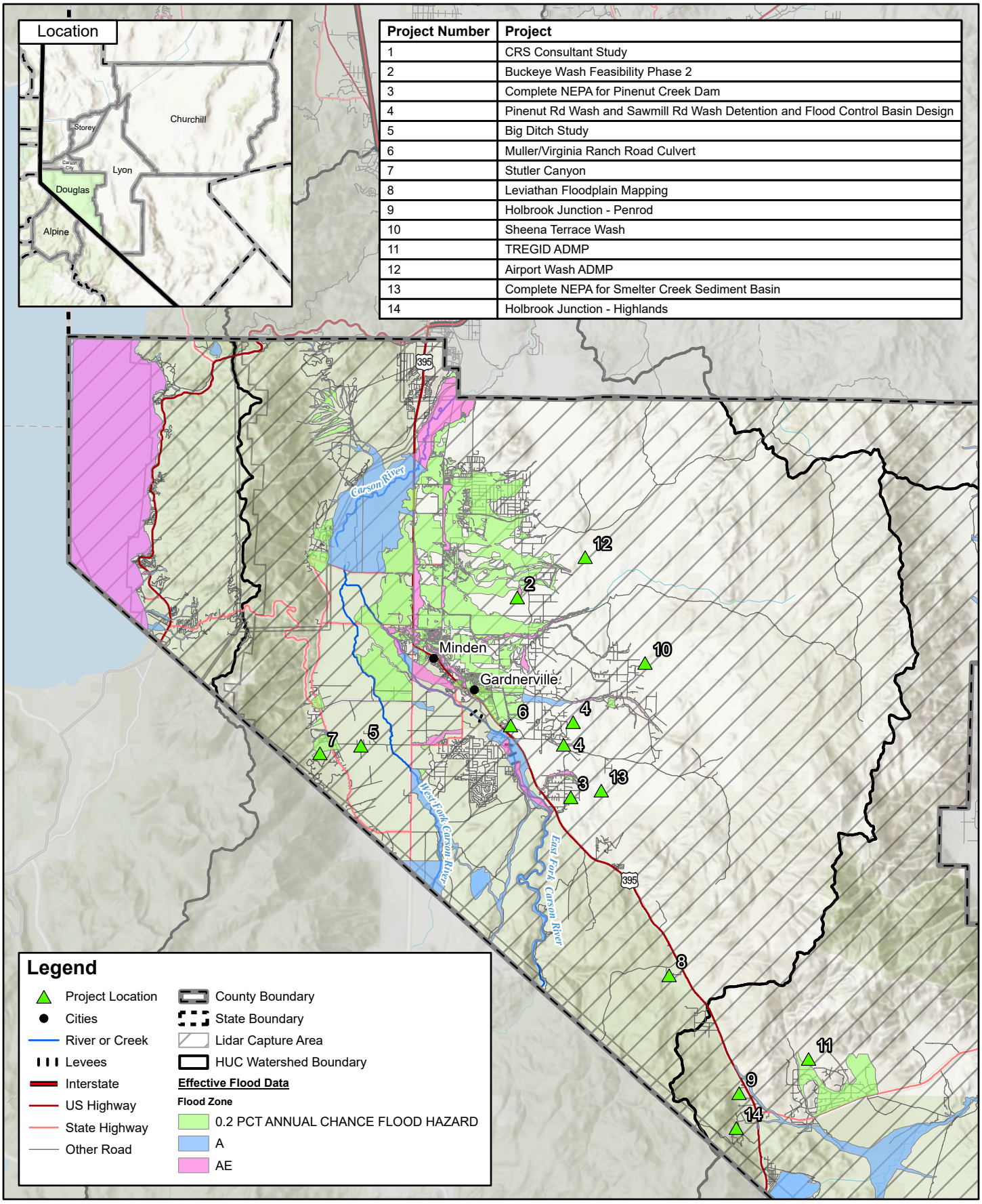
FEMA

0 1.5 3 Miles

Source: Esri, ArcGIS Online, FEMA, USGS, Nevada Department of Transportation, US Census Bureau

Discovery Report Release Date: 08/11/2017

UPDATED FEBRUARY 2025



Project Number	Project
1	CRS Consultant Study
2	Buckeye Wash Feasibility Phase 2
3	Complete NEPA for Pinenut Creek Dam
4	Pinenut Rd Wash and Sawmill Rd Wash Detention and Flood Control Basin Design
5	Big Ditch Study
6	Muller/Virginia Ranch Road Culvert
7	Stutler Canyon
8	Leviathan Floodplain Mapping
9	Holbrook Junction - Penrod
10	Sheena Terrace Wash
11	TREGID ADMP
12	Airport Wash ADMP
13	Complete NEPA for Smelter Creek Sediment Basin
14	Holbrook Junction - Highlands

FEMA

0 2 4 Miles

Source: Esri, ArcGIS Online, FEMA, USGS, Nevada Department of Transportation, US Census Bureau

NATIONAL FLOOD INSURANCE PROGRAM

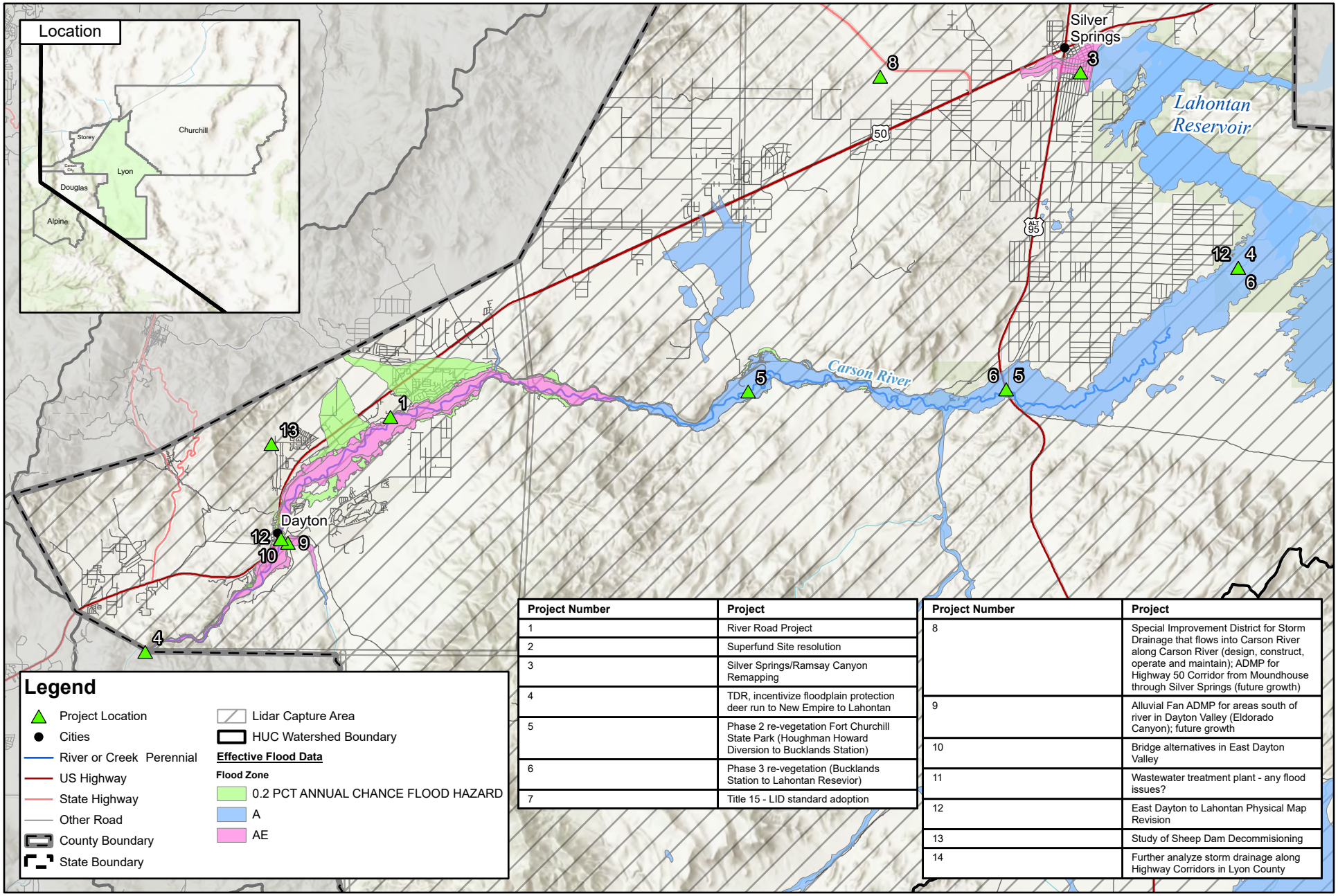
Discovery Map: Flood Risk

Carson River Watershed

Douglas County

Discovery Report Release Date: 11/01/2017

UPDATED FEBRUARY 2025



Project Number	Project
1	River Road Project
2	Superfund Site resolution
3	Silver Springs/Ramsay Canyon Remapping
4	TDR, incentivize floodplain protection deer run to New Empire to Lahontan
5	Phase 2 re-vegetation Fort Churchill State Park (Houghman Howard Diversion to Bucklands Station)
6	Phase 3 re-vegetation (Bucklands Station to Lahontan Resevior)
7	Title 15 - LID standard adoption

Project Number	Project
8	Special Improvement District for Storm Drainage that flows into Carson River along Carson River (design, construct, operate and maintain); ADMP for Highway 50 Corridor from Moundhouse through Silver Springs (future growth)
9	Alluvial Fan ADMP for areas south of river in Dayton Valley (Eldorado Canyon); future growth
10	Bridge alternatives in East Dayton Valley
11	Wastewater treatment plant - any flood issues?
12	East Dayton to Lahontan Physical Map Revision
13	Study of Sheep Dam Decommisioning
14	Further analyze storm drainage along Highway Corridors in Lyon County

FEMA

0 1.5 3 Miles

Source: Esri, ArcGIS Online, FEMA, USGS, Nevada Department of Transportation, US Census Bureau

NATIONAL FLOOD INSURANCE PROGRAM

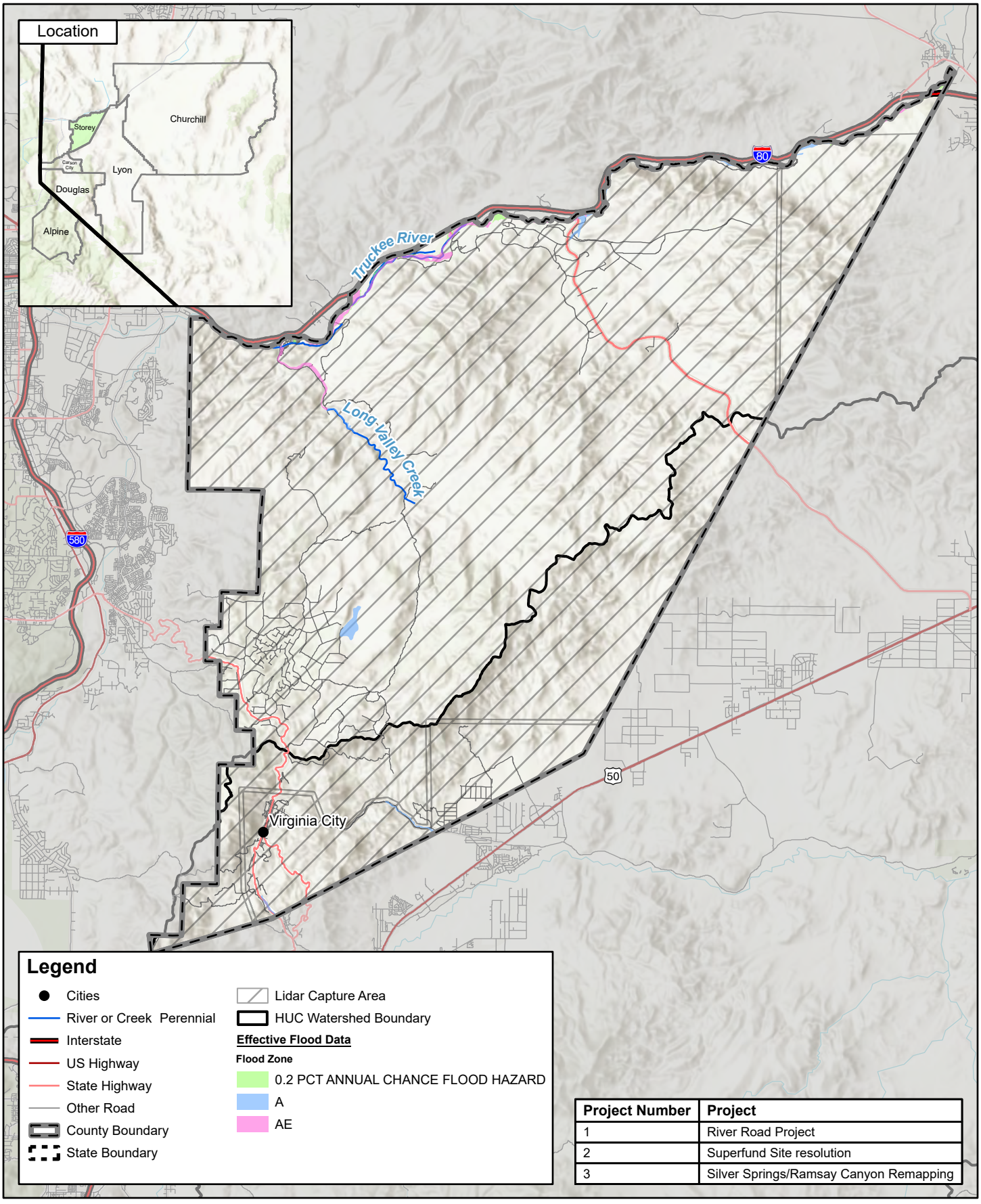
Discovery Map: Flood Risk

Carson River Watershed

Lyon County

Discovery Report Release Date: 11/01/2017

UPDATED FEBRUARY 2025



Legend

- Cities
- River or Creek Perennial
- Interstate
- US Highway
- State Highway
- Other Road
- County Boundary
- State Boundary
- Lidar Capture Area
- HUC Watershed Boundary

Effective Flood Data

Flood Zone

- 0.2 PCT ANNUAL CHANCE FLOOD HAZARD
- A
- AE

Project Number	Project
1	River Road Project
2	Superfund Site resolution
3	Silver Springs/Ramsay Canyon Remapping

FEMA

0 2 4 Miles

Source: Esri, ArcGIS Online, FEMA, USGS, Nevada Department of Transportation, US Census Bureau

NATIONAL FLOOD INSURANCE PROGRAM

Discovery Map: Flood Risk

Carson River Watershed

Storey County

UPDATED FEBRUARY 2025

DISCOVERY MAP

Dams

National ID	Name	State ID	Stream	Hazard	EAP
NV10133	Stillwater Point Dam		Carson River-Os	L	
NV10120	Carson River Diversion		Carson River	L	
CA01473	Topaz Lake	70.003	Walker River	H	
CA00630	Crater Lake	511.002	Crater Lake Creek	L	
CA00639	Upper Sunset Lake	513.007	U Pleasant Vy Cr	L	
NV00087	S Line Dam		Carson River-Os	L	
NV00094	Nuti Storage Dam	J-077	Desert Creek-Os	L	
CA00634	Kinney Meadows	513	Tr Silver Creek	L	
NV10466	Oles Pond Dam		Carson River-Os	L	
NV10177	Wetlands Enhancement Cell 7 Dam	J-211	Carson River-Os	L	
NV00223	Carson City Treated Effluent Dam	J-228	Carson River-Tr	H	
NV00214	Sheckler Dam		Carson River-Offstream	L	
NV10455	Lippincott Ski Ii Dam	J-419	Carson River-Os	L	
CA00635	Lower Kinney Lake	513.002	Tr Silver Creek	L	
NV10168	Indian Hills Effluent Pond #5 Dam	J-350	Carson River-Os	S	
NV10638	Sheep Camp Detention Dam		Carson River-Tr	H	
NV10123	Lahontan Dike			L	
NV10624	Carson City South Storage Ponds Dam		Clear Creek-Os	L	
CA00633	Lost Lake West	512.002	Lost Creek	L	
NV10123	Lahontan Dam		Carson River	H	
NV10686	Buckeye Creek Middle Effluent Storage Pond Dam	J-380	Buckeye Creek-Os	H	
NV10960	Aspen Creek Ribs Dam	J-782		L	
CA01222	Harvey Place	1062.003	Indian Creek	H	
NV10623	Carson City Treatment Plant Drying Beds Dam		Eagle Creek-Os	L	
NV10175	Sierra Springs Dam	J-229	Carson River-Os	S	
NV10693	Wetlands Enhancement Cell 3 4 5 Dam	J-211	Carson River-Os	L	
NV00227	Minden-Gardnerville Sanitation District Dam	J-238	Carson River-Os	S	
CA00647	Lobdel Lake	539	Desert Creek	L	

National ID	Name	State ID	Stream	Hazard	EAP
CA00894	Indian Creek	1062	Indian Creek	H	
CA00646	Black Reservoir	538	Black Creek	L	
NV10439	Mud Lake Dam	J-515	Indian Creek-Os	H	
NV00086	Old Reservoir Dam		Wade Drain	L	
NV10687	Buckeye Creek Upper Effluent Storage Pond Dam	J-380	Buckeye Creek-Os	H	
NV10635	Shenandoah Detention Basin Dam		Eagle Creek-Tr	H	
NV10691	Wetlands Enhancement Cell 8 Dam	J-211	Carson River-Os	L	
NV00092	Allerman #1 Dam		Carson River-Os	H	
CA00640	Wet Meadows	513.008	Tr Pleasant Vy Cr	L	
NV10467	Harmon Dam		Carson River-Os	L	
NV00150	Eldorado Canyon Dam (Herman Reservoir)	L63400	Eldorado Canyon	H	
NV10166	Buckeye Creek Lower Effluent Storage Pond Dam	J-380	Buckeye Creek-Os	H	
NV10665	North Carson Valley Treated Effluent Storage Dam	J-594	Carson River-Os	S	
NV10470	Topaz Lake Dam		West Fork Walker River-Os	H	
CA00638	Upper Kinney Lake	513.006	Tr Silver Creek	L	
CA00631	Red Lake	1.09	Red Lake Creek	H	
CA00636	Lower Sunset	513.003	Pleasant Val Cr	L	
NV10605	Bently Reservoir Dam	J-551	Buckeye Creek-Tr	H	
NV00234	East Peak Lake Dam	J-257	Daggett Creek	H	
CA00637	Tamarac Lake	513.005	Tr Pleasant Vy Cr	L	
NV10435	Indian Hills Effluent Pond #6 Dam	J-411	Carson River-Os	S	
NV00231	Carson City Golf Course Detention Basin Dam	J-244	Carson River-Tr	S	
CA00648	Poore Lake Reservoir	540	Poore Creek	L	
NV10176	Sonora Buckskin Tails Dam	J-355	N/A	L	
CA00629	Scott Lake	511	Tr Wfk Carson R	L	
CA00632	Lost Lake East	512	Lost Creek	L	
CA00641	Heenan Lake	1.083	Tr Efk Carson R	L	
NV10468	Sagouspe Diversion Dam		Carson River	L	

FEMA FIS Status

County	Status	Effective Date
Alpine County	Unkown	11/19/1987
Carson City	Effective	6/20/2019
Churchill County	Effective	9/26/2008
Douglas County	Effective	6/15/2016
Lyon County	Effective	10/20/2016
Storey County	Effective	1/16/2009

Community Census Information

Community	CID	Population (2020 Census)
Alpine County	6003	1,204
Carson City	320001	58,639
Churchill County	320030;320002	25,516
Douglas County	320008	49,488
Lyon County	320029; 320038; 320016	59,235
Storey County	320033	4,104

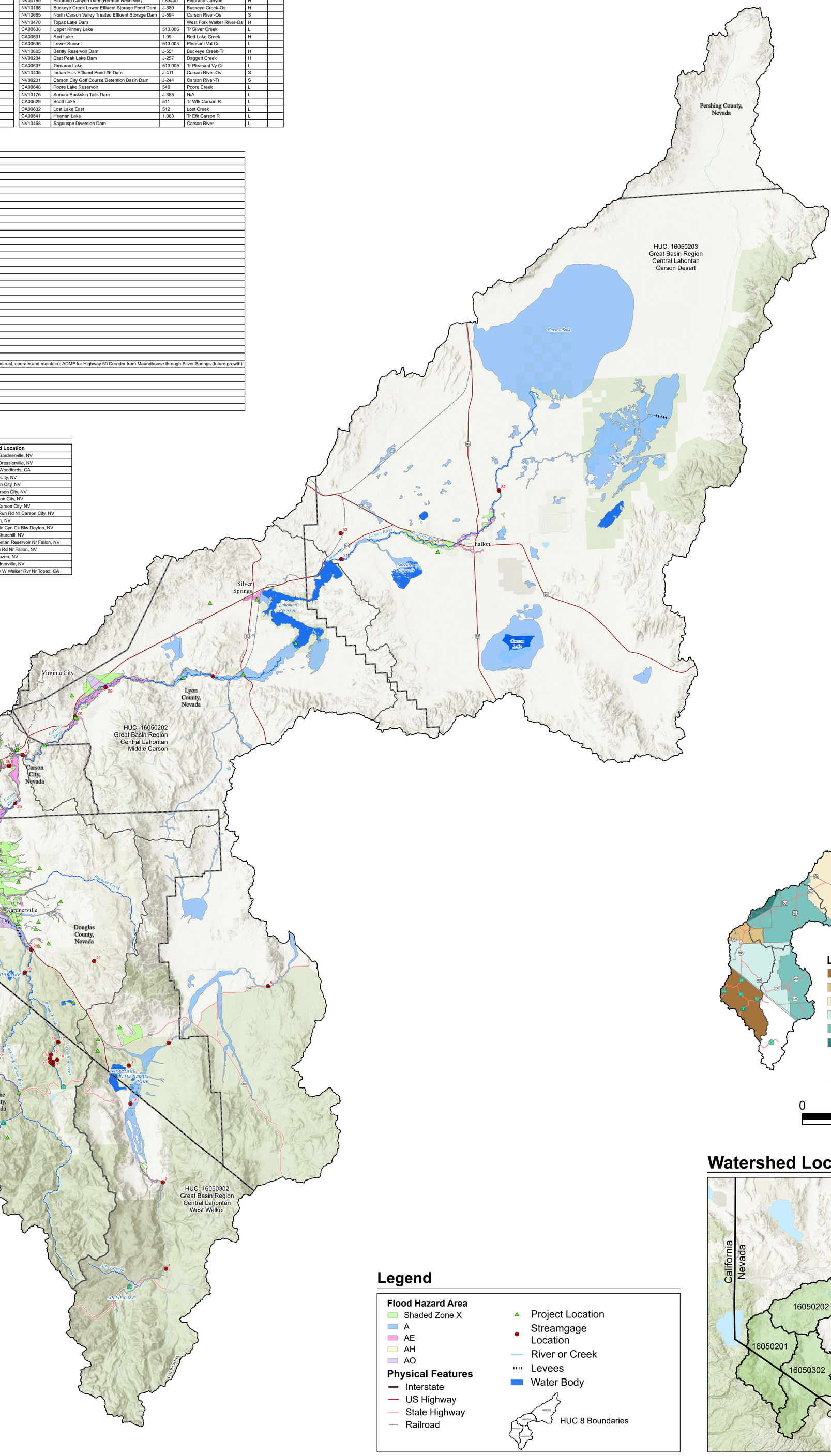
Potential Mitigation Projects

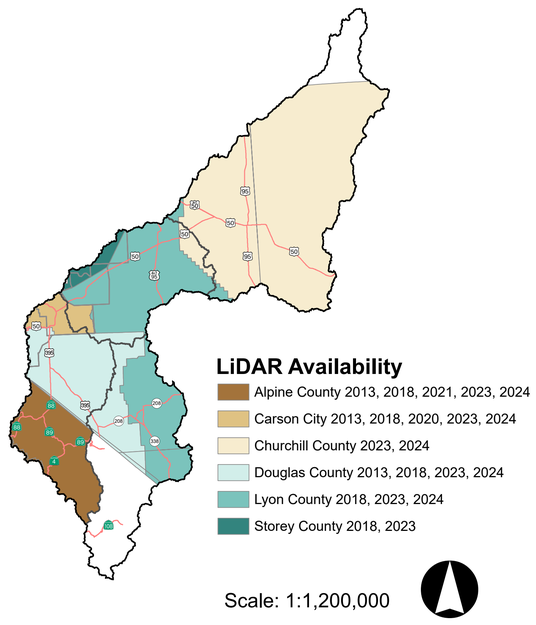
Number	Project
AL1	Analysis of post fire (Washington) flood mitigation; along Highway 89
AL3	Erosion Zone Analysis
AL5	Markleeville Creek LOMR
AL7	State Highway 89/4 -Map known flood damage
AL9	Woodfords/Highway 88 Bridge - STPUD C- Line blowout
CC1	Voltaire Canyon Area Drainage Study
CC2	Goni Wash Alternatives Feasibility Phase 2
CC3	Eagle Valley Alternatives Feasibility Phase 2
CH5	FIRM impact study of a levee along Casey or Bottom Roads
DO2	Buckeye Wash Feasibility Phase 2
DO3	Complete NEPA for Pinenut Creek Dam
DO4	Pinenut Rd Wash and Sawmill Rd Wash Detention and Flood Control Basin Design
DO5	Big Ditch Study
DO6	Muller/Virginia Ranch Road Culvert
DO7	Stutler Canyon
DO8	Leviathan Floodplain Mapping
DO9	Holbrook Junction - Penrod
DO10	Sheena Terrace Wash
DO11	TREGID ADMP
DO12	Airport Wash ADMP
DO13	Complete NEPA for Smelter Creek Sediment Basin
DO14	Holbrook Junction - Highlands
LY1	River Road Project
LY3	Silver Springs/Ramsay Canyon Remapping
LY4	TDR, incentivize floodplain protection deer run to New Empire to Lahontan
LY5	Phase 2 revegetation Fort Churchill State Park (Houghman Howard Diversion to Bucklands Station)
LY6	Phase 3 revegetation (Bucklands Station to Lahontan Resevior)
LY8	Special Improvement District for Storm Drainage that flows into Carson River along Carson River (design, construct, operate and maintain); ADMP for Highway 50 Corridor from Moundhouse through Silver Springs (future growth)
LY9	Alluvial Fan ADMP for areas south of river in Dayton Valley (Eldorado Canyon); future growth
LY10	Bridge alternatives in East Dayton Valley
LY11	Wastewater treatment plant any flood issues?
LY12	East Dayton to Lahontan Physical Map Revision
LY13	Study of Sheep Dam Decommisioning
ST3	Silver Springs/Ramsay Canyon Remapping

USGS Streamgage Index

Gage Number	Station Name and Location
US10296000	W Walker Rv Blw L Walker Rv Nr Coleville, CA
US10296500	W Walker Rv Nr Coleville, CA
US10297010	Topaz Canal Blw Topaz Lake Nr Topaz, CA
US10297500	W Walker Rv At Hoye Brg Nr Wellington, NV
US10300000	W Walker Rv Nr Hudson, NV
US10308200	E Fk Carson Rv Blw Markleeville Ck Nr Markleeville
US10308783	Leviathan C Ab Mine Nr Markleeville CA
US103087835	Unnamed Trib 1 To Leviathan C At Leviathan Mine CA
US10308784	Leviathan Mine Adit Drain Nr Markleeville CA
US10308785	Leviathan Mine Pit Flow Nr Markleeville CA
US10308853	Leviathan Mine Pond 1 Nr Markleeville CA
US10308855	Leviathan Mine Pit Junction Box Nr Markleeville CA
US10308865	Unnamed Trib 2 To Leviathan C At Leviathan Mine CA
US10308889	4L C Nr Markleeville CA
US10308789	Leviathan C Ab Aspen C Nr Markleeville CA
US10308891	Aspen C Abv Leviathan Mine Nr Markleeville CA
US10308792	Leviathan C Ab Mountaineer C Nr Markleeville CA
US10308794	Bryant C Bl Mountaineer C Nr Markleeville CA

Gage Number	Station Name and Location
US10309000	E Fk Carson Rv Nr Gardnerville, NV
US10309010	E Fk Carson Rv Nr Dresslerville, NV
US10310000	W Fk Carson Rv At Woodfords, CA
US10310500	Clear Ck Nr Carson City, NV
US10311000	Carson Rv Nr Carson City, NV
US10311100	Kings Cyn Ck Nr Carson City, NV
US10311200	Ash Cyn Ck Nr Carson City, NV
US10311300	Eagle Valley Ck At Carson City, NV
US10311400	Carson Rv At Deer Run Rd Nr Carson City, NV
US10311700	Carson Rv At Dayton, NV
US10311750	Carson R Abv Sixmile Cyn Ck Blw Dayton, NV
US10312000	Carson Rv Nr Fort Churchill, NV
US10312150	Carson Rv Blw Lahontan Reservoir Nr Fallon, NV
US10312275	Carson Rv At Tarzyn Rd Nr Fallon, NV
US10351400	Truckee Canal Nr Hazen, NV
US10309050	Pine Nut Ck Nr Gardnerville, NV
US10296750	Topaz Canal Blw Div W Walker Rvr Nr Topaz, CA

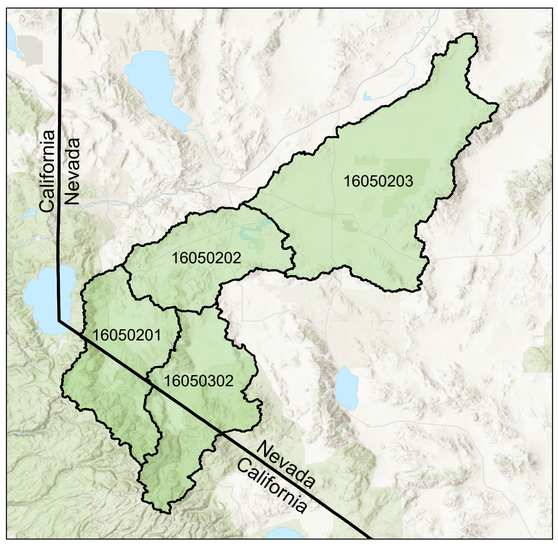




Scale: 1:1,200,000

0 20 40 80 Miles

Watershed Location



Legend

Flood Hazard Area
- Shaded Zone X
- A
- AE
- AH
- AO

Physical Features
- Interstate
- US Highway
- State Highway
- Railroad

- Project Location
- Streamgage Location
- River or Creek
- Levees
- Water Body
- HUC 8 Boundaries

FEMA

Scale 1:250,000

0 5 10 20 Miles

Source: Esri, ArcGIS Online, FEMA, USGS, Nevada Department of Transportation, US Census Bureau

Projection Information

Universal Transverse Mercator
Zone 10
North American Datum 1983

HUC-8 Codes

16050203
16050202
16050201
16050302

NATIONAL FLOOD INSURANCE PROGRAM

Discovery Map: Flood Risk

Carson River Watershed

Discovery Report Release Date: 12/2017
Revised: 03/04/2025

APPENDIX D: COOPERATIVE TECHNICAL PARTNER PROJECT SUMMARY (2005 – 2024), CRS ANNUAL REPORTS, FIRM LINK

FEMA Cooperating Technical Partners (CTP) Grants				
Project Type	**Project Elements**	**Grant Performance Period:**	**Completed**	**Comments**
FEMA RISK Mapping Activity Statement 1				
FEMA Proj. #: EMF-2009-GR-0911	Carson River Remap and Restudy - Lahontan to Dayton Valley & Discovery See FEMA Map Service Center	9/2009-9/2011; 9/2009 -3/31/2012	3/31/2012	PMR Effective 10/20/2016
FEMA RISK Mapping Activity Statement 2				
FEMA Proj. #: EMF-2011-GR-1114	Carson River Remap and Restudy - Dayton Valley - Carson City See FEMA Map Service Center	9/26/2011-9/25/2013; - 9/26/2014	7/30/2014	PMR Effective 6/20/2019
FEMA RISK Mapping Activity Statement 3				
FEMA Proj. #: EMF-2012-GR-1211	Carson River Remap and Restudy - Carson Valley Phase 1 (H & H for Carson River) See FEMA Map Service Center	9/21/2012- 9/23/2014; 9/21/2012-9/30/2015	9/30/2015	PMR Preliminary 11/8/2023; PMR Effective* 6/2025
FEMA RISK Mapping Activity Statement 4				
FEMA Proj. #: EMF-2013-GR-2010	Grant Management	9/21/2012- 5/29/2015; extended 9/21/2012-12/31/2016		
	Carson River Remap and Restudy - Carson Valley Phase 2		12/31/2016	PMR Preliminary 11/8/2023; PMR Effective* 6/2025
	Community Outreach		12/31/2016	
	Evaluate Floodplain Ordinances based on new map			
	Stillwater Report Technical Assistance for Mitigation Actions		9/30/2016	
	Floodplain Model Protocol & Proceures for Updates		12/31/2016	
*PMR is tentiative to be released June 2025				
FEMA RISK Mapping Activity Statement 5				
FEMA Proj. #: EMW-2014-CA-00170	Grant Management	9/26/2014- 9/24/2016; 9/26/2014-12/31/2016		
	Douglas County Smelter Creek Identification and Mitigation Project		8/8/2015	
	Churchill County Water Shunt Identification and Mitigation Project		10/20/2015	
	Public Outreach Flood Awareness Program 2016:	Carson River Flooplain Inventory	12/22/2016	
	Inundation Flood Maps Upper Carson River Watershed Non-Regulatory Product		12/31/2016	
	Douglas County Alpine View Estates Restudy and Remapping Project LOMR	See FEMA Map Service Center	12/31/2016	LOMR Effective 6/7/2018
	Carson City Restudy and Remapping - Eagle Valley Golf Course A & B	See FEMA Map Service Center	12/31/2016	LOMR Effective 12/26/2017
FEMA RISK Mapping Activity Statement 6				
FEMA Proj. #: EMW-2015-CA-00087	Douglas County Stephanie Lane Drainage Identification and Mitigation Project	9/25/2015-9/24/2017	5/27/2016	
	Public Outreach Flood Awareness Program - PSA Videos			
	Public Service Announcement (PSA) - Conserving the Carson River Floodplain as a Community Asset (:30)		7/31/2017	
	Agriculture's a Good Fit for Conserving the Carson River Floodplain as a Community Asset		7/31/2017	
	A Case for Developers to Conserve the Carson River Floodplain as a Community Asset (3:13)		7/31/2017	
	Our Officials in Conserving the Carson River Floodplain as a Community Asset (4:19)		7/31/2017	
	Carson City Inundation Maps			
	Carson City Goni Wash Restudy and Remapping Project		7/31/2017	In FEMA Review
	Lyon County Ramsey Canyon Restudy and Remapping Project		7/31/2017	In FEMA Review

FEMA Cooperating Technical Partners (CTP) Grants				
Project Type	**Project Elements**	**Grant Performance Period:**	**Completed**	**Comments**
FEMA RISK Mapping Activity Statement 7				
EMF-2016-CA-00005	Grant Management	9/19/2016-9/18/2018; 9/19/2016 - 6/30/2019		
	Douglas County Johnson Lane Area Drainage Master Plan		8/31/2018	8/31/2018
	Carson River Watershed Regional Floodplain Management Plan 2018 (Includes FEMA Discovery		8/15/2018	8/15/2018
	Carson City Voltaire Canyon Restudy and Remapping Project	See FEMA Map Service Center		LOMR Effective 6/20/2019
	Northern Nevada Public Outreach Flood Awareness		1/15/2018	1/15/2018
FEMA RISK Mapping Activity Statement 8				
EMF-2017-CA-00002	Grant Administration	9/1/2017-8/31/2019		
	(North) Dayton Valley Area Drainage Master Plan		8/31/2019	
	Floodplain Ordinances Update & Modification			
	Northern Nevada Public Outreach Flood Awareness Program			
FEMA RISK Mapping Activity Statement 9				
EMF-2018-CA-00005	Grant Management	9/1/2018-8/30/2022		
	South Dayton Valley Area Drainage Master Plan		8/31/2020	
	North Carson City Identification and Mitigation Plan	Contact CWSD for more information	9/30/2021	
	Pine Nut Wash Letter of Map Review (LOMR)		10/31/2020	In FEMA Review
	Northern Nevada Public Outreach Flood Awareness Program		10/31/2020	
FEMA RISK Mapping Activity Statement 10				
EMF - 2019-CA- 00018	Grant Administration	8/1/2019-7/29/2022	7/29/2022	
	Carson River Flood Map PMR to update FIRM below	Contact CWSD for more	7/29/2022	In FEMA Review
	Ruhenstroth ADMP Phase 1	Contact CWSD for more information	6/30/2021	
	West Carson City Drainage Study	Contact CWSD for more information	7/31/2021	
	Carson Valley PMR Revisions		9/16/2022	
	Northern Nevada Public Outreach Flood Awareness Program	Delayed because of COVID	7/29/2022	
FEMA RISK Mapping Activity Statement 11				
EMF - 2020-CA- 00002	Grant Administration	7/1/2020-9/30/2023	9/30/2023	
	ADMP Web Access System	View ADMP Flood Hazard Map	7/31/2023	
	Ruhenstroth ADMP - Phase 2	Contact CWSD	10/31/2021	
	Clear Creek LOMR	See FEMA Map Service Center	7/31/2022	LOMR Effective
	Smelter Creek LOMR	See FEMA Map Service Center	11/30/2022	LOMR Effective
	Northern Nevada Public Outreach Flood Awareness	Contact CWSD	9/30/2023	
FEMA RISK Mapping Activity Statement 12				
	Grant Administration	7/1/2021-6/30/2024 ;	9/30/2024	
	Hotel & Meals			
	Southeast Carson City Area Drainage Study	Contact CWSD	10/31/2023	
	Buckeye Creek Detention Mitigation	Contact CWSD	8/31/2023	
	Virginia City & Six Mile Canyon Drainage Study	Contact CWSD	11/30/2023	
	East Carson City Area Drainage Plan	Contact CWSD	5/31/2023	
	Flood Risk Communication & Community Outreach includes	See CWSD Outreach Report	6/30/2024	
	Douglas County CV PMR response to comments		6/30/2022	
	Ramsey Canyon LOMR response to comments		6/30/2022	

FEMA Cooperating Technical Partners (CTP) Grants

Project Type	Project Elements	Grant Performance Period:	Completed	Comments
Communication and Mitigation Strategies (COMS) Grant 1				
	Grant Administration / Training	9/1/2022-9/30/2025	In Progress	
	Engagement Plan		1/18/2023	
	Stagecoach ADMP	Contact CWSD	10/31/2024	
	Silver Springs ADMP	Contact CWSD	8/31/2024	
	Flood Risk Communication & Community Outreach includes	See CWSD Outreach Report	12/31/2024	
	Fish Springs/Pinenut Creek culvert study	Contact CWSD	12/31/2024	
	Walker River	Contact CWSD	11/30/2024	
	Update Carson River Floodplain Management Plan (CRFMP)	CRFMP will be uploaded once	In Progress	
Communication and Mitigation Strategies (COMS) Grant 2				
Communication and	**Project Elements**	**Grant Performance Period:**	**Completed**	**Comments**
	Grant Administration	9/1/2024-6-30-2026	All In Progress	3/2025 Paused
	Engagement Plan		In Progress	
	Training		In Progress	
	Gold Canyon ADMP		In Progress	
	South Silver Springs ADMP		In Progress	
	Flood Risk Communication & Community Outreach includes		In Progress	
	Sawmill wash & Pinenut wash Drainage		In Progress	

Additional Resources

Please see CWSD Webpage for links to most reports: Flood Hazard Reduction Plans and Documents
https://www.cwsd.org/flood-risk-mitigation-projects/

Please see CWSD Web Hazard Maps: Flood Hazard Reduction Plans and Documents
https://gis.mbakerintl.com/carsonwatersubconservancydistrict/

Many of these studies include large data sets. Please contact CWSD staff for more information. 775-887-7450

COMMUNITY RATING SYSTEM (CRS) ANNUAL REPORT

Carson Water Subconservancy District (CWSD) has provided the most recent CRS Report to this Appendix. CRS reports prior to 2023-2024 can be provided by CWSD upon request.

Risk Communication and Project Engagement
FEMA Mapping Activity Statements 12
(Period of July 1, 2023, to June 30, 2024)

These activities are associated with the

Carson River Watershed
REGIONAL FLOODPLAIN MANAGEMENT PLAN
And the
NevadaFloods.org Flood Awareness Campaign of the Nevada Floodplain Manager's Office, Division of Water Resources

Submitted for:

Carson River Watershed CRS Communities
Carson City, Nevada
Douglas County, Nevada
Storey County, Nevada

September 30th, 2024
Prepared by:

Lindsay Marsh, Water Resource Specialist 1
Debbie Neddenriep, CFM, Water Resource Specialist 2
Carson Water Subconservancy District
777 E. William Street, #210A
Carson City, NV 89701

This report outlines regional floodplain management actions and lists the activities in the Community Outreach and Flood Awareness efforts conducted in Carson River Watershed which occurred during the period of July 1, 2023, to June 30, 2024. In addition to meeting requirements of mapping activities statements (MAS) 12, the Carson River Watershed Regional Floodplain Management Plan (FMP) informs and guides Carson Water Subconservancy District's (CWSD) floodplain management activities as part of the Integrated Watershed Management Process.

1.0 Background

In 2008, the 2018 Carson River Watershed Regional Floodplain Management Plan (CRFMP) was formally adopted by the boards of the Carson Water Subconservancy District, Douglas, Carson City, Lyon, Storey, and Churchill Counties in Nevada, and Alpine County, California, to provide a consistent approach to planning efforts, programs and projects, help protect community members from flooding hazards, and conserve floodplain lands. CWSD staff updated the plan in 2018 and are currently in the process of updating the plan again. Storey County adopted the CRFMP for the first time; therefore, all the counties in the Watershed have adopted this plan. Section 3.0 describes the 2018 Revision process and document updates. The plan is currently being updated.

Federal Emergency Management Agency Cooperating Technical Partner

In 2005, CWSD became a Cooperative Technical Partner (CTP) with Federal Emergency Management Agency (FEMA). Through this program, CWSD can apply for funding from FEMA to conduct floodplain mapping, flood studies, mitigation planning, public outreach, and other projects that reduce flood risk in the Carson River Watershed. Since 2005, CWSD has received thirteen CTP funding grants from FEMA. Each grant application includes activities to accomplish in a Mapping Activity Statement (MAS) or a Communication and Mitigation Strategies (COMS), The MAS or COMs are documents that identify various flood or hazard mitigation studies and risk communication and outreach (See specifics in Section 3.3 and 3.5 below).

Nevada Division of Emergency Management

In 2020, CWSD was listed as a jurisdiction in Storey County's Hazards Mitigation Plan and was approved by FEMA. Therefore, CWSD is eligible to receive hazard mitigation grants. Since then, CWSD received a $293,700 to create a 30 Year Regional Water Plan to mitigate effects of drought and climate variability from FEMA's Building Resilient Infrastructure Communities (BRIC) grant through Neveda Division of Emergency Management (NDEM). In 2024, CWSD received another BRIC grant of $128,727 grant to further design of drainage infrastructure in the North Dayton Valley portion of Storey County from (NDEM). CWSD will work with all watershed counties in the future to pursue similar projects with regional benefits.

FEMA Risk MAP Program

In 2011, CWSD and various federal, state, and county government bodies signed the first FEMA Region IX Risk MAP (Mapping, Assessment, and Planning) Charter agreement formalizing

collaborative efforts for flood management in the Carson River Watershed. In October 2016, Storey County became a signatory to the Charter. This collaboration enhances hazard mitigation plans, improves community resilience after flooding, protects beneficial functions of floodplains, and raises awareness about local flood risks. After being informed FEMA Region 9 would not be funding FY 2023, CWSD did not hold a Risk MAP Charter meeting in 2023. However, CWSD still kept in contact with county staff to identify projects for CWSD to pursue for the next FEMA funding round.

2.0 Carson River Coalition Stakeholder Process

Carson River Coalition

Meetings

The Carson River Coalition (CRC) is a bi-state, multi-county stakeholder group, hosted by the CWSD and funded by CWSD and the Nevada Division of Environmental Protection (NDEP). Planners, engineers, floodplain managers, and other staff members from all watershed counties participate in this group. In addition, employees from other local; state and federal entities; and non-governmental agencies such as conservation districts, State Floodplain Manager, State Division of Emergency Management, FEMA, US Bureau of Reclamation, National Weather Service and The Nature Conservancy participate in CRC working groups. CRC meetings are open to the public. Meeting information is available at https://www.cwsd.org/crc-meetings/ at the bottom of the webpage.

Carson River Watershed Literacy Campaign

With Environmental Protection Agency (EPA) 319 funding, CWSD has spearheaded a watershed literacy campaign. Over the past five years, this campaign has installed watershed boundary signs on Nevada highways; updated the online Carson River Watershed interactive map website; created a Spanish version of the watershed online interactive map. Throughout 2023-2024, CWSD promoted 12 videos for the "I Am Carson River Watershed" campaign (https://iamcarsonriver.org/). These videos focus on water quality, but they also lay a foundation to be able to discuss watersheds, floodplains, and the value of open space. They demonstrate areas of the watershed and provide an understanding of where they live in the world. They inspire residents to look up and view the natural world around them. Watershed moments are short videos like "Make your Yard a Sponge" that encourage residents to adopt actions that improve watershed health. CWSD provided campaign resources for counties to share on their websites. Residents are urged to take the watershed pledge at the campaign web page. First, residents select an action they will take to protect watershed health. Next, the resident is provided a short video to learn how to keep our watershed and our waters healthy. Table 2.0 lists the icons and pledge for each activity.

Table 2.0 I Am Carson River Watershed Videos and Pledge Actions			
Icon	**Pledge Action**	**Icon**	**Pledge Action**
	I will pick up my pet's waste in my backyard, neighborhood or on the trail and dispose of it properly.		I will keep oils, salts, grime, and chemicals out of our storm drains and rivers by using a car wash.
	I will capture stormwater on my property and let it soak into the ground instead of sending it down storm drains by creating raingardens, redirecting my down spouts to landscaping and reducing hard surfaces on my property.		I will reduce my chemical use by reading labels properly, using only what's needed, and finding alternative natural pest reduction methods.
	I will promote pollinator habitat by adding pollinator friendly native plants and ornamentals, creating solitary bee hotels, and curbing my pesticide use in my garden and beyond!		I will practice the 5 principles of healthy soil: 1) minimize ground disturbance 2) reducing bare soil 3) building diversity of plants, animals, and insects, 4) keeping living roots in the soil; and 5) Integrating animals: Worms, insects, and livestock where appropriate
	When recreating (camping, hiking, biking, fourwheeling, etc.), I will dispose of any waste (trash, human and pet waste, chemicals) by putting them in the proper receptacles (trash cans, recycling, or sewer dump facility).		I will take my used motor oil to my local auto parts store, garage, or recycling center to prevent contamination of water and soil!
	I will visit 3 new parks, trails or open space areas in the Watershed I've never been to before!		I will dispose of my trash properly because I know a more pristine environment looks nicer but also means a healthier watershed.
	I will practice the Play Clean Go principles: 1) REMOVE plants, animals and mud from my boots, gear, pets, and vehicles 2) CLEAN my gear before entering and leaving the recreation site 3) STAY on designated roads and trails 4) USE CERTIFIED or local firewood and hay; and 5) CLEAN, DRAIN, and DRY my boat to prevent spreading aquatic invasives		I will be a steward and engage in my watershed. I will find fun and meaningful ways to volunteer and foster a healthy Carson River Watershed.

3.0 Community Rating System Activities

The 2018 Carson River Watershed Regional FMP (CRFMP) divides implementation strategies into eight categories and provides suggested actions for each category. Table 3.1 correlates suggested actions in the 2018 Regional FMP to FEMA's Community Rating System categories (Table 3.2). This section outlines CRS work completed by CWSD between July 1, 2023 - June 30, 2024.

Table 3.1 Correlation of CRS Categories to Suggested Actions of 2018 Regional FMP

CRS Categories	2018 Regional Floodplain Management Plan Suggested Actions
310, 320, 350,	Protect Natural Floodplain Function and Values
410, 420, 450	
510, 520, 530	
430	Set Higher Regulatory Standards
410, 440	Collect Flood Data Information and Maintenance
410, 430, 440, 510	Balance Channel Migration and Bank Erosion Monitoring
330	Increase Floodplain and Flood Hazard Outreach and Education
510, 540	Reduce Infrastructure Impact
440, 530	Map/Study Alluvial Fans
320, 450	Minimize Stormwater Impacts

Table 3.2 CRS activities outlined in CRS Coordinator's Manual (2017)

CRS Category	ACTIVITY
300 Public Information Activities	310 Elevation Certificates 320 Map Information 330 Outreach Projects 340 Hazard Disclosure 350 Flood Protection Information 360 Flood Protection Assistance 370 Flood Insurance Promotion
400 Mapping and Regulatory Activities	410 Additional Flood Data 420 Open Space Preservation 430 Higher Regulatory Standards 440 Flood Data Maintenance 450 Stormwater Management
500 Flood Damage	510 Floodplain Management Planning 520 Acquisition and Relocation 530 Flood Protection

Reduction Activities	540 Drainage System Maintenance
600 Flood Preparedness Activities	610 Flood Warning Program 620 Levee Safety 630 Dam Safety

The following sections provide an overview of CWSD's work conducted for each CRS category during this reporting period. Please refer to CWSD's 2022 Engagement Plan, Appendix A at the end of this document.

300 - Public Information Activities

310 Elevation Certificate Activities: *This activity's objective maintains correct FEMA Elevation Certificates and other needed certifications for new and substantially improved buildings in Special Flood Hazard Area (SFHA).*

CWSD Progress during this period on Elevation Certificates Activities include:

- CWSD staff does not address Elevations Certificates in our public interactions, but we refer questions regarding elevation certificates to the appropriate city or county staff.

320 Map Information Activities: *This activity's objective provides information about local flood hazard and flood-prone areas that need special protection because of their natural functions.*

CWSD risk communication and outreach demonstrates the watershed model. During the demonstrations, staff uses plain language to underscore the importance of conserving open space areas to protect because of their natural floodplain functions. During the demonstration, shown in Figure 1, staff tries to touch on the following.

Safety and Hazard Reduction:

- *Recent Projects to Map flood hazards.*
- *Floodplains provide flood storage that reduces flood velocities and peak flows, and sediment buildup.*
- *Floodplains keep communities safe by not allowing structures in the floodplain.*
- *Recreational spaces in the floodplains can temporarily closed during floods.*
- *Safety preparedness and safety actions to take during floods.*

As time allows, other Natural and Beneficial functions of floodplains listed below, are mentioned:

- *Natural Flood and Erosion Control*
- *Groundwater Recharge*
- *Water Quality: Floodplains filter polluted runoff, process organic waste, and curb shifts in water temperatures.*
- *Biological Productivity*
- *Fish and Wildlife Habitat*

These are Natural and Beneficial Functions of Floodplain are explained in detail in Section 330

Figure 1: Watershed Model Demonstration at Mitch Park Pond in Douglas County

The presenter offers each person a watershed map at the end of their demonstration. The map refers people to CWSD's interactive watershed map. Other handout materials are shown in Figure 2, the paper materials offered include:

- Carson River Watershed Map
- I Am Ready Flood Preparedness Activity provided through USACE Silver Jackets partnership (English and Spanish)
- Nevada Floods. Are you prepared? (English and Spanish)
- Discover Floods (Project Wet)
- Floodplain Protection Inventory of the Carson River
- Various Ready.gov and Quick Series Guides

Figure 2: Printed Outreach Materials

CWSD Progress during this period on Flood Hazard Mapping Activities include:

<u>Douglas County</u>

- FEMA issued preliminary maps of the Carson Valley Physical Map November 2023. The 90-Day comment period began in April and closed in July without comment. The letter of final determination for this project is expected to be issued in 2025.

- Walker River Watershed Flood Risk Analysis project began in early 2023 and concluded in June 2024. This project assessed flood risk and determined projects to increase resilience in Douglas and Lyon County. This portion of South Douglas County has unincorporated communities in Double Springs, Holbrook Junction, Topaz Lake, and Topaz Ranch Estates and surrounding homes in the Walker River Watershed. The Climate and Social Justice Index lists these areas of the county as underserved.

- Fish Springs and Pinenut Creek Culvert Study determined culvert improvements and refined potential detention sites and designs for a detention basin to reduce flows from Buckeye Creek. An upstream feasibility project delayed this project start until summer of 2023. Work will continue through August 2024. Jeff Weagel, of J-U-B Engineering, will present the results of this project to CWSD's Board of Directors the Douglas County Commissioners in the late summer of 2024.

Carson City

- Southeast Carson City ADMP commenced in April 2022, and a public project kickoff occurred June 2022. This project was completed in December 2023. Mapped alluvial fans and drainage areas in East Carson City help city staff to understand flood hazards and present mitigation alternatives. This project also identified potential mitigation projects to better plan for flooding, infrastructure improvements, and maintenance. The contractor asked residents to share flood experiences and pictures they had experienced. Targeted outreach was successful in the various neighborhoods that staff visited. Geoff Brownell presented the study and mitigation recommendations to CWSD and city board in early 2024.

Storey County

- Virginia City Area Drainage Master Plan commenced in April 2022. In June 2022, a public outreach kickoff informed residents about the project goals and how the county would use the information from the study. Mapped alluvial fans and drainage areas in Virginia City and Six Mile Canyon of Storey County help city staff to understand flood hazards and present mitigation alternatives. This project also identified potential mitigation projects to better plan for flooding, infrastructure improvements, and maintenance. The contractor asked residents to share flood experiences and pictures they had experienced. County staff scheduled a public meeting in October 2023 so residents can hear about the results of the drainage study and potential solutions. Michelle Gamble, Lumos & Associates, will present the study and mitigation recommendations to CWSD and city board in November 2023.

Carson River Watershed

- CWSD continues, through 2024, to support a web interface that allows access to flood information that is not in the regulatory floodplain. This interface is available to county staff and residents and can be accessed at https://gis.mbakerintl.com/carsonwatersubconservancydistrict/. A training is planned in late 2024 for county staff to better utilize the tool.

330 Outreach Project Activities: *The objective of this activity is to provide the public with information needed to increase flood hazard awareness and to motivate actions to reduce flood damage, encourage flood insurance coverage, and protect the natural functions of floodplains.*

CWSD risk communication and outreach demonstrates the watershed model. During the demonstrations, staff use plain language to underscore the importance of conserving open space areas to protect because of their natural floodplain functions. During the demonstration, shown in Figure 1, staff tries to touch on the following.

Safety and Hazard Reduction:

- *Recent Projects to Map flood hazards.*
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- *Safety preparedness and safety actions to take during floods.*

The presenter offers each person a watershed map at the end of their demonstration. The map refers people to CWSD's interactive watershed map. During the demonstration, staff tries to touch on the following.

Natural Flood and Erosion Control:

- *Floodplains provide flood storage and room to move that reduces flood velocities, peak flows, and sediment buildup.*

Water Quality:

- *Floodplains filter polluted runoff, process organic waste, and curb shifts in water temperatures.*
- *Groundwater recharge:*
- *Floodplains allow water to slow down and sink into the ground. As water soaks into the ground, it collects in underground spaces called aquifers, so instead of water flowing out to the desert and evaporating, water aquifers keep water in our community. Floodplain plants and soil store incredible amounts of water. So as surface flows decrease, water continues to seep out and keep more water in our river and streams.*

Biological Productivity:

- *Floodplains enrich the soil, so they are ideal for farmers and ranchers to grow plants and animals. Floodplains keep our watershed healthy because they promote biodiversity and stabilize ecosystem frameworks.*
- *Fish and Wildlife Habitat: Floodplains maintain a rich array of plants, bugs, birds, fish, and animals to keep their habitat vital and healthy. Animals love to feed and breed here; the Carson River our watershed is an important bird area and flyway, so whether ducks and geese and other birds live here year-round or migrate through in summer and fall, they can find good places to nest and raise their families. Our watershed is also a place for rare and endangered species such as the Lahontan Cutthroat trout, Sage Grouse, Yosemite Toad, Western Yellow Billed Cuckoo, and the Western Pond turtle. (We refer to the 2017 Carson River Adaptive Stewardship Plan section 3.5, for talking points https://www.cwsd.org/wp-content/uploads/2017/12/Final-CRWASP-2017-Update-Plan-Part-1.pdf)*

Figure 3: Interactive Map screenshot available at cwsd.org.

CWSD Progress during this period on Flood Hazard Mapping Activities include:

Douglas County

- FEMA issued preliminary maps of the Carson Valley Physical Map November 2023. The 90-Day comment period began in April and closed in July without comment. The letter of final determination for this project is expected to be issued in 2025.

- Walker River Watershed Flood Risk Analysis project began in early 2023 and concluded in June 2024. This project assessed flood risk and listed projects to increase resilience in Douglas and Lyon County. This portion of South Douglas County has unincorporated communities in Double Springs, Holbrook Junction, Topaz Lake, and Topaz Ranch Estates and surrounding homes in the Walker River Watershed. The Climate and Social Justice Index lists these areas of the county as underserved.

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Storey County

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Carson River Watershed

- CWSD continues, through 2024, to support a web interface that allows access to flood information that is not in the regulatory floodplain. This interface is available to county staff and residents and can be accessed athttps://gis.mbakerintl.com/carsonwatersubconservancydistrict/. A training is planned in late 2024 for county staff to better utilize the tool.

- Carson City installed a high-water mark at the Morgan Mill Aquatic Trailhead in East Carson City. Not only is this high-water mark at the aquatic trail, but it is also on the Carson River Recreational trail for bicyclists and hikers. Carson City finished the project late summer 2024, and outreach is planned for flood awareness week, November 10-16,2024. This outreach tool underscores how floodplains and open space work together to reduce flood danger to people and their property. It is also a stark reminder of how high the water can get at this location. The mural includes two interpretive signs. One describes how open space and floodplains work together. It also includes a QR code so residents can find out about their flood risk. The other interpretive sign explains the mining history of the area; these two interpretive panels were paid by Waste Management and the city staff installed them. In collaboration with this high-water mark, the Nevada Silver Jackets team will install two more interpretive panels between Morgan Mill trailhead and Carson River Park.

Table 3.3 Map Information Project Outreach July 1st, 2023 – June 30th, 2024.

Project Meetings & Outreach				
DATE (S)	**PROJECT**	**Location**	**EVENT OUTREACH DESCRIPTION**	**~ Residents /Adults # Reached**
7/18/2023	Pinenut Detention	Douglas County Community Center	Project presentation in public meeting	24
7/19/2023	Pinenut Detention Study	Alpine County Commission Chambers	Project presentation to CWSD Board	19
7/20/2023	Pinenut Detention	Douglas County Commission Chambers	Project presentation to county Board	23
8/16/2023	VC ADMP	Storey County Courthouse Slammer and & County Museum	Project presentation to CWSD Board	14
8/29/2023	Southeast CC ADMP	4 locations in S. Carson City	Met with residents at 4 locations in study area	37
10/12/2023	VC ADMP	Piper's Opera, Virginia City, NV	This meeting will provide project results and mitigation alternatives to residents	13
3/20/2024	Southeast CC ADMP	CWSD Conference Room, Carson City	Project presentation to CWSD Board	15
4/1/2024	Southeast CC ADMP	Carson City Community Center	Project presentation to county Board	35
			Project Outreach Total:	180

- CWSD utilized FEMA funding to assist counties in the Flood Awareness Week Outreach Program (FAW) held in November 2023. CWSD maintains a webpage with flood preparedness information for watershed residents. The FAW planning committee is led by Nevada's Floodplain Management office and met regularly to prepare for November FAW. FAW activities included state and county proclamations and newspaper advertisements.

Table 3.4 : Public Outreach in Carson River Watershed

Public Outreach in the Carson River Watershed		
DATE (S)	**EVENT/OUTREACH EFFORT**	**~ Residents/Adults # Reached**
6/1/2023	Douglas LID Outreach	25
6/17/2023	Sheep Foundations	310
7/20/2023	Washoe Tribal Outreach	10
10/7/2023	CC PW outreach and Source Water	10
8/2/2023	National Night Out	50
8/8/2023	Sheriff's Night out	45
10/26/2023	Boonanza	300
11/14/2023	Douglas County FAW and preliminary release of physical map revision	28
11/15/2023	River Fork Ranch HWM unveiling	10
4/20/2024	Fallon Paiute Shoshone Earth Day (members from Washoe Community attend this event)	75
5/4/2024	FAW- Washoe Tribal Earth Day	33
6/22/2024	Nevada Outdoor Experience	113
Total		706

- CWSD staff highlights NevadaFloods.org website and the FEMA map service center at its outreach events. The NevadaFloods.org website has copies of the county and state proclamations.

- CWSD's flood awareness school program thrived in 2023-2024 school year. FAW school outreach elements include:
    - The Floodplain model demonstrates and defines watersheds and floodplains to educators and students. The presenter also discusses how floodplains work, flooding, risk, and the importance of floodplain protection.
    - "I Am Ready" flood preparedness activity books are provided by US Army Corps of Engineers. Classroom flood preparedness education uses the "I Am Ready" books for two purposes – teachers provide a count of booklets needed, so it is easy to track participant numbers. The flood awareness educator provides coloring books the week prior to flood awareness event.

Students demonstrate how they acted on their knowledge when they return with their emergency information page filled in. As a reward, they receive program swag with nevadafloods.org logo – such as yoyo's, Great Basin wildflower seeds, or a flood awareness bag.

- The flood awareness educator developed a relay race game to underscore the importance of disaster preparedness. Teams of 4-6 students race across field / gym and select items for a family of four with a dog to grab as they "evacuate" After the race, students brainstorm about items they may have forgotten.
- Table 3.5 lists FAW school outreach in each CRS community and Table 3.6 lists FAW outreach throughout the Watershed.

Table 3.5: Summary of school outreach event attendance in CRS communities.

Risk Communication and Outreach in CRS Communities		
County	**~ Educators/ Adults # Reached**	**~ Students Reached**
Douglas County	77	630
Carson City	124	1156
Storey County	2	25

Demonstrating this model is helpful to educate children and their families about learning to respect water when it is flooding.

In March, staff cancelled three events because of the weather these are outlined in Table 3.6a.

Figure 5: Watershed Model demonstration at River Fork Ranch in Douglas County.

Table 3.6: Summary of School Outreach Events

School Outreach Events					
DATE (S)	**Location**	**EVENT OUTREACH DESCRIPTION**	**School**	**~ Educators/ Adults # Reached**	**~ Students Reached**
7/20/2023	Dresslerville Tribal Allotment	Carson Watashemu Day	Washoe Tribal TANF	5	10
6/8/2023	River Fork Ranch	Flood Awareness and Safety preparedness at Conserve Carson River Workday (CCRWD)	Scarselli ES-Douglas	11	71
10/13/2023	River Fork Ranch	Snapshot Day	Douglas County	9	75
10/16/2023	Fuji Park	Flood Awareness Conserve Carson River Workday (CCRWD)	Empire, Carson City	11	99
10/24/2023	Carson City	Ag In the Classroom	Seeliger Elementary School	12	270
12/6/2023	Carson Valley Middle School	Flood Awareness and Safety preparedness	Carson Valley Middle School	4	60
3/28/2024	Dayton	Flood Awareness and Safety preparedness	Hugh Gallagher ES	2	25
4/30/2024	Carson City	Flood Awareness and Safety preparedness	St. Teresa School	2	25
5/3/2024	On-Site	Ag In the Classroom	Pioneer HS	12	72
5/20/2024	On-site	Field Day	Eagle Valley Middle School	20	255
5/21/2024	On-Site	Field Day	Eagle Valley Middle School	11	120
5/22/2024	On-Site	Field Day	Eagle Valley Middle School	18	240
5/29/2024	River Fork Ranch	Field Day	Pinon Hills ES	4	36
5/30/2024	On-Site	Ag In the Classroom	Scarcelli ES	15	250
6/1/2024	River fork Ranch	CCRWD	Scarselli ES-Douglas	8	60
6/4/2024	River Fork Ranch	CCRWD	Minden ES	26	78
6/22/2024	Carson City Shooting Range	Nevada Outdoor Experience	Flood Awareness and Safety Preparedness	38	75
			School Outreach Total:	**206**	**1796**

Table 3.6a Cancelled School Outreach Events

Cancelled School Outreach - River Wranglers and CWSD Staff				
DATE (S)	**School**	**EVENT OUTREACH DESCRIPTION**	**~ Educators/ Adults # Reached**	**~ Students Reached**
1-Mar	Pinon Hills ES	Flood Awareness and Safety preparedness	**0**	**0**

340 Hazard Disclosure Activities: *This activity's objective discloses a property's potential flood hazard to prospective buyers before the lender notifies them of the need for flood insurance.*

CWSD staff coordinates with city/county staff at public meetings to provide hazard maps of its flood projects to residents in the Carson River Watershed. At these public meetings, community residents can ask questions, discuss their property with project engineers, resource professionals, and city/county staff to better understand their specific flood hazards. Messaging directs watershed residents to Nevadafloods.org. Residents can search this website to discover their flood risk and find out if they need flood insurance on any given parcel. Staff also underscores the affordability of flood insurance for buildings not in SFHAs

350 Flood Protection Information Activities: *This activity's objective provides the public with information about flood protection that is more detailed than that provided through outreach projects.*

CWSD Progress during this period on Flood Protection Information Activities include:

- Public and Project outreach has returned to pre-pandemic levels. Refer to Tables 3.3-3.6.
- CWSD's website provides link to the Floodplain Management Plan and its updates, on www.cwsd.org. One of the core tenets of this plan is floodplain conservation.
- CWSD updates County/City floodplain and emergency manager information and is available on the Flood Awareness section on www.cwsd.org.
- Floodplain protection and flooding articles were included in CWSD's newsletter, "Watershed Connections" that is distributed to over 1000 individuals throughout the six counties located in the Carson River watershed.
- CWSD's website and floodplain management plan lists areas targeted to protect because of their natural floodplain functions. UNR Cooperative Extension staff created the 2015 Floodplain Protection Inventory on the Carson River. CWSD's website discusses the need to conserve floodplain lands and refers visitors to the report.
- The website also includes an interactive watershed map, in English and Spanish. It provides site visitors with information about the watershed, and the plants and animals who live in it. Refer to the messages below.

CWSD risk communication and outreach demonstrates the watershed model. During the demonstrations, staff uses plain language to underscore the importance of conserving open space areas to protect because of their natural floodplain functions.

The presenter offers each person a watershed map at the end of their demonstration. The map refers people to CWSD's interactive watershed map. During the demonstration, staff tries to touch on the following:

Safety and Hazard Reduction:

- *Recent Projects to Map flood hazards.*
- *Floodplains provide flood storage that reduces flood velocities and peak flows, and sediment buildup.*
- *Floodplains keep communities safe by not allowing structures in the floodplain.*
- *Recreational spaces in the floodplains can temporarily closed during floods.*
- *Safety preparedness and safety actions to take during floods.*

As time allows, other Natural and Beneficial functions of floodplains listed below, are mentioned:

- *Natural Flood and Erosion Control*
- *Groundwater Recharge*
- *Water Quality: Floodplains filter polluted runoff, process organic waste, and curb shifts in water temperatures.*
- *Biological Productivity*
- *Fish and Wildlife Habitat*

360 Flood Protection Assistance: *This activity's objective provides one-on-one help to people who are interested in protecting their property from flooding.*

CWSD Progress during this period on Flood Protection Assistance Activities include:

- CWSD staff collaborates with people who inquire about how they can protect their property from flooding in flood outreach efforts.
- CWSD staff also refers property owners with specific questions to appropriate city or county staff member.

370 Flood Insurance Promotion: *This activity's objective improves flood insurance coverage in the community.*

CWSD Progress during this period on Flood Insurance Promotion Activities include:

- CWSD staff coordinates with staff from counties, state and FEMA at various outreach events listed in sections 320, 330 and 340 to include flood insurance promotion. Flood awareness week events include FEMA flood insurance specialists so residents can ask specific questions. Common messaging themes include:
    - Consider purchasing flood insurance even if the property is outside of a special flood hazard area.
    - Check out Nevadafloods.org to know your flood risk.
    - Money spent on flood insurance (aka mitigation) reduces disaster costs.

400 Mapping and Regulatory Activities

410 Flood Hazard Mapping Activities: *This activity's objective improves the quality of the mapping that is used to identify and regulate development as risk from flood hazards.*

CWSD Progress during this period on Flood Hazard Mapping Activities include:

Douglas County

- FEMA issued issue preliminary maps of the Carson Valley Physical Map November 2023. The 90-Day comment period began in April and closed in July without comment. The letter of final determination for this project is expected to be issued in 2025.

- Walker River Watershed Flood Risk Analysis project began in early 2023 and concluded in June 2024. This project assessed flood risk and listed projects to increase resilience in Douglas and Lyon County. This portion of South Douglas County has unincorporated communities in Double Springs, Holbrook Junction, Topaz Lake, and Topaz Ranch Estates and surrounding homes in the Walker River Watershed. The Climate and Social Justice Index lists these areas of the county as underserved.

- Fish Springs and Pinenut Creek Culvert Study determined culvert improvements and refined potential detention sites and designs for a detention basin to reduce flows from Buckeye Creek. An upstream feasibility project delayed this project start until summer of 2023. Work will continue through August 2024. Jeff Weagel, of J-U-B Engineering, will present the results of this project to CWSD's Board of Directors the Douglas County Commissioners in the summer of 2024.

Carson City

- Southeast Carson City ADMP commenced in April 2022, and a public project kickoff occurred June 2022. This project was completed December 2023. Mapped alluvial fans and drainage areas in East Carson City help city staff to understand flood hazards and present mitigation alternatives. This project also identified potential mitigation projects to better plan for flooding, infrastructure improvements, and maintenance. The contractor asked residents to share flood experiences and pictures they had experienced. Targeted outreach was successful in the various neighborhoods that staff visited. Geoff Brownell will present the study and mitigation recommendations to CWSD and city board in early 2024.

Storey County

- Virginia City Area Drainage Master Plan commenced in April 2022. In June 2022, a public outreach kickoff informed residents about the project goals and how the county would use the information from the study. Mapped alluvial fans and drainage areas in Virginia City and Six Mile Canyon of Storey County help city staff to understand flood hazards and present mitigation alternatives. This project also identified potential mitigation

projects to better plan for flooding, infrastructure improvements, and maintenance. The contractor asked residents to share flood experiences and pictures they had experienced. County staff have scheduled a public meeting in October 2023 so residents can hear about the results of the drainage study and potential solutions. Michelle Gamble, Lumos & Associates, will present the study and mitigation recommendations to CWSD and city board in November 2023.

Carson River Watershed

CWSD continues, through 2024, to support a web interface that allows access to flood information that is not in the regulatory floodplain. This interface is available to county staff and residents and can be accessed at https://gis.mbakerintl.com/carsonwatersubconservancydistrict/. A training is planned in late 2024 for county staff to better utilize the tool.

420 Open Space Preservation: *This activity's objective will:*

1) *Prevent flood damage by keeping flood-prone lands free of development, and*
2) *Protect and enhance the natural functions of floodplains.*

CWSD Progress during this period for Open Space Preservation efforts include:

- Through the Carson River Coalition (CRC) Floodplain Management Group, CWSD works with counties to promote preserving open spaces in the Carson River Watershed. The *Living River Approach,* in CWSD's Regional FMP, recognizes the importance of balancing the natural floodplain form and function of the river by conserving open floodplain lands. All outreach messaging includes a discussion about the open space floodplains in the Carson River Watershed and the value they provide for flood protection, water quality enhancement, and groundwater recharge. The CRC encourages audiences to advocate for open space preservation and funding. This will be included in Carson City's Carson River Master Plan.

- Carson City installed a high-water mark at the Morgan Mill Aquatic Trailhead in East Carson City. Not only is this high-water mark at the aquatic trail, but it is also on the Carson River Recreational trail for bicyclists and hikers. Carson City finished the project late summer 2024, and outreach is planned for flood awareness week, November 10-16,2024. This outreach tool underscores how floodplains and open space work together to reduce flood danger to people and their property. It is also a stark reminder of how high the water can get at this location. The mural includes two interpretive signs. One describes how open space and floodplains work together. It also includes a QR code so residents can find out about their flood risk. The other interpretive sign explains the mining history of the area; these two interpretive panels were paid by Waste Management and the city installed them at their own cost. In collaboration with this high-water mark, the Nevada Silver Jackets team will install 2 more interpretive panels between Morgan Mill trailhead and Carson River Park.

Figure 4: Morgan Mill High Water Mark Installation.

430 Higher Regulatory Standards: *This activity's objective credits community for regulations to protect existing and future development and natural floodplain functions that exceed the minimum criteria of the National Flood Insurance Program (NFIP).*

CWSD Progress during this period on Higher Regulatory Standards Activities include:

- CWSD is working collaboratively with City or County planners and floodplain managers to update local flood regulations.
- Staff presented draft ordinances for adoption in Douglas County. The Douglas County Board of Commissioners adopted the updated floodplain ordinance on September 7, 2023.
- Douglas County adopted a Stormwater Master Plan. CWSD staff spoke in support of this plan when it was presented to the county commissioners when it was presented for adoption. The purpose of the plan is described in its executive summary, "This County-wide Stormwater Master Plan was developed to assist the County in meeting goals and policies to maintain safe and effective infrastructure to protect life and property, meet regulatory water quality mandates, and identify projects and programs necessary to improve, operate, and maintain facilities within Douglas County."
- City staff presented Carson City's floodplain ordinances to the board for adoption in October 2023.

- Storey County used the same language template and chose to fund an update of their floodplain ordinances in conjunction with the Project.

440 Flood Data Maintenance: *This activity's objective makes community floodplain data more accessible, current, useful, and/or accurate so that the information contributes to the improvement of local regulations, insurance rating, planning, disclosure, and property appraisals.*

CWSD Progress during this period on Flood Data Maintenance Activities include:

- CWSD has a website page which directs watershed residents to community floodplain data with links to NevadaFloods.org and the FEMA Map Service Center.

- CWSD continues, through 2024, to support a web interface that allows access to flood information that is not in the regulatory floodplain. This interface is available to county staff and residents and can be accessed at https://gis.mbakerintl.com/carsonwatersubconservancydistrict/.

450 Stormwater Management: *This activity's objective prevents future development from increasing flood hazards to existing development, to protect existing hydrologic functions within the watershed, and to maintain and improve water quality.*

CWSD Progress during this period on Stormwater Management Activities include:

- CWSD promotes Low Impact Development (LID) Use in the Carson River Watershed. In 2018, CWSD received Clean Water 208 funding to update LID ordinances throughout the watershed. This project examined existing LID language and provided draft LID ordinance language to Douglas, Lyon, and Carson City. Douglas County's stormwater master plan utilized the 2018 LID language in this report and was adopted by the County.

Contractors conducted multiple area drainage studies (refer to section 410) in the Carson River Watershed. These studies assist city/county staff and board members by informing decisions by identifying areas likely to flood, considering infrastructure, mapping flooding, and providing alternative solutions to reduce alluvial and stormwater flooding.

- CWSD continues, through 2024, to support a web interface that allows access to flood information that is not in the regulatory floodplain. This interface is available to county staff and residents and can be accessed at https://gis.mbakerintl.com/carsonwatersubconservancydistrict/.

500 Flood Damage Reduction Activities

510 Floodplain Management Planning: *This activity's objective credits community for the overall strategy of programs, projects, and measures that will reduce the adverse impact of the hazard on the community and help meet other community needs.*

CWSD Progress during this period on Floodplain Management Planning activities include:

Floodplain Management Working Group

CWSD's Watershed Program Manager facilitates the Carson River Coalition Floodplain Management Working Group. This group meets quarterly on the fourth Wednesday of January, April, July, and October from 1:30 pm to 3:30 pm. Table 3.7 lists meeting dates and additional stakeholder outreach.

County and regional floodplain & stormwater projects typically attend these meetings. The group also discusses implementation of river rehabilitation and flood projects funded by other state and federal entities. Agendas and Meeting notes are available on CWSD's website.

Table 3.7 Carson River Coalition Floodplain Management Meetings

Stakeholder Outreach			
DATE (S)	**Project**	**EVENT/OUTREACH EFFORT**	**Approximate # Reached**
7/26/2023	Stakeholder Outreach	Carson River Coalition Floodplain Management Working Group	24
8/30/2023	Stakeholder Outreach	Flood Plain Management Plan Update Kickoff Meeting	32
10/4/2023	Stakeholder Outreach	CRFMP Stakeholder Interviews (CC)	4
10/25/2023	Stakeholder Outreach	Carson River Coalition Floodplain Management Working Group	21
11/3/2023	Stakeholder Outreach	CRFMP Stakeholder Interviews (DC)	5
12/13/2024	Stakeholder Outreach	CRFMP Stakeholder Interviews (SC)	3
1/24/2024	Stakeholder Outreach	Carson River Coalition Floodplain Management Working Group	41
4/24/2024	Stakeholder Outreach	Carson River Coalition Floodplain Management Working Group	35
		Stakeholder Outreach Total	**165**

Risk MAP Discovery

In 2011, CWSD staff conducted the Risk MAP Discovery process to better understand the local flood risk and mitigation efforts to spur watershed-wide discussions about increasing the area's resilience after flooding. The FEMA RiskMAP Discovery Report was updated in 2018 and is part of the 2018 Regional FMP . An update of the Regional FMP began in 2023 and has continued through 2024.

Please contact CWSD staff with any questions or comments regarding the above report:

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Debbie Neddenriep 775.887.1260; debbie@cwsd.org

CWSD 2022 Engagement Plan, Appendix A:

Table 1. Outreach Objectives & Messages

Audience	Objectives	Primary Messages	Supporting Messages
Community Officials & Business Community	Community engagement will raise awareness of: ▪ local flood risk; ▪ value of floodplains; ▪ importance of flood preparedness as part of community emergency management.	▪ Communities save $7[1] on flood damage for every $1 spent on mitigation. ▪ See video Carson River Floodplains are Worth Conserving: What officials need to know - https://www.youtube.com/watch?v=ZGco3s6K_AY ▪ See video Carson River Floodplains are Worth Conserving: A Case for Developers - https://www.youtube.com/watch?v=aR9aaecjmbA ▪Nevada Floods, Be Prepared.	▪ Disaster cost less when communities invest in flood preparedness. ▪ Open floodplains lands provide many benefits: they reduce danger from flood water, filter, and recharge groundwater, and provide habitat for plants and animals. ▪ Know your flood risk by visiting NevadaFloods.org.
Homeowners, and Renters	Community engagement will raise awareness of: ▪ local flood risk; ▪ value of floodplains; ▪ how to protect home, property, and person before, during, and after a flood; and ▪ the importance of a personal emergency plan.	▪ Nevada Floods, Be Prepared ▪ See Video: Carson River Floodplains Are Worth Conserving: Agriculture is a good fit https://www.youtube.com/watch?v=2TTYIS3oxC0&t=112s ▪ Flood Insurance reduces flood losses: $7* is lost for each flood disaster for every $1 spent to plan & prepare for floods.	▪ Disaster cost less when communities invest in flood preparedness. ▪ Open floodplains lands provide many benefits: they reduce danger from flood water, filter, and recharge groundwater, and provide habitat for plants and animals. ▪ Know your flood risk by visiting NevadaFloods.org.
Educators and School Children	Community engagement will raise awareness of: ▪ local flood risk; ▪ value of floodplains; ▪ how to protect home, property, and person before, during, and after a flood; and ▪ the importance of a personal emergency plan.	▪ Understand what rivers and alluvial fans are in the Carson River Watershed and characteristics of their floods at various times of year. ▪ Understand what a "watershed" and "floodplains" are. ▪ There are even ways for students to prepare for floods. ▪ Share what you learned about flooding when you go home.	▪ You live in a Watershed with many floodplains. ▪ Low-lying lands next to rivers are prone to flooding. Floodplains give water space to spread out and slow down runoff from storms and snowmelt. ▪ Distribute an activity book that lists items to include in an emergency kit, a fill-in portion 'in case of emergencies,' and a section for adults to discuss preparedness with kids.

[1] Mitigation Saves. National Institute of Business Sciences. https://www.nibs.org/files/pdfs/ms_v4_overview.pdf. Accessed 12/16/2022.

Table 2: Suggested Actions #30-34 of [2018 Carson River Watershed Regional Floodplain Management Plan]

SA #		CRS	SUGGESTED ACTION	Responsible Party	Existing or Potential Funding Partner
FLOODPLAIN AND FLOOD HAZARD OUTREACH AND EDUCATION (30-34)					
FLOODPLAIN AND FLOOD HAZARD OUTREACH AND EDUCATION (30-34)	30	330	Continued implementation of watershed-wide outreach and education program about floodplain importance and flooding hazards.	FAW Working group which includes CWSD, Federal, State and Local Jurisdictions	FEMA; NDWR, and Federal, state and local partners
	31	330	Promote and participate in Annual Flood Awareness Week (FAW) and events throughout the year with the objective of providing information about protection of floodplains, flooding and flood hazards to the general public.	FAW Working group which includes CWSD, Federal, State and Local Jurisdictions	All Federal, state and local funding sources
	32	330	Develop and update media in conjunction with FAW working group (social media, videos, brochures, web content, press releases etc.) for distribution throughout watershed with consistent messages and information for the general public.	FAW Working group which includes CWSD, Federal, State and Local Jurisdictions	CWSD, NDWR, USACE
	33	330	Promote FAW partner websites (e.g., NevadaFloods.org, National Weather Service, CWSD, and county websites) which provide information on the Regional Floodplain Management Plan, floodplain protection, flood risk, emergency preparedness, and emergency contact information. Link to one another's websites and social media sites to amplify message.	In conjunction with Flood Awareness Campaign led by NDWR, CWSD, NOAA -NWS Reno specifically address flood risk and local jurisdictions have websites as well which also link to these websites.	CWSD, NDWR, NOAA -NWS Reno
	34	330	Utilize special Events, River Work Days, and other outreach opportunities in conjunction with FAW working group to raise awareness of flooding hazards and importance of floodplains.	FAW Working group which includes CWSD, Federal, State and Local Jurisdictions	All Federal, state and local funding sources

FLOOD INSURANCE RATE MAPS (FIRM) LINK

Flood Insurance Rate Maps (FIRMs) are constantly updated as Physical Map Revisions (PMRs), Letters of Map Revisions (LOMRs) and Conditional Letters of Map Revisions (CLOMRs). To access the most recent published version of FIRMs can be seen at FEMA's Flood Map Service Center at the website below. If that does not work, an online search FEMA Flood Map Service Center.

FEMA Flood Map Service Center:

https://msc.fema.gov/portal/home

APPENDIX E: 2023 COUNTY PROGRESS REPORTS

2023 COUNTY PROGRESS REPORTS

The following reports are a summary of each county's progress towards the suggested actions outlined in the Floodplain Management Plan from 2018 to 2023.

SA #		CRS	SUGGESTED ACTION	Alpine County 2023 Update
PROTECT FLOODPLAIN NATURAL FUNCTION AND VALUE (1-8) - Refer also to Stewardship Plan Table 8.8				
	1	320 420 510	Maintain Living River approach to retain river system in a more natural state that allows the river to access its floodplain. Recognize that not all areas of the river system can be allowed to migrate freely due to special designation (i.e., Superfund area) and/or existing infrastructure.	Alpine County will be presented with opportunity to adopt the 2018 Regional Floodplain Management Plan, as it has the 2008 and 2013 Plans, which states the Living River approach as one of its main goals. The county also participates in the Carson River Coalition (CRC) stakeholder process. Through Carson River Coalition (CRC) process, county worked with CWSD on the revison of the Regional Floodplain Managment plan.
	2	350 410	Develop, support and implement a good neighbor floodplain management policy that recognizes cumulative impacts and actions by one property owner can impact upstream, adjacent and downstream property owners.	Flood insurance rate map effective November 2023. Uses one hydraulic model from Alpine County, California to Weeks Bridge, Lyon County, Nevada.

SA #		CRS	SUGGESTED ACTION	Alpine County 2023 Update
PROTECT FLOODPLAIN NATURAL FUNCTION AND VALUE (1-8)	3	420	Investigate, identify, and implement areas where stream zone buffers would provide multi-objective benefits for river system and downstream communities. (Previously SA # 4)	96% public land so Alpine County work on suggested actions is bounded by USFS, BLM, and other public lands. A geomorphology study of west fork Carson River will begin 2024. County has applied for East Fork Geomorphology Study. Alpine County shares their work at CRC meetings. Alpine Watershed Group works in coordination with the county. Between 2013 and 2018, AWG completed East Fork Carson River stabilization project and worked with American Rivers in Hope Valley to stabilize West Fork Carson River. Some SEZ that have more significant buffers than zoning requires, in the absence of regulatory requirements. Bear Valley (outside the Carson River Watershed) has open space areas and drainage easements where they have true buffer . This has all been part of overall master plan for last 40 years. However, CEQA is a challenge to meet for a small county with limited resources. A programmatic CEQA for various elements of work within the county would be a great option to pursue with the California DWR's Integrated Watershed Management prorgram. Between 2018 and 2023, AWG completed construction in Hope Valley to stabilize two sections of the West Fork Carson River and reconnect a portion to the floodplain, provided immediate action after the Tamarck Fire to stabilize hillsides along Musser and Jarvis drainage that feeds into the East Fork Carson River, and assisted American Rivers with outreach and monitoring of implementation of a series of beaver dam analogs and road repairs in Faith Valley to reconnect the West Fork Carson River with its floodplain and better diverte runoff from the adjacent road.

SA #		CRS	SUGGESTED ACTION	Alpine County 2023 Update
	4	310 410 530	Manage development in special flood hazard areas and other flood hazard areas (those known flood hazard areas not included on most current FIRMs) to provide public safety and protect the natural functions and benefits of floodplain lands. (Previously SA # 6)	Alpine Watershed Group (2018-2023). Replace old verbiage with following: Markleeville Creek Floodplain Restoration Project will go to construction in 2024 or 2025 following completion of the Markleeville Public Utility District Sewer Pump Station Relocation and Improvements Project. The restoration project will re-establish the natural form and function of Markleeville Creek at the site of the former USFS Markleeville Guard Station by removing the old bridge abutments, floodwalls, and artificial fill material, and re-vegetating all distrubed areas.
DPLAIN NATURAL FUNCTION AND VALUE (1-8)	5	320 450	Promote and utilize best management practices as a means of protecting riparian habitat. (Previously SA #10)	Vision plan for the West Fork Carson River was funded by Lahontan Regional Water Quality Control Board. Alpine County now has an approved Clean Water Act 319 Plan for WFCR. Landowners along the lower West Fork Carson River have continued to seek out resources to fund projects that implement best management practices. The Amador RCD and NRCS have providing technical assistance and funding opportunities. The CRC has also recently helped in the conversation on BMPs on ranch land. The Vision Plan covers some of the issues that are tied to ranching in ripariran habitats and acknowledges the success of projects like Rivers and Ranches at Ace Hereford Ranch.
	ECOSYSTEM SERVICES IMPORTANT to MAINTAINING LIVING RIVER APPROACH			
	6	350 420	Consider Floodplain and flood hazards ecosystem service objectives which preserve open floodplain lands when selecting acquisition targets and establishing management strategies for open spaces. (Previously SA #3)	> 95% of Alpine County land is public land and open space; however Alpine County doesn't have a formal open space program. Alpine County has secured funding for the Markleeville Creek Floodplain Restoration Project. The County would benefit from a Land and Parks Plan that describes Turtle Rock and Airport and the way they're managed. Open spaces are actively managed considering ecosystem services.

SA #		CRS	SUGGESTED ACTION	Alpine County 2023 Update
PROTECT FLOO	7	520	Identify and promote options for landowner incentive programs, such as floodplain leasing program and conservation easements that provide compensation to landowners providing ecosystem services and seek funding mechanisms. (Previously # SA 9)	Williamson Act for preservation of agricultural lands; the county has some proposals in there now, but it is not particularly valuable for floodplain preservation, but does provide benefit. On the West Fork - if it was to be argued for a Williamson Act action by the county then floodplain preservation might be legitimate reason. Ace Hereford
	8	420 520	Retain lands that preserve floodplain storage which maintain and/or restore connection of river with floodplain through land acquisition, conservation easements, local open space programs, TDR and PDR Programs, and other protection methods. Pursue protection of additional acreage in flood prone areas. (Previously # SA 7)	Alpine County General Plan encourages protection of floodplains and riparian areas. Conservation subdivision density bonus available for projects that protect these type of lands as permanent open space. Alpine County purchased the site of the former USFS Markleeville Guard Station located in the floodplain of Markleeville Creek; the floodplain restoration project will be constructed in 2024 or 2025. In addition, there are ongoing projects in Hope Valley to address incised banks so the West Fork Carson River can access its floodplain.
HIGHER REGULATORY STANDARDS (9-11)				
HIGHER REGULATORY STANDARDS (9-11)	9	430	Periodically review county ordinances that include floodplain protection as a purpose, account for the loss of floodplain storage volume, and mitigate losses through a variety of methods. (Previously SA # 11)	Flood plain ordinances adopted (October, 2023)
	10	430	Investigate, promote, and implement of additional flood protection measures that go beyond minimum FEMA requirements, such as improving community rating system. (Previously SA # 12)	10/2023 Flood ordinance update includes a 50 foot set back from top of bank or 2x width of the stream (whatever is greater). Non-conversions of building space. It also includes a limit of 1 foot rise by development in floodplain.
	11	430	Development and adoption of consistent floodplain management ordinance language and consistent use of hydraulic model of Carson River system. (Previously SA # 13)	Flood plain ordinances adopted (October, 2023). Though drafted, language to update hydraulic model was not included in ordinance adoption.
FLOOD DATA INFORMATION AND MAINTENANCE (12-21)				
D DATA INFORMATION AND MAINTENANCE (12-21)	12	410 440	Establish and adopt funding source, and protocol / procedures to consistently update watershed-wide unsteady state modeling to identify flood water storage requirements and to look at the cumulative effects of watershed development. (Previously SA #14)	Flood Insurance Rate Maps became effective for a portion of the West Fork Carson River in Alpine County , which is part of the Hydraulic Model of the Carson River. The County would benefit from a 'small' area drainage master plans, plans that affect only a few homes, because that is all that is generally affected, given the low density of the population.
	13	440	Support FEMA's Map Modernization Program and encourage FEMA to update FIRMs with current and future conditions. Significant verification of topography and other variables should be conducted prior to release of draft FIRMs. (Previously # SA 15)	This element is ongoing with FEMA.

SA #		CRS	SUGGESTED ACTION	Alpine County 2023 Update
FLOOD	14		Participate in FEMA's Cooperating Technical Partner Program. (Previously SA#16)	CWSD continues to be a CTP and works with Alpine County through the CRC process to identify and projects which may be of assistance to the county.
FLOOD DATA INFORMATION AND MAINTENANCE (12-21)	15	410 440	Collect and Maintain up-to-date and consistent data collection which includes updating flood studies as needed and conducting new studies for significant water courses and alluvial fan areas. This data should be used to update FEMA maps and/or fill local data gaps. Complete delineation of the floodway throughout river system and incorporate into FIRMs. (Previously SA #17)	Flood Insurance Rate Maps became effective November 16, 2023 for a portion of the West Fork Carson River in Alpine County. Rain gage data and stream flow data are collected in other counties; groundwater data is collected in Alpine through CASGEM and a small study area of the Mesa is also monitoring groundwater. AWG also conducts Ambient and water-quality based monitoring in the Carson River. Lahontan Regional Water Quality Control Board samples water quality in the Carson River watershed quarterly. They also collected post-storm water quality samples in 2021 and 2022 following the Tamarack Fire.
	16	410 440	Update flood studies and maps after significant flooding events. (Previously SA #18)	Alpine County has developed a proposed project list
	17	410 440	Update and Maintain Elevation Reference Marks (ERM) as- permanent monuments using NAVD88 Datum which matches base flood elevations on FEMA FIRMs. (Previously SA #19 & #20)	The need for more ERMs was discussed in the Discovery process. Alpine County maps are NAVD 88 datum.
	18	410 440	Develop and maintain master list of ERMs provide-to interested parties. (Previously SA #21)	Need funding to maintain a master linst of ERMs to provide to interested parties.
FLOOD DATA INFORMATION AND MAINTENANCE (12-21)				
FLOOD DATA INFORMATION AND MAINTENANCE (19-21)	19	350 410 440	Develop and coordinate photo-monitoring program (on-the-ground and aerial) on a watershed level to consistently document flooding and flood hazards. (Previously SA #22)	The need for consistent photo-monitoring discussed in CRC River & Floodplain Working group meetings. A systematic plan to track flood events at specific sites needs to be created and implemented. Specific protocol would be helpful to collect flood data photos.
	20	350 410 440	Establish and maintain rain gage data network in each local jurisdiction.	Alpine County would like to implement rain gage data network; it is especially insterested in monitoring vunerable ditches.
	21		Evaluate potential impacts due to climate variability which could include changing storm patterns, rainfall amounts, and snow levels, adding uncertainty to future conditions.	Determine extent Alpine County is included in the USGS model and Drought management plan. Does it include Climate action corp? It would be greate to update Dr. Lutz data. Consider Anne Knols study of snow melt affected by burn areas). Consider tree growth encroachment in upland meadows such as Hope valley.
CHANNEL MIGRATION AND BANK EROSION MONITORING (22-29)				

SA #		CRS	SUGGESTED ACTION	Alpine County 2023 Update
CHANNEL MIGRATION AND BANK EROSION MONITORING (22-29)	22	410	Document/map and update known and projected hazard areas including channel migration hazards and incorporated into planning processes. (Previously SA #23)	Alpine County has finished Multi-Jurisdictional Hazard Mitigation Plan which includes flood hazards. The HMP will be updated in 2024.County is also participating in Rapid Evaluation of the River System as part of the 2018 Update to the Carson River Floodplain Management Plan.
	23	440	Conduct LiDAR and/or aerial photography (on a watershed level) on a 5-year basis, or as needed, to provide updated information on channel movement and floodplain condition. (Previously SA #24)	The USGS created QL1 quaility LIDAR through the 3 DEP program. The County is interested in more than just data collection. Would like to evaluate economic value of what to use it for; there are things other than flooding that are a priority.
	24	430	Conduct research and establish appropriate building set-backs in flood hazard areas to reduce severe hazards from channel migration. (Previously SA #25)	This was done in new flood plain management ordinanaces that were adopted October 2023.
	25	410 440	Conduct and document channel cross-sectional surveys to track long term changes in river channel. (Previously SA #26)	A Geomorph assesment is planned for the West Fork Carson River in 2024; have applied to conduct Geomorphology assessment on East Fork Carson River.
	26	410 440	Identify unstable stream banks and areas with high potential for erosion. (Previously SA #27)	
CHANNEL MIGRATION AND Bank EROSION MONITORING (22-29)	27	510	Promote the use of non-structural, bio-engineering (soft-engineering utilizing natural materials) techniques in river restoration projects in combination with other proven methods. (Previously SA #28)	Alpine County coordinates with Alpine Watershed Group, Friends of Hope Valley, and American Rivers which tries to utilize non-structural, bio-engineering (soft-engineering utilizing natural materials) techniques in river restoration projects in combination with other proven methods.
	28	440 510	Update the 1996 Fluvial Geomorphic Assessment and create a sediment transport model of the Carson River. (Previously SA #29)	In progress on West Fork Carson River with Lahontan Regional Quality Control Board. A grant application to for fluvial geomorphic assesment on the East Fork has been submitted for 2025-2027.
	29	440 510	Create a baseline study that informs management and project decisions regarding flood risks, damages, and ecosystem impacts.	American River Assesment and Prioritization (add link).
FLOODPLAIN AND FLOOD HAZARD OUTREACH AND EDUCATION (30-34)				

SA #		CRS	SUGGESTED ACTION	Alpine County 2023 Update
FLOODPLAIN AND FLOOD HAZARD OUTREACH AND EDUCATION (30-34)	30	330	Continued implementation of watershed-wide outreach and education program about floodplain importance and flooding hazards.	Snapshot day, update, whale tail, no change. CWSD works with AWG and County on th EPA. AWG partnered with River Wranglers and Alpine County Library to bring Diamond Valley Students to Hope Valley for Carson River Snapshot Day 2023. AWG aims to grow this partnership and increase education programs for students in the future. In addition to Snapshot Day 2024, AWG has secured funding for environmental education in 2024 and 2025 through the California Coastal Commission Whale Tail Grant Fund. AWG will also continue tabling at community outreach events and leading community restoration events which always contain an education portion.
	31	330	Promote and participate in Annual Flood Awareness Week (FAW) and events throughout the year with the objective of providing information about protection of floodplains, flooding and flood hazards to the general public.	In Alpine County in 2023 had a flood awareness event during California's flood awareness week, October 21-28, 2023. Carson River Watershed Map (printed and online); UNCE Brochures; Created Flood Awareness 4 -part Video Series for Public, Elected Officials, and Developers as well as one video that highlights how Agriculture is a good fit in Floodplains.
	32	330	Develop and update media in conjunction with FAW working group (social media, videos, brochures, web content, press releases etc.) for distribution throughout watershed with consistent messages and information for the general public.	Alpine County cordinated to share California DWR's Flood Awareness Week Information on its website and social media. Information posted on CWSD.org, Nevada Floods.org, National Weather Service - Reno; and County Websites and social media sites.
LOODPLAIN AND FLOOD HAZARD OUTREACH AND EDUCATION (30-34)	33	330	Promote FAW partner websites (e.g., NevadaFloods.org, National Weather Service, CWSD, and county websites) which provide information on the Regional Floodplain Management Plan, floodplain protection, flood risk, emergency preparedness, and emergency contact information. Link to one another's websites and social media sites to amplify message.	In conjunction with Flood Awareness Campaign led by CAL -DWR, Alpine County shared posts that address flood risk. CWSD and NOAA - NWS Reno also post information about flood to share with local jurisdictions for their web and social media sites .
	34	330	Utilize special Events, River Work Days, and other outreach opportunities in conjunction with FAW working group to raise awareness of flooding hazards and importance of floodplains.	Flood Awareness outreach occurs as requested in Alpine County. CWSD demonstrates the watershed model to share how land use decisions affect flooding.
Reduce Infrastructure Impacts (35-39)				
RE	35	510 540	Investigate opportunities and implement actions when feasible to remove existing restrictions, such as berms or uncertified levees, to allow flood waters to access floodplain.	Alpine County works in coordination with Alpine Watershed Group, to monitor and act upon strategic activities to remove existing restrictions to allow flood waters to access floodplain. The wall for Markeville creek is being removed.

SA #		CRS	SUGGESTED ACTION	Alpine County 2023 Update
REDUCE INFRASTRUCTU IMPACTS (35-39)	36	510	Limit the use of future management measures such as dams, levees, and floodwalls.	Alpine County, through CRC process, supports limiting the use of future management measures such as dams, levees, and floodwalls.
	37	540	Design future bridges and roads to protect floodplain and accommodate rather than restrict river course changes, and minimize back up of flood water.	Alpine County, through CRC process, supports bridge and road designs which protects flooplain, accomodates storage, does not restrict river course, and minimized back up of flood waters.
	38		Investigate opportunities to enhance grade control structures.	Alpine County, through CWSD board and CRC process, supports investigation of opportunities to enhance grade control structures.
	39		Inventory, categorize, and house data regarding public and private drainage and flood control infrastructure in the Carson River Watershed.	Would be good for additional information discussion and construction. Refer to diversion structures.
ALLUVIAL FAN HAZARD REDUCTION (40-43)				
ALLUVIAL FAN HAZARD REDUCTION (40-43)	40	440	Investigate extent of potential alluvial fan flood damage and include on maps.	After the Tamarack fire, Alpine County had a flash flood in burn scar area that closed highway 89 between Woodfords and Markleeville. Consider drainage studies in several fans around the county, especially in burn scar areas that affect Highway 88, Highway 89 and Highway 4.
	41	440	Conduct Area Drainage Master Plans for alluvial fans which examines infrastructure, land use, sediment transport to identify & identify alternative to mitigate and/or reduce risk.	No progress to date and most land in county is owned by Federal Government; however, drainages studies that affect highways may be useful in planning.
	42	440 530	Implement studies to inform and motivate land use planning & development which protects high risk areas, and/or allows flood waters and debris flows to safely move through fan flood zones;	No progress to date and most land in county is owned by Federal Government; however, drainages studies that affect highways may be useful in planning.
	43		Define and implement means to protect existing open alluvial fans, implement recommendations associated with SA#'s 40-43 to limit further development and/or alleviate hazards in high risk areas.	No progress to date and most land in county is owned by Federal Government; however, drainages studies that affect highways may be useful in planning.
MINIMIZE STORMWATER IMPACTS (44-49)				
	44	450	Retain and infiltrate stormwater to reduce flood risk, capture groundwater and improve water quality.	No reported progress.
	45	450	Plan for and mitigate cumulative effects of existing watershed urbanization, including stormwater runoff, to reduce flood	Topic is discussed in CRC meetings; I'm not sure if progress has been made.

SA #		CRS	SUGGESTED ACTION	Alpine County 2023 Update
MINIMIZE STORMWATER IMPACTS (44-49)	46	450	Incorporate GI/LID methods to reduce stormwater flooding on site in all development and redevelopment proposals.	No requirements for LID in Alpine County; however, Alpine County will be considering adding LID language to their floodplain ordinance.Through CRC process, county work with CWSD to create Low Impact Development in the Carson River Watershed. http://www.cwsd.org/wp-content/uploads/2015/07/2015-04-07-LID-Carson-Watershed.pdf. However, LID specific for development in floodplain lands is the minority of places the County develops, so in general there are minimal opportunities for retrofit in the floodplain.
	47	450	Adopt model LID ordinances created for Watershed.	LID Ordinance being conducted through CWSD with 208 Funding.
	48	320 450	Utilize best management practices to reduce stormwater/ urban runoff and mitigate stormwater flooding.	No change.
	49	320 450	Protect and buffer natural drainage ways (existing green infrastructure) from development to ensure historic and natural flows are maintained.	No update, new suggested action.

SA #		CRS	SUGGESTED ACTION	Carson City 2023 Update
PROTECT FLOODPLAIN NATURAL FUNCTION AND VALUE (1-8) - Refer also to Stewardship Plan Table 8.8				
PROTECT FLOODPLAIN NATURAL FUNCTION AND VALUE (1-8)	1	320 420 510	Maintain Living River approach to retain river system in a more natural state that allows the river to access its floodplain. Recognize that not all areas of the river system can be allowed to migrate freely due to special designation (i.e., Superfund area) and/or existing infrastructure.	The 2023 Regional Floodplain Management Plan will be presented to Carson City's Board of Supervisors for potential adoption. The Living River approach is one of the main goals of the plan. Carson City provides an example to other watershed counties by funding the purchase of floodplain lands as open space. The City also participates in the Carson RIver Coalition (CRC) stakeholder process. Additionally, Carson City Open Space staff are working to update the 1996 Carson River Master Plan, in conjunction with the National Park Service, Rivers, Trails and Conservation Assistance program. The revised plan will have language surrounding the living river approach.
	2	350 410	Develop, support and implement a good neighbor floodplain management policy that recognizes cumulative impacts and actions by one property owner can impact upstream, adjacent and downstream property owners.	Carson City plans to adopt the 2023 Regional Floodplain Management Plan which includes a good neighbor floodplain management as one of its policies.
	3	420	Investigate, identify, and implement areas where stream zone buffers would provide multi-objective benefits for river system and downstream communities.	Carson City has developed and maintains many parks and open space areas that meet multi-objective goals; refer to SA #6.
	4	310 410 530	Manage development in special flood hazard areas and other flood hazard areas (those known flood hazard areas not included on most current FIRMs) to provide public safety and protect the natural functions and benefits of floodplain lands.	Several areas have been remapped (Goni Wash, Eagle Valley Wash, Saliman/Voltaire Drainage). Clear Creek is in the process of being remapped. There is a physical map revision of the Carson River currently in process. Carson City also expects the floodplain management ordinance to be updated in November 2023.
	5	320 450	Promote and utilize best management practices as a means of protecting riparian habitat.	Carson City owns and manages most of the Carson River riparian habitat. It is mantained by Carson City Parks, Recreation & Open Space Department. Practices include limiting formal development in the river corridor - development is limited to trailheads and trails. Additionally, staff also work to treat noxious weeds in the river corridor to maintain riparian health and maintain native riparian plant communities.
	ECOSYSTEM SERVICES IMPORTANT to MAINTAINING LIVING RIVER APPROACH			

SA #		CRS	SUGGESTED ACTION	Carson City 2023 Update
PROTECT FLOODPL	6	350 420	Consider Floodplain and flood hazards ecosystem service objectives which preserve open floodplain lands when selecting acquisition targets and establishing management strategies for open spaces.	Carson City has developed and maintains open space and parks along the Carson River corridor including Morgan Mill Preserve and Open Space, Ambrose Carson River Natural Area, Carson River Park, Silver Saddle Ranch, Riverview Park, Mexican Ditch Trail, Empire Ranch Trail, Linear Ditch Trail, Buzzy's Ranch Open Space, East Silver Saddle Ranch Open Space, Mexican Dam Open Space, Golden Eagle Open Space and Carson River Canyon from Deer Run Road to Lyon County line. At Fuji Park, Carson City worked with non-profits, NDEP, CWSD, and others to develop Bailey Pond which not only provides a place for people to fish, but it also is designed to catch stormwater, channel sediment to adjacent catch basins, and filter the water before returning to Clear Creek. Clear Creek is the only tributary of the Carson River in Nevada that flows year round. The Question 18 initiative provides funds for the acquisition, development, and maintenance of open space through a local tax, the "Quality of Life Inititative".
	7	520	Identify and promote options for landowner incentive programs, such as floodplain leasing program and conservation easements that provide compensation to landowners providing ecosystem services and seek funding mechanisms.	This programmatic goal is unnecessary since the majority of the floodplain land is owned by Carson City.
	8	420 520	Retain lands that preserve floodplain storage which maintain and/or restore connection of river with floodplain through land acquisition, conservation easements, local open space programs, TDR and PDR Programs, and other protection methods. Pursue protection of additional acreage in flood prone areas (See UNCE 2015, Floodplain Protection Inventory for the Carson River)	Carson City is an exemplary in fulfilling this suggested action. Refer to SA #6. Carson City has acted on acquisition of Special Flood Hazard Areas (SFHA) in the floodplain as open space. Currently there are 3,832 acres of SFHA, 71% is open space or 2718.5 acres.
	HIGHER REGULATORY STANDARDS (9-11)			
-11)	9	430	Periodically review county ordinances that include floodplain protection as a purpose, account for the loss of floodplain storage volume, and mitigate losses through a variety of methods.	The Floodplain Management Ordinance update is in progress and is anticipated to be completed in November 2023. The update to the ordinance intends to meet this requirement.

SA #		CRS	SUGGESTED ACTION	Carson City 2023 Update
HIGHER REGULATORY STANDARDS (9-	10	430	Investigate, promote, and implement of additional flood protection measures that go beyond minimum FEMA requirements, such as improving community rating system.	The Floodplain Management Ordinance update is in progress and is anticipated to be completed in November 2023. Ways that Carson City has exceeded flood protection initiatives or intend to elevate the current CRS Class include: lowering the substantial improvement threshold from 50% to 49% and requiring critical structures to be elevated a foot above the 500-year level. Carson City still has a 2 foot freeboard requirement for structures in the Special Flood Hazard Area. The ordinance update will include specific language requiring machinery and equipment to be elevated 1 foot above the base flood elevation.
	11	430	Development and adoption of consistent floodplain management ordinance language and consistent use of hydraulic model of Carson River system.	The Floodplain Management Ordinance update is in progress and is anticipated to be completed in November 2023.
	FLOOD DATA INFORMATION AND MAINTENANCE (12-21)			
D MAINTENANCE (12-21)	12	410 440	Establish and adopt funding source, and protocol / procedures to consistently update watershed-wide unsteady state modeling to identify flood water storage requirements and to look at the cumulative effects of watershed development.	Using FEMA grant funds, an unsteady state model of the Carson River System upstream of the Lahontan Reservoir was created. Draft protocol for updating the model was included in this effort.
	13	440	Support FEMA's Map Modernization Program and encourage FEMA to update FIRMs with current and future conditions. Significant verification of topography and other variables should be conducted prior to release of draft FIRMs.	This element is ongoing with FEMA.
	14		Participate in FEMA's Cooperating Technical Partner Program.	CWSD continues to be a Cooperating Technical Partner with FEMA. As a CWSD partner, Carson City actively engages in this partnership. Counties provide input through the Carson River Coalition (CRC) stakeholder process.
	15	410 440	Collect and Maintain up-to-date and consistent data collection which includes updating flood studies as needed and conducting new studies for significant water courses and alluvial fan areas. This data should be used to update FEMA maps and/or fill local data gaps. Complete delineation of the floodway throughout river system and incorporate into FIRMs.	Clear Creek Restudy currently in process. Previous FIRM updates include Ash Canyon Creek, Kings Canyon Creek, Vicee Canyon Creek, Combs Canyon Creek, Eagle Valley Creek, Saliman Road Tributary, Voltaire Canyon Creek, H Tributary, and I Tributary.

SA #		CRS	SUGGESTED ACTION	Carson City 2023 Update
FLOOD DATA INFORMATION AND	16	410 440	Update flood studies and maps after significant flooding events.	From flash flooding in 2014-2016, riverine flooding in 2017, and flash flooding in 2023, Carson City has identified numerous watersheds for area drainage master plans and flood studies to be conducted. The East Carson City Area Drainage Master Plan and Southeast Carson City Area Drainage Master Plan were completed in 2023. Completing an addendum to the Southeast Carson City Area Drainage Master Plan that focuses on granular level issues would be beneficial. Carson City would like to work on a master plan/scoping project for the Voltaire Canyon/North Tributary drainages that produced mud flows in 2023. Carson City plans to seek funding and assistance to compile all area drainage master plans into a stormwater master plan that compiles models, incorporates proposed projects, improves existing asset information, and fills in any gaps for the entire city.
	17	410 440	Update and Maintain Elevation Reference Marks (ERM) should be as permanent monuments using NAVD88 Datum which matches base flood elevations on FEMA FIRMs.	Carson City has 99 ERMs thoughout the city in the NAVD 88 datum. Verification is typically scheduled every five years. The City is working with a consultant currently to verify accuracy of the control network.
	18	410 440	Develop and maintain master list of ERMs provide-to interested parties.	Carson City's ERM are available through Carson City's storm water website at www.carsonsw.org
	FLOOD DATA INFORMATION AND MAINTENANCE (12-21)			
ATION AND MAINTENANCE (19-21)	19	350 410 440	Develop and coordinate photo-monitoring program (on-the-ground and aerial) on a watershed level to consistently document flooding and flood hazards.	The need for consistent photo-monitoring has been discussed in Carson River Coalition (CRC) and floodplain management working group meetings. Carson City has an app, Carson City Connect that allows for residents to take photos of areas of concern.
	20	350 410 440	Establish and maintain rain gage data network in each local jurisdiction.	Carson City has ALERT sites in various locations throughout the watershed. These are monitored by NWS. Carson City applied for a Hazard Mitigation grant in 2022 to add an additional site in the Goni watershed and to purchase replacement equipment for all of the sites. Upgrading to the ALERT2 system was explored, but due to the connectivity to other entities that would also need to upgrade, Carson was not able to proceed. Pursuing this in the future may be beneficial for improved data quality.

	SA #	CRS	SUGGESTED ACTION	Carson City 2023 Update
FLOOD DATA INFORM	21		Evaluate potential impacts due to climate variability which could include changing storm patterns, rainfall amounts, and snow levels, adding uncertainty to future conditions.	Carson City experienced abnormal storm patterns, rainfall amounts, and snow levels January-June in 2023. While currently undergoing the Southeast Carson City Area Drainage Master Plan, it became evident that an addendum to that a master plan is needed to identify solutions to issues on a more granular level in this area. The storms in June that hit the Goni and Voltaire areas illicited great need to construct the basins in the Goni area identified in the North Carson City Area Drainage Master Plan and to investigate a mitigation project for the Voltaire Canyon and North Tributary.
	CHANNEL MIGRATION AND BANK EROSION MONITORING (22-29)			
CHANNEL MIGRATION AND BANK EROSION MONITORING (22-29)	22	410	Document/map and update known and projected hazard areas including channel migration hazards and incorporated into planning processes.	Carson City updated and adopted their Hazard Mitigation Plan in 2021, which includes flood hazards. Carson City has completed Area Drainage Master Plans for North, West, East, and Southeast Areas.
	23	440	Conduct LiDAR and/or aerial photography (on a watershed level) on a 5-year basis, or as needed, to provide updated information on channel movement and floodplain condition.	The latest survey of alluvial fan areas was conducted by USGS in Carson City and Douglas County in March 2020.
	24	430	Conduct research and establish appropriate building set-backs in flood hazard areas to reduce severe hazards from channel migration.	No action
	25	410 440	Conduct and document channel cross-sectional surveys to track long term changes in river channel.	No action has been taken towards this end. However, the Carson River Master Plan amedment will identify this as a suggested action, and Carson City can work with partners like CWSD to accomplish this task.
	26	410 440	Identify unstable stream banks and areas with high potential for erosion.	Topic discussed in Carson River Coalition (CRC) meetings. Additionally, a map will be produced in the Carson River Master Plan amendment that will identify priority areas for erosion control.
	27	510	Promote the use of non-structural, bio-engineering (soft-engineering utilizing natural materials) techniques in river restoration projects in combination with other proven methods.	Bio-engineering techniques are being used on river restoration projects being accomplished by the Conversation District and their partners. This is the preferred method for Carson City Open Space led river projects as well.
	28	440 510	Update the 1996 Fluvial Geomorphic Assessment and create a sediment transport model of the Carson River.	CWSD has identified FEMA Pre-Disaster Mitigation funidng, USACE, and USBR Watershed grants as possible sources to update the 1996 Fluvial Geomorphic Assessment of the Carson River System. Carson City would participate through the CRC process to reivew and ground-truth its section of the river.

SA #		CRS	SUGGESTED ACTION	Carson City 2023 Update
	29	440 510	Create a baseline study that informs management and project decisions regarding flood risks, damages, and ecosystem impacts.	No action
	FLOODPLAIN AND FLOOD HAZARD OUTREACH AND EDUCATION (30-34)			
FLOODPLAIN AND FLOOD HAZARD OUTREACH AND EDUCATION (30-34)	30	330	Continued implementation of watershed-wide outreach and education program about floodplain importance and flooding hazards.	This program was developed in 2014 and continues throughout the watershed. (See SA #31.) CWSD and River Wranglers provide significant outreach and education opportunities thoughout the watershed. Carson City staff participates in flood awareness outreach efforts throughout the year.
	31	330	Promote and participate in Annual Flood Awareness Week (FAW) and events throughout the year with the objective of providing information about protection of floodplains, flooding and flood hazards to the general public.	Carson City's Board of Supervisors has presented a proclamation for Flood Awareness Week (FAW) in 2022 and 2023. NV Department of Water Resouces leads the FAW working group which includes CWSD, federal, state, and local jurisdictions. Flood awareness planning and outreach efforts are ongoing and include a presence on social media.
	32	330	Develop and update media in conjunction with FAW working group (social media, videos, brochures, web content, press releases etc.) for distribution throughout watershed with consistent messages and information for the general public.	Information posted on CWSD.org, NevadaFloods.org, carsonsw.org, and social media sites. Brochures are updated biannually with new content as necessary.
	33	330	Promote FAW partner websites (e.g., NevadaFloods.org, National Weather Service, CWSD, and county websites) which provide information on the Regional Floodplain Management Plan, floodplain protection, flood risk, emergency preparedness, and emergency contact information. Link to one another's websites and social media sites to amplify message.	In conjunction with the flood awareness campaign led by NDWR, CWSD and NOAA-NWS Reno specifically address flood risk through their social media, videos, web content, etc. Information and useful links are also posted on Carson City's stormwater website. On the high -water mark signs, partner websites or QR codes linked to their websites are included for viewers to learn more about flood risk and mitigation.
	34	330	Utilize special Events, River Work Days, and other outreach opportunities in conjunction with FAW working group to raise awareness of flooding hazards and importance of floodplains.	FAW events occur throughout the year at events such as National Nigh Out, Boonanza, Carson City Source Water Protection, CWSD and River Wranglers school outreach, and during outreach presentations about flood studies or area drainage master plans. Carson City's high water marks provide continuous outreach opportunities to raise awareness of flooding hazards and the importance of floodplains. There is currently a completed high water mark mural and two proposed high water mark projects to be implemented in 2023-2024. Flood information is also provided at City offices, the library, community center, and various other locations throughout the city. A proclamation for Flood Awareness Week will take place at the first Board of Supervisors meeting in November 2023.

SA #		CRS	SUGGESTED ACTION	Carson City 2023 Update
REDUCE INFRASTRUCTURE IMPACTS (35-39)				
REDUCE INFRASTRUCTURE IMPACTS (35-39)	35	510 540	Investigate opportunities and implement actions when feasible to remove existing restrictions, such as berms or uncertified levees, to allow flood waters to access floodplain.	No action
	36	510	Limit the use of future management measures such as dams, levees, and floodwalls.	No action
	37	540	Design future bridges and roads to protect floodplain and accommodate rather than restrict river course changes, and minimize back up of flood water.	No action
	38		Investigate opportunities to enhance grade control structures.	No action
	39		Inventory, categorize, and house data regarding public and private drainage and flood control infrastructure in the Carson River Watershed.	Carson City plans to seek funding and assistance to compile all area drainage master plans into a stormwater master plan that compiles models, incorporates proposed projects, improves existing asset information, and fills in any gaps for the entire city.
SA #		**CRS**	**SUGGESTED ACTION**	**Carson City 2023 Update**
ALLUVIAL FAN HAZARD REDUCTION (40-43)				
ALLUVIAL FAN HAZARD REDUCTION (40-43)	40	440	Investigate extent of potential alluvial fan flood damage and include on maps.	The latest survey of alluvial fan areas was conducted by USGS in Carson City and Douglas County in March 2020.
	41	440	Conduct Area Drainage Master Plans for alluvial fans which examines infrastructure, land use, sediment transport to identify & identify alternative to mitigate and/or reduce risk.	Carson City completed East Carson City and Southeast Carson City Area Drainage Master Plans in 2023. While they did not specifically identify alluvial fan flood damage, alluvial fan flooding is a known issue in these areas and the area drainage master plans provide flood mitigation solutions.
	42	440 530	Implement studies to inform and motivate land use planning & development which protects high risk areas, and/or allows flood waters and debris flows to safely move through fan flood zones;	No action
	43		Define and implement means to protect existing open alluvial fans from development and where development exists, implement recommendations associated with SA#'s 38-40 to limit further development and/or alleviate hazards in high risk areas.	During the first reading of the updated Floodplain Management Ordinance, the existing prohibition of manufactured homes in alluvial fan zones was questioned. Carson City staff has prepared a response recommending that the prohibition remains as manufactured homes and owners tend to be the most vulnerable and alluvial fans tend to be one of the most dangerous and unpredictable flood zones.
MINIMIZE STORMWATER IMPACTS (44-48)				
	44	450	Retain and infiltrate stormwater to reduce flood risk, capture groundwater and improve water quality.	Carson City adopted their Drainage Manual in July 2021. Developments and redevelopments with impervious surfaces greater than 10,000 square feet or more than 1 acre of disturbance

SA #		CRS	SUGGESTED ACTION	Carson City 2023 Update
MINIMIZE STORMWATER IMPACTS (44-49)	45	450	Plan for and mitigate cumulative effects of existing watershed urbanization, including stormwater runoff, to reduce flood	A Carson River inundation map was created in cooperation with the NWS. Carson City plans to seek funding and assistance to compile all area drainage master plans into a stormwater master plan that compiles models, incorporates proposed projects, improves existing asset information, and fills in any gaps for the entire city.
	46	450	Incorporate GI/LID methods to reduce stormwater flooding on site in all development and redevelopment proposals.	Carson City adopted their Drainage Manual in July 2021. Developments and redevelopments with impervious surfaces greater than 10,000 square feet or more than 1 acre of disturbance are required to treat the 2-year, 24-hour storm with water quality controls. Any development or redevelopment except for single-family residences that cause less than 1/4 acre of disturbance are required to incorporate detention or retention on their site designed to the 10-year storm.
	47	450	Adopt model LID ordinances created for Watershed.	Carson City adopted their Drainage Manual in July 2021 which includes LID practices and requirements.
	48	320 450	Utilize best management practices to reduce stormwater/ urban runoff and mitigate stormwater flooding.	Carson City adopted their Drainage Manual in July 2021 which includes LID Best Management Practices that are most likely to be included in Carson City. The Drainage Manual also specifies that storm drainage improvements shall incorporate BMPs in accordance with the Nevada Handbook of Best Management Practices and CCMC Title 18, Division 13.
	49	320 450	Protect and buffer natural drainage ways (existing green infrastructure) from development to ensure historic and natural flows are maintained.	No update, new suggested action

SA #		CRS	SUGGESTED ACTION	Churchill County 2023 Update
PROTECT FLOODPLAIN NATURAL FUNCTION AND VALUE (1-8) - Refer also to Stewardship Plan Table 8.8				
AL FUNCTION AND VALUE (1-8)	1	320 420 510	Maintain Living River approach to retain river system in a more natural state that allows the river to access its floodplain. Recognize that not all areas of the river system can be allowed to migrate freely due to special designation (i.e., Superfund area) and/or existing infrastructure.	Churchill County has adopted the 2018 Floodplain Management Plan and operatres within its guidelines and policies. A key guideline the Living River approach to floodplain management. . The county also participates in the Carson River Coalition (CRC) stakeholder process.
	2	350 410	Develop, support and implement a good neighbor floodplain management policy that recognizes cumulative impacts and actions by one property owner can impact upstream, adjacent and downstream property owners.	Churchill County has adopted the 2018 Floodplain Management Plan and operatres within its guidelines and policies and includes the good neighbor floodplain management policy. .
	3	420	Investigate, identify, and implement areas where stream zone buffers would provide multi-objective benefits for river system and downstream communities. (Previously SA # 4)	no update
	4	310 410 530	Manage development in special flood hazard areas and other flood hazard areas (those known flood hazard areas not included on most current FIRMs) to provide public safety and protect the natural functions and benefits of floodplain lands. (Previously SA # 6)	Working with CWSD/HDR on a revision to the current floodplain. All comments have been resolved and the PMR is going through FEMA review process.
	5	320 450	Promote and utilize best management practices as a means of protecting riparian habitat. (Previously SA #10)	Topic discussed in CRC meetings as possible landowner stock fencing and watering incentives.

SA #		CRS	SUGGESTED ACTION	Churchill County 2023 Update
PROTECT FLOODPLAIN NATURA	ECOSYSTEM SERVICES IMPORTANT to MAINTAINING LIVING RIVER APPROACH			
	6	350 420	Consider Floodplain and flood hazards ecosystem service objectives which preserve open floodplain lands when selecting acquisition targets and establishing management strategies for open spaces. (Previously SA #3)	Section 16.12.040.3 of Churchill County Code explains planned unit developments, a specialized kind of subdivision. The Planning Commission may allow up to five units per acre if the developer provides benefits to the community such as protection and access to the Carson River corridor or protection of agriculture through the Transfer of Development Rights program.
	7	520	Identify and promote options for landowner incentive programs, such as floodplain leasing program and conservation easements that provide compensation to landowners providing ecosystem services and seek funding mechanisms. (Previously # SA 9)	See SA 6
	8	420 520	Retain lands that preserve floodplain storage which maintain and/or restore connection of river with floodplain through land acquisition, conservation easements, local open space programs, TDR and PDR Programs, and other protection methods. Pursue protection of additional acreage in flood prone areas. (Previously # SA 7)	Section 16.12.040.3 of Churchill County Code explains planned unit developments, a specialized kind of subdivision. The Planning Commission may allow up to five units per acre if the developer provides benefits to the community such as protection and access to the Carson River corridor or protection of agriculture through the Transfer of Development Rights program.
HIGHER REGULATORY STANDARDS (9-11)				
HIGHER REGULATORY STANDARDS (9-11)	9	430	Periodically review county ordinances that include floodplain protection as a purpose, account for the loss of floodplain storage volume, and mitigate losses through a variety of methods. (Previously SA # 11)	Churchill County is currently reviewing ordinances and will include floodplain ordinances in the review.
	10	430	Investigate, promote, and implement of additional flood protection measures that go beyond minimum FEMA requirements, such as improving community rating system. (Previously SA # 12)	Construction of the emergency weirs I 2017 and 2023. to control flood water down the Carson River.
	11	430	Development and adoption of consistent floodplain management ordinance language and consistent use of hydraulic model of Carson River system. (Previously SA # 13)	Churchill County is currently reviewing ordinances and will include floodplain ordinances in the review.

SA #		CRS	SUGGESTED ACTION	Churchill County 2023 Update
FLOOD DATA INFORMATION AND MAINTENANCE (12-21)				
FLOOD DATA INFORMATION AND MAINTENANCE (12-21)	12	410 440	Establish and adopt funding source, and protocol / procedures to consistently update watershed-wide unsteady state modeling to identify flood water storage requirements and to look at the cumulative effects of watershed development. (Previously SA #14)	Hyrdrologic and Hydraulic data has been collected as part of the FEMA Physical Map revision of Flood Insurance Rate Maps.
	13	440	Support FEMA's Map Modernization Program and encourage FEMA to update FIRMs with current and future conditions. Significant verification of topography and other variables should be conducted prior to release of draft FIRMs. (Previously # SA 15)	Hyrdrologic and Hydraulic data has been collected as part of the FEMA Physical Map revision of Flood Insurance Rate Maps. . This information is available digitally.
	14		Participate in FEMA's Cooperating Technical Partner Program. (Previously SA#16)	CWSD continue to participate in FEMA's Cooperating Technical Partner Program.
FLOOD DATA INFORMATION AND MAINTENANCE (12-21)	15	410 440	Collect and Maintain up-to-date and consistent data collection which includes updating flood studies as needed and conducting new studies for significant water courses and alluvial fan areas. This data should be used to update FEMA maps and/or fill local data gaps. Complete delineation of the floodway throughout river system and incorporate into FIRMs. (Previously SA #17)	Hyrdrologic and Hydraulic data has been collected as part of the FEMA Physical Map revision of Flood Insurance Rate Maps.
	16	410 440	Update flood studies and maps after significant flooding events. (Previously SA #18)	Data is available from the 2023 flood.
	17	410 440	Update and Maintain Elevation Reference Marks (ERM) as- permanent monuments using NAVD88 Datum which matches base flood elevations on FEMA FIRMs. (Previously SA #19& 20)	Churchill County maps are NAVD 88 datum.At January 23, 2018 Floodplain and River Management working group reaffirmed the need for updated ERMs.
	18	410 440	Develop and maintain master list of ERMs provide-to interested parties. (Previously SA #21)	The need for master list of ERMs was affirmed in the CRC process.

SA #		CRS	SUGGESTED ACTION	Churchill County 2023 Update
FLOOD DATA INFORMATION AND MAINTENANCE (12-21)				
FLOOD DATA INFORMATION AND MAINTENANCE (19-21)	19	350 410 440	Develop and coordinate photo-monitoring program (on-the-ground and aerial) on a watershed level to consistently document flooding and flood hazards. (Previously SA #22)	Photos were taken during the 2017 and 2023 flood events, however, no formal program was developed for documenting flooding and flood hazards.
	20	350 410 440	Establish and maintain rain gage data network in each local jurisdiction.	No Update
	21		Evaluate potential impacts due to climate variability which could include changing storm patterns, rainfall amounts, and snow levels, adding uncertainty to future conditions.	No Update
CHANNEL MIGRATION AND BANK EROSION MONITORING (22-29)				
CHANNEL MIGRATION AND BANK EROSION MONITORING (22-29)	22	410	Document/map and update known and projected hazard areas including channel migration hazards and incorporated into planning processes. (Previously SA #23)	Topic discussed in CRC meetings but not acted on to date.
	23	440	Conduct LiDAR and/or aerial photography (on a watershed level) on a 5-year basis, or as needed, to provide updated information on channel movement and floodplain condition. (Previously SA #24)	LIDAR and aerial photography is completed every 2 years for the county assessor. Information can be evaluated.
	24	430	Conduct research and establish appropriate building set-backs in flood hazard areas to reduce severe hazards from channel migration. (Previously SA #25)	Topic discussed in CRC meetings but not acted on to date.
	25	410 440	Conduct and document channel cross-sectional surveys to track long term changes in river channel. (Previously SA #26)	Topic discussed in CRC meetings but not acted on to date in Churchill County.
	26	410 440	Identify unstable stream banks and areas with high potential for erosion. (Previously SA #27)	Topic discussed in CRC meetings but not acted on to date.
	27	510	Promote the use of non-structural, bio-engineering (soft-engineering utilizing natural materials) techniques in river restoration projects in combination with other proven methods. (Previously SA #28)	No Update
CHANNEL MIGRATION AND Bank EROSION MONITORING (22-	28	440 510	Update the 1996 Fluvial Geomorphic Assessment and create a sediment transport model of the Carson River. (Previously SA #27)	CWSD has identified FEMA Pre-Disaster Mitigation funding; USACE, and USBR Watershed grants as a possible source to update the 1996 Fluvial Geomorphic Assessment of the Carson River System. County would participate through CRC process to review and ground-truth its section of the river.
	29	440 510	Create a baseline study that informs management and project decisions regarding flood risks, damages, and ecosystem impacts.	No Update

SA #		CRS	SUGGESTED ACTION	Churchill County 2023 Update
FLOODPLAIN AND FLOOD HAZARD OUTREACH AND EDUCATION (30-34)				
FLOODPLAIN AND FLOOD HAZARD OUTREACH AND EDUCATION (30-34)	30	330	Continued implementation of watershed-wide outreach and education program about floodplain importance and flooding hazards.	This program was developed in 2014 and continues throughout the watershed. (See SA #31). Significant outreach and education has occurred. The County participates in Flood Awareness outreach efforts throughout the year.
	31	330	Promote and participate in Annual Flood Awareness Week (FAW) and events throughout the year with the objective of providing information about protection of floodplains, flooding and flood hazards to the general public.	NV Department of Water Resources leads FAW Working group which includes CWSD, Federal, State and Local Jurisdictions. Significant outreach and education has occurred. Flood Awareness planning and outreach efforts are ongoing.
	32	330	Develop and update media in conjunction with FAW working group (social media, videos, brochures, web content, press releases etc.) for distribution throughout watershed with consistent messages and information for the general public.	Information posted on CWSD.org, NevadaFloods.org, National Weather Service - Reno; and County Websites and social media sites.
LOODPLAIN AND FLOOD HAZARD OUTREACH AND EDUCATION (30-34)	33	330	Promote FAW partner websites (e.g., NevadaFloods.org, National Weather Service, CWSD, and county websites) which provide information on the Regional Floodplain Management Plan, floodplain protection, flood risk, emergency preparedness, and emergency contact information. Link to one another's websites and social media sites to amplify message.	In conjunction with Flood Awareness Campaign led by NDWR, CWSD, NOAA -NWS Reno specifically address flood risk and local jurisdictions have websites as well which also link to these websites. Information is also posted on County Websites and social media sites.
	34	330	Utilize special Events, River Work Days, and other outreach opportunities in conjunction with FAW working group to raise awareness of flooding hazards and importance of floodplains.	FAW Events occur throughout the year at such events as the Cantaloupe Festival, CWSD is developing Flood Awareness program and will work with River Wranglers to implement flood awareness education program in schools in the watershed, including those in Churchill County.

SA #		CRS	SUGGESTED ACTION	Churchill County 2023 Update
REDUCE INFRASTRUCTURE IMPACTS (35-39)				
REDUCE INFRASTRUCTURE IMPACTS (35-39)	35	510 540	Investigate opportunities and implement actions when feasible to remove existing restrictions, such as berms or uncertified levees, to allow flood waters to access floodplain.	Much of this is under the jurisdiction of BOR/TCID. Topic discussed in CRC meetings but not acted on to date and a BOR representative attends these meetings.
	36	510	Limit the use of future management measures such as dams, levees, and floodwalls.	Much of this is under the jurisdiction of BOR/TCID. Topic discussed in CRC meetings but not acted on to date and a BOR representative attends these meetings.
	37	540	Design future bridges and roads to protect floodplain and accommodate rather than restrict river course changes, and minimize back up of flood water.	Topic discussed in CRC meetings but not acted on to date.
	38		Investigate opportunities to enhance grade control structures.	Topic discussed in CRC meetings but not acted on to date.
	39		Inventory, categorize, and house data regarding public and private drainage and flood control infrastructure in the Carson River Watershed.	No Update
ALLUVIAL FAN HAZARD REDUCTION (40-43)				
ALLUVIAL FAN HAZARD REDUCTION (40-43)	40	440	Investigate extent of potential alluvial fan flood damage and include on maps.	No Update
	41	440	Conduct Area Drainage Master Plans for alluvial fans which examines infrastructure, land use, sediment transport to identify & identify alternative to mitigate and/or reduce risk.	No Update
	42	440 530	Implement studies to inform and motivate land use planning & development which protects high risk areas, and/or allows flood waters and debris flows to safely move through fan flood zones;	No Update
	43		Define and implement means to protect existing open alluvial fans, implement recommendations associated with SA#'s 38-40 to limit further development and/or alleviate hazards in high risk areas.	No Update

SA #		CRS	SUGGESTED ACTION	Churchill County 2023 Update
MINIMIZE STORMWATER IMPACTS (44-49)				
MINIMIZE STORMWATER IMPACTS (44-49)	44	450	Retain and infiltrate stormwater to reduce flood risk, capture groundwater and improve water quality.	No Update
	45	450	Plan for and mitigate cumulative effects of existing watershed urbanization, including stormwater runoff, to reduce flood	Regional efforts through CWSD are in process. See SA – 12.
	46	450	Incorporate GI/LID methods to reduce stormwater flooding on site in all development and redevelopment proposals.	No action to date by Churchill County. FPMP was adopted by Churchill County and calls for LID practices to be implemented. No requirements for LID in Churchill County; however, recent development of Maverick Gas Station is a prime example of LIDs. Through CRC process, CWSD created Low Impact Development in the Carson River Watershed. http://www.cwsd.org/wp-content/uploads/2015/07/2015-04-07-LID-Carson-Watershed.pdf. The CRC Floodplain and River Management working groups chose to use 208 funding to update LID ordinances . Once LID ordinance update is completed, the CRC FRM working group chose to conduct pilot projects with future Clean Water 208 funding.
	47	450	Adopt model LID ordinances created for Watershed.	LID Ordinance being conducted through CWSD with 208 Funding.
	48	320 450	Utilize best management practices to reduce stormwater/ urban runoff and mitigate stormwater flooding.	Ongoing as part of the planning review process.
	49	320 450	Protect and buffer natural drainage ways (existing green infrastructure) from development to ensure historic and natural flows are maintained.	No update, new suggested action

SA #	CRS	SUGGESTED ACTION	Douglas County 2023 Update*
PROTECT FLOODPLAIN NATURAL FUNCTION AND VALUE (1-8) - Refer also to Stewardship Plan Table 8.8			
1	320 420 510	Maintain Living River approach to retain river system in a more natural state that allows the river to access its floodplain. Recognize that not all areas of the river system can be allowed to migrate freely due to special designation (i.e., Superfund area) and/or existing infrastructure.	The 2024 Regional Floodplain Management Plan will be presented to the Douglas County for possible adoption early 2025. The Living River approach as one of its main goals of the plan. Through Carson River Coalition (CRC) process, county worked with UNCE to create brochure FS 123-06 The Important of Floodplains in Our Communities for use throughout the watershed. Through the Carson River Coalition (CRC) process, the County worked with staff from University of Nevada Cooperative Extension (UNCE) to create the brochure Agriculture is a Good Fit for the Floodplain. https://extension.unr.edu/publication.aspx?PubID=3014.
2	350 410	Develop, support and implement a good neighbor floodplain management policy that recognizes cumulative impacts and actions by one property owner can impact upstream, adjacent and downstream property owners.	The 2018 Regional Floodplain Management Plan was adopted by Douglas County in November 2018. They are using the floodplain hydraulic model in relation to requirements of the Floodplain Management Plan.
3	420	Investigate, identify, and implement areas where stream zone buffers would provide multi-objective benefits for river system and downstream communities.	Douglas County requires 50 foot setbacks from the bank of any river (minimum) for development. 20.690.030.Y.5.e.i.
4	310 410 530	Manage development in special flood hazard areas and other flood hazard areas (those known flood hazard areas not included on most current FIRMs) to provide public safety and protect the natural functions and benefits of floodplain lands.	The county has worked with CWSD to update flood mapping to provide an accurate assessment of SFHAs. Carson River has been remapped and preliminary Flood Insurance Rate maps were issued November 2023. Effective FIRMS anticipated in May 2025. Smelter Creek and Clear Creek were completed May 2024. Pinenut Creek LOMR has been submitted and is in review. Alpine View LOMR became effective in 2019.
5	320 450	Promote and utilize best management practices as a means of protecting riparian habitat.	In early 2024, Douglas County published a comprehensive Stormwater Master Plan that promotes Low Impact Development (LID) and Best Management Practices (BMP). The county promotes LID and BMPs with potential to conserve riparian habitat. Douglas County is working to add LID/BMPs to code in 2024.
ECOSYSTEM SERVICES IMPORTANT to MAINTAINING LIVING RIVER APPROACH			
6	350 420	Consider Floodplain and flood hazards ecosystem service objectives which preserve open floodplain lands when selecting acquisition targets and establishing management strategies for open spaces.	2024 Actions continued as in 2013, 2018 version of this plan. Chapter 20.714 Division of Agricultural Land for Conservation Purposes address preservation of open space to protect floodplains from development, thereby maintaining a passive flood control, drainage, and ground water recharge system.

SA #		CRS	SUGGESTED ACTION	Douglas County 2023 Update*
	7	520	Identify and promote options for landowner incentive programs, such as floodplain leasing program and conservation easements that provide compensation to landowners providing ecosystem services and seek funding mechanisms.	Douglas County offered incentive for landowners as an ballot item in 2020. The ballot question on vote would have provided a 1/4th cent from sales tax to a conservation easement fund that supported agricultural producers. These easements preserve Carson Valley floodplain. The motion failed by narrow margined and did not get added to the 2024 ballot.
	8	420 520	restore connection of river with floodplain through land acquisition, conservation easements, local open space programs, TDR and PDR Programs, and other protection methods. Pursue protection of additional acreage in flood prone areas (See UNCE 2015, Floodplain Protection Inventory for the Carson River)	Update 2015 Floodplain Inventory, possible by Douglas County GIS. The original inventory was created by UNCE through CRC process. There have been a lot of conservation easements dedicated in Douglas County. (See UNCE 2015, Floodplain Protection Inventory for the Carson River.) Douglas County has Transfer of Development Rights in

SA #		CRS	SUGGESTED ACTION	Douglas County 2023 Update*
			HIGHER REGULATORY STANDARDS (9-11)	
HIGHER REGULATORY STANDARDS (9-11)	9	430	Periodically review county ordinances that include floodplain protection as a purpose, account for the loss of floodplain storage volume, and mitigate losses through a variety of methods.	Building code is 1' higher than FEMA regulations. Ordinance update language will be presented for adoption once FIRMs become effective (May2025). There are currently limitations for land division in SFHA. No parcels in the floodplain can be divided smaller than 19 acres unless DC code 20.50.170 is met. Also refer to SA #18.
	10	430	Investigate, promote, and implement of additional flood protection measures that go beyond minimum FEMA requirements, such as improving community rating system.	Douglas County participate in CRS program, and is working to adopt additional flood protection measures once floodplain maps are effective. The county hope to improve community rating score and considering regulations that would benefit county's CRS score.
	11	430	Development and adoption of consistent floodplain management ordinance language and consistent use of hydraulic model of Carson River system.	County created Draft Floodplain Ordinance in 2019 for future adoption. The ordinance includes language that will utilize information from 2016 Draft Model Management Distribution, and Update Guide; and Carson River Mitigation Plan. Refer to Appendix D. Update will be adopted in 2025.
			FLOOD DATA INFORMATION AND MAINTENANCE (12-21)	
NCE (12-21)	12	410 440	Establish and adopt funding source, and protocol / procedures to consistently update watershed-wide unsteady state modeling to identify flood water storage requirements and to look at the cumulative effects of watershed development.	Update the model to include new development since previous - subsequent to FEMA submittal. refer to SA #11.
	13	440	Support FEMA's Map Modernization Program and encourage FEMA to update FIRMs with current and future conditions. Significant verification of topography and other variables should be conducted prior to release of draft FIRMs.	Entire county has updated LIDAR as of 2023 that was conducted in FEMA / USGS cooperative effort.
	14		Participate in FEMA's Cooperating Technical Partner Program.	CWSD continues to be a Cooperating Technical Partner & Counties provide input through CRC stakeholder process. Effective FIRMS anticipated in May 2025. Smelter Creek and Clear Creek were completed May 2024. Pinenut Creek LOMR has been submitted and is in review. Alpine View LOMR became effective in 2019.

SA #		CRS	SUGGESTED ACTION	Douglas County 2023 Update*
FLOOD DATA INFORMATION AND MAINTENA	15	410 440	Collect and Maintain up-to-date and consistent data collection which includes updating flood studies as needed and conducting new studies for significant water courses and alluvial fan areas. This data should be used to update FEMA maps and/or fill local data gaps. Complete delineation of the floodway throughout river system and incorporate into FIRMs.	Carson River has been remapped and preliminary Flood Insurance Rate maps were issued November 2023. Ruhenstroth ADMP was completed December 2021. Effective FIRMS anticipated in May 2025. Smelter Creek and Clear Creek were completed May 2024. Pinenut Creek LOMR has been submitted and is in review. Alpine View LOMR became effective in 2019. SR88 Culvert expansion at Cottonwood Slough and East Fork is complete. Buckeye Mitigation solutions were identified in early 2024, and a Fish Springs/ Pinenut Creek culvert analysis was created in 2024 and is being finalized. The county will begin to analyze Sawmill and Pinenut Wash in 2025.
	16	410 440	Update flood studies and maps after significant flooding events.	In 2023, there were many flood events occurred when low elevation snow was melted by spring rains; county staff realized alluvial channels in East Carson Valley can flood in the winter in addition to typical summer cloudbursts that cause flash floods. The county is always updating flood studies and maps when funding becomes available. Refer to Douglas County's Stormwater Master Plan.
	17	410 440	Update and Maintain Elevation Reference Marks (ERM) should be as permanent monuments using NAVD88 Datum which matches base flood elevations on FEMA FIRMs.	There are actually quite a few in Douglas County; NDOT website very useful. The need for more ERMs was discussed in the Discovery process. However, the County does not maintain ERMs.
	18	410 440	Develop and maintain master list of ERMs provide-to interested parties.	There are actually quite a few in Douglas County; NDOT website very useful. The need for more ERMs was discussed in the Discovery process. However, the County does not maintain ERMs. Master List needs to be developed for entire watershed.

	SA #	CRS	SUGGESTED ACTION	Douglas County 2023 Update*
FLOOD DATA INFORMATION AND MAINTENANCE (12-21)				
FLOOD DATA INFORMATION AND MAINTENANCE (19-21)	19	350 410 440	Develop and coordinate photo-monitoring program (on-the-ground and aerial) on a watershed level to consistently document flooding and flood hazards.	A protocol to document HWM at specific locations specific coordinates during flood events would be helpful. There is also a need for consistent photo-at given locations. . A systematic plan to track flood events at specific sites needs to be created and implemented. Douglas County set this up in the Johnson Lane area for the ADMP. During flood events certain problem areas are photo documented and needs to be repeated.
	20	350 410 440	Establish and maintain rain gage data network in each local jurisdiction.	Douglas County is placing 2 flow gages at lower Pinenut creek and 2 rain gauges at the top as an initial test. They are willing to expand with promising results. The county is looking to NWS for rain gages and data keeping funding opportunities, as this would provide helpful data. Douglas county is coordinating with Carson City on the best tools for this data.
	21		Evaluate potential impacts due to climate variability which could include changing storm patterns, rainfall amounts, and snow levels, adding uncertainty to future conditions.	Explore frequent atmospheric weather changes with low elevation snow as an impact by climate variability. Snowmelt patterns and changes to weather can cause potential flood events.
CHANNEL MIGRATION AND BANK EROSION MONITORING (22-29)				
TION AND TORING (22-29)	22	410	Document/map and update known and projected hazard areas including channel migration hazards and incorporated into planning processes.	County Hazard Mitigation Plan (2019) and will be updated in 2024. County updated Rapid Evaluation of the River System as part of the 2018 Update to the Carson River Floodplain Management Plan.
	23	440	Conduct LiDAR and/or aerial photography (on a watershed level) on a 5-year basis, or as needed, to provide updated information on channel movement and floodplain condition.	FEMA/ USGS project has provided updated LiDAR for entire county March 2023.
	24	430	Conduct research and establish appropriate building set-backs in flood hazard areas to reduce severe hazards from channel migration.	Douglas County requires 50 foot setbacks from the bank of any river (minimum) for development. 20.690.030.Y.5.e.i. Need to evaluate if that is sufficient.
	25	410 440	Conduct and document channel cross-sectional surveys to track long term changes in river channel.	Douglas County is working with the local conservation district to track changes. Refer to item #28.
	26	410 440	Identify unstable stream banks and areas with high potential for erosion.	Douglas County is working with the local conservation district to track changes. Refer to item #28.
	27	510	Promote the use of non-structural, bio-engineering (soft-engineering utilizing natural materials) techniques in river restoration projects in combination with other proven methods.	Carson Valley Conservation District utilizes these practices when appropriate.

SA #		CRS	SUGGESTED ACTION	Douglas County 2023 Update*
CHANNEL MIGRA BANK EROSION MONI	28	440 510	Update the 1996 Fluvial Geomorphic Assessment and create a sediment transport model of the Carson River.	CWSD did not get the Conserve Nevada funding for an update to the 1996 Fluvial Geomorphic Assessment, however, CWSD has identified FEMA Pre-Disaster Mitigation, BRIC, and FMA grants through NV Emergency Management; as a possible source. County would participate through CRC process to review and ground-truth its section of the river. The USACE could also submit a proposal to conduct a Fluvial Geomorphic Assessment. Alpine County is currently in the process of performing Fluvial Geomorphic Assessment on a fork of the Carson river and is going to be completed 2025. This will assist in procuring funding for the Nevada side of the Carson River study.
	29	440 510	Using the baseline conditions and recommendations from geomorphology and sediment transport analysis, create a decision matrix and prioritization plan to rank projects in Adaptive Stewardship Plan categories to reduce flood risk, damages and provide ecosystem benefits. Examples may include targeted projects that reduce sediment loads, improve access of the river to its floodplain, conservation easements and structure modifications.	No Update

SA #		CRS	SUGGESTED ACTION	Douglas County 2023 Update*
FLOODPLAIN AND FLOOD HAZARD OUTREACH AND EDUCATION (30-34)				
FLOODPLAIN AND FLOOD HAZARD OUTREACH AND EDUCATION (30-34)	30	330	Continued implementation of watershed-wide outreach and education program about floodplain importance and flooding hazards.	This program was developed in 2014 and continues throughout the watershed. (See SA #31). Significant outreach and education has occurred. The County participates in Flood Awareness outreach efforts throughout the year.
	31	330	Promote and participate in Annual Flood Awareness Week (FAW) and events throughout the year with the objective of providing information about protection of floodplains, flooding and flood hazards to the general public.	NV Department of Water Resources leads FAW Working group which includes CWSD, Federal, State and Local Jurisdictions. Significant outreach and education has occurred. Flood Awareness planning and outreach efforts are ongoing.
	32	330	Develop and update media in conjunction with FAW working group (social media, videos, brochures, web content, press releases etc.) for distribution throughout watershed with consistent messages and information for the general public.	Information posted on CWSD.org, Nevada Floods.org, National Weather Service - Reno; and County Websites and social media sites.
	33	330	Promote FAW partner websites (e.g., NevadaFloods.org, National Weather Service, CWSD, and county websites) which provide information on the Regional Floodplain Management Plan, floodplain protection, flood risk, emergency preparedness, and emergency contact information. Link to one another's websites and social media sites to amplify message.	In conjunction with Flood Awareness Campaign led by NDWR, CWSD, NOAA -NWS Reno specifically address flood risk and local jurisdictions have websites as well which also link to these websites. Information is also posted on County Websites and social media sites.
	34	330	Utilize special Events, River Work Days, and other outreach opportunities in conjunction with FAW working group to raise awareness of flooding hazards and importance of floodplains.	FAW Events occur throughout the year at such events as CWSD school outreach program, and during outreach presentations about new flood studies. Special events that could be utilized include Genoa's Candy Dance festival and Safety Day. Flood information is provided at county offices and community centers.
REDUCE INFRASTRUCTURE IMPACTS (35-39)				
REDUCE INFRASTRUCTURE IMPACTS (35-39)	35	510 540	Investigate opportunities and implement actions when feasible to remove existing restrictions, such as berms or uncertified levees, to allow flood waters to access floodplain.	N/A for county. Could possibly be done by Carson Valley Conservation District.
	36	510	Limit the use of future management measures such as dams, levees, and floodwalls.	N/A for county. Could possibly be done by Carson Valley Conservation District.
	37	540	Design future bridges and roads to protect floodplain and accommodate rather than restrict river course changes, and minimize back up of flood water.	Upsizes on Highway 88 and Martin Slough have been completed. All additional structures in the floodplain are molded to avoid adverse impact on the floodplain and river. NDOT is currently in the process of replacing bridges along Highway 88.
	38		Investigate opportunities to enhance grade control structures.	N/A for county. Could possibly be done by Carson Valley Conservation District.
	39		Inventory, categorize, and house data regarding public and private drainage and flood control infrastructure in the Carson River Watershed.	Drain and flood control infrastructure is inventoried and categorize as apart of the Stormwater Master Plan.

SA #		CRS	SUGGESTED ACTION	Douglas County 2023 Update*
ALLUVIAL FAN HAZARD REDUCTION (40-43)				
ALLUVIAL FAN HAZARD REDUCTION (40-43)	40	440	Investigate extent of potential alluvial fan flood damage and include on maps.	Investigation on potential alluvial fan flood damage is included Stormwater Master Plan.
	41	440	Conduct Area Drainage Master Plans for alluvial fans which examines infrastructure, land use, sediment transport to identify & identify alternative to mitigate and/or reduce risk.	Area Drainage Master Plans (ADMP) have been procured for Buckeye, Pinenut, Johnson Lane, and the Ruhenstroth areas.
	42	440 530	Implement studies to inform and motivate land use planning & development which protects high risk areas, and/or allows flood waters and debris flows to safely move through fan flood zones;	The implementation of the previously completed Johnson Lane Area Drainage Master Plan has began. Douglas county is now identifying funds to implement projects in other study areas.
	43		Define and implement means to protect existing open alluvial fans from development and where development exists, implement recommendations associated with SA#'s 38-40 to limit further development and/or alleviate hazards in high risk areas.	The County is taking steps to secure funding through the procurement of recent Area Drainage Master Plans (ADMP) in order to alleviate hazards in high risk areas. Current and future development can benefit from implementation of the local ADMP as per the Stormwater Master Plan. Douglas county is working with contractors for future development by having the contractors contribute to regional improvements. This prevents developments from creating adverse effects by their existence.
MINIMIZE STORMWATER IMPACTS (44-49)				
MINIMIZE STORMWATER IMPACTS (44-49)	44	450	Retain and infiltrate stormwater to reduce flood risk, capture groundwater and improve water quality.	Stormwater Master Plan promotes stormwater infiltration.
	45	450	Plan for and mitigate cumulative effects of existing watershed urbanization, including stormwater runoff, to reduce flood	Stormwater Master Plan is addressing these issue and proposes plans to mitigate cumulative hazards.
	46	450	Incorporate GI/LID methods to reduce stormwater flooding on site in all development and redevelopment proposals.	Stormwater Master Plan encourages the adoption of LID principles in Douglas County.
	47	450	Adopt model LID ordinances created for Watershed.	Stormwater Master Plan encourages the adoption of LID principles in Douglas County.
	48	320 450	Utilize best management practices to reduce stormwater/ urban runoff and mitigate stormwater flooding.	Stormwater Master Plan promotes best management practices to reduce urban runoff in Douglas County.
	49	320 450	Protect and buffer natural drainage ways (existing green infrastructure) from development to ensure historic and natural flows are maintained.	Douglas County Stormwater Master Plan

*This includes county updates from the 10/30/2024 Workshop

	SA #	CRS	SUGGESTED ACTION	Lyon County 2023 Progress
PROTECT FLOODPLAIN NATURAL FUNCTION AND VALUE (1-8) - Refer also to Stewardship Plan Table 8.8				
PROTECT FLOODPLAIN NATURAL FUNCTION AND VALUE (1-8)	1	320 420 510	Maintain Living River approach to retain river system in a more natural state that allows the river to access its floodplain. Recognize that not all areas of the river system can be allowed to migrate freely due to special designation (i.e., Superfund area) and/or existing infrastructure.	The 2018 Regional Floodplain Management Plan will be presented to Lyon County for possible adoption. The Living River approach is one of the main goals of the plan. The county also participates in the Carson River Coalition (CRC) stakeholder process.
	2	350 410	Develop, support and implement a good neighbor floodplain management policy that recognizes cumulative impacts and actions by one property owner can impact upstream, adjacent and downstream property owners.	The 2018 Regional Floodplain Management Plan will be presented to Lyon County. The plan includes a" good neighbor" floodplain management as one of it policies.Lyon County is able to track cumulative development along the rive plans by using the hydraulic model of the Carson River from the County line in Carson Canyon to the Weeks Bridge. Area Drainage Master Plans along the Highway 50 corridor also inform Lyon County staff of potential flood hazards to avoid.
	3	420	Investigate, identify, and implement areas where stream zone buffers would provide multi-objective benefits for river system and downstream communities.	Lyon County shares their work at CRC meetings. The County also works with Dayton Valley Conservation District to meet multiple objectives by doing river rehab, channel clearing and bank stabilization projects on the Carson River.
	4	310 410 530	Manage development in special flood hazard areas and other flood hazard areas (those known flood hazard areas not included on most current FIRMs) to provide public safety and protect the natural functions and benefits of floodplain lands.	Lyon County section of the Carson River was remapped using detailed methods from upstream of Weeks Bridge to Carson City / Lyon County line during Physical Map Revision (PMR), and includes a mapped floodway. Ramsey Canyon two-dimensional study was also conducted in Lyon County. Lyon County is also updating Floodplain Ordinances.
	5	320 450	Promote and utilize best management practices as a means of protecting riparian habitat.	Topic discussed in CRC Floodplain Management and Agricultural Working Group meetings as possible landowner stock fencing and watering incentives.
	ECOSYSTEM SERVICES IMPORTANT to MAINTAINING LIVING RIVER APPROACH			
	6	350 420	Consider Floodplain and flood hazards ecosystem service objectives which preserve open floodplain lands when selecting acquisition targets and establishing management strategies for open spaces.	Lyon County's Comprehensive Master Plan places high priority on moving development density out of the floodplain; open space program to be developed in the future. Rolling A Ranch is an area preserved as a natural open space area in Dayton, Nevada.
	7	520	Identify and promote options for landowner incentive programs, such as floodplain leasing program and conservation easements that provide compensation to landowners providing ecosystem services and seek funding mechanisms.	Not acted upon to date
	8	420 520	Retain lands that preserve floodplain storage which maintain and/or restore connection of river with floodplain through land acquisition, conservation easements, local open space programs, TDR and PDR Programs, and other protection methods. Pursue protection of additional acreage in flood prone areas (See UNCE 2015, Floodplain Protection Inventory for the Carson River)	Lyon County's Comprehensive Master Plan places high priority on moving development density out of the floodplain; incentive programs proposed for new development code.
HIGHER REGULATORY STANDARDS (9-11)				
HIGHER REGULATORY STANDARDS (9-11)	9	430	Periodically review county ordinances that include floodplain protection as a purpose, account for the loss of floodplain storage volume, and mitigate losses through a variety of methods.	Lyon County updated its floodplain ordinances to reduce flood risk in 2019. The county also includes Area Drainage Master Plans in its Hazard Mitigation Plans.
	10	430	Investigate, promote, and implement of additional flood protection measures that go beyond minimum FEMA requirements, such as improving community rating system.	Topic has been discussed at length in CRC meetings and Lyon County has 1ft. above BFE requirement. As part of Discovery, Lyon County identified multiple projects which are beyond FEMA requirements.
	11	430	Development and adoption of consistent floodplain management ordinance language and consistent use of hydraulic model of Carson River system.	Lyon County updated its floodplain ordinances to reduce flood risk in 2019. The county also includes Area Drainage Master Plans in its Hazard Mitigation Plans.
FLOOD DATA INFORMATION AND MAINTENANCE (12-21)				
FLOOD DATA INFORMATION AND MAINTENANCE (12-21)	12	410 440	Establish and adopt funding source, and protocol / procedures to consistently update watershed-wide unsteady state modeling to identify flood water storage requirements and to look at the cumulative effects of watershed development.	Using FEMA grant funds through CWSD, Lyon County completed unsteady state model and created draft protocol for updating said model when the Physical Map Revision of the Carson River was completed in 2016.
	13	440	Support FEMA's Map Modernization Program and encourage FEMA to update FIRMs with current and future conditions. Significant verification of topography and other variables should be conducted prior to release of draft FIRMs.	Physical Map Revision became effective 10-2016.
	14		Participate in FEMA's Cooperating Technical Partner Program.	CWSD continues to be a CTP and works with Lyon County to identify projects in the Carson River Watershed which may be of assistance to the county.
	15	410 440	Collect and Maintain up-to-date and consistent data collection which includes updating flood studies as needed and conducting new studies for significant water courses and alluvial fan areas. This data should be used to update FEMA maps and/or fill local data gaps. Complete delineation of the floodway throughout river system and incorporate into FIRMs.	Physical Map Revision became effective 10-2016. Through CRC process, county is working to identify alluvial fans. County received funding to conduct Area Drainage Master Plan in the Dayton Valley area to mitigate flood hazards and implement a plan to avoid flood hazards.
	16	410 440	Update flood studies and maps after significant flooding events.	In January and February 2017, Lyon County experienced flooding which were federally declared disasters. Flood damage affected the Carson River and alluvial fan drainages in Lyon County.
	17	410 440	Update and Maintain Elevation Reference Marks (ERM) should be as permanent monuments using NAVD88 Datum which matches base flood elevations on FEMA FIRMs.	The need for more ERMs was affirmed in the Discovery process. Lyon County ERM are in NAVD 88 datum.
	18	410 440	Develop and maintain master list of ERMs provide-to interested parties.	The need for more ERMs was affirmed in the Discovery process.
FLOOD DATA INFORMATION AND MAINTENANCE (12-21)				
FLOOD DATA INFORMATION AND MAINTENANCE (19-21)	19	350 410 440	Develop and coordinate photo-monitoring program (on-the-ground and aerial) on a watershed level to consistently document flooding and flood hazards.	The need for consistent photo-monitoring discussed in CRC River & Floodplain Working group meetings. A systematic plan to track flood events at specific sites needs to be created and implemented.
	20	350 410 440	Establish and maintain rain gage data network in each local jurisdiction.	Not acted upon to date
	21		Evaluate potential impacts due to climate variability which could include changing storm patterns, rainfall amounts, and snow levels, adding uncertainty to future conditions.	Not acted upon to date
CHANNEL MIGRATION AND BANK EROSION MONITORING (22-29)				
CHANNEL MIGRATION AND BANK EROSION MONITORING (22-29)	22	410	Document/map and update known and projected hazard areas including channel migration hazards and incorporated into planning processes.	Topic discussed in CRC meetings. Through Lyon County's 2018 update to their Multi-jurisdictional Hazard Mitigation Plan, new mitigation actions were added to the plan specifically for addressing low points along river banks at critical areas along the Carson River.
	23	440	Conduct LiDAR and/or aerial photography (on a watershed level) on a 5-year basis, or as needed, to provide updated information on channel movement and floodplain condition.	The latest survey of alluvial fan areas was conducted by USGS in Carson City, Lyon County, and Storey County in 2017.
	24	430	Conduct research and establish appropriate building set-backs in flood hazard areas to reduce severe hazards from channel migration.	Topic discussed in CRC meetings; also identified areas during 2018 Rapid Evaluation of Carson River (Plan Appendix C).
	25	410 440	Conduct and document channel cross-sectional surveys to track long term changes in river channel.	Surveys were done as part of PMR under contracts FEMA MAS-1, 2 and 3.
	26	410 440	Identify unstable stream banks and areas with high potential for erosion.	Topic discussed in CRC meetings; also identified areas during 2018 Rapid Evaluation of Carson River (Plan Appendix C).
	27	510	Promote the use of non-structural, bio-engineering (soft-engineering utilizing natural materials) techniques in river restoration projects in combination with other proven methods.	Bio-engineering techniques are being used on river restoration projects being accomplished by the Conservation District and their partners.
	28	440 510	Update the 1996 Fluvial Geomorphic Assessment and create a sediment transport model of the Carson River.	CWSD has identified FEMA Pre-Disaster Mitigation funding; USACE, and USBR Watershed grants as a possible source to update the 1996 Fluvial Geomorphic Assessment of the Carson River System. County would participate through CRC process to review and ground-truth its section of the river.
	29	440 510	Create a baseline study that informs management and project decisions regarding flood risks, damages, and ecosystem impacts.	Not acted upon to date
FLOODPLAIN AND FLOOD HAZARD OUTREACH AND EDUCATION (30-34)				

FLOODPLAIN AND FLOOD HAZARD OUTREACH AND EDUCATION (30-34)	30	330	Continued implementastion of watershed-wide outreach and education program about floodplain importance and flooding hazards.	This program was developed in 2014 and continues throughout the watershed. (See SA #31). Significant outreach and education has occurred. The County participates in Flood Awareness outreach efforts throughout the year.
	31	330	Promote and participate in Annual Flood Awareness Week (FAW) and events throughout the year with the objective of providing information about protection of floodplains, flooding and flood hazards to the general public.	NV Department of Water Resources leads FAW Working group which includes CWSD, Federal, State and Local Jurisdictions. Significant outreach and education has occurred. Flood Awareness planning and outreach efforts are ongoing.
	32	330	Develop and update media in conjunction with FAW working group (social media, videos, brochures, web content, press releases etc.) for distribution throughout watershed with consistent messages and information for the general public.	Information posted on CWSD.org, Nevada Floods.org, National Weather Service - Reno; and County Websites and social media sites.
	33	330	Promote FAW partner websites (e.g., NevadaFloods.org, National Weather Service, CWSD, and county websites) which provide information on the Regional Floodplain Management Plan, floodplain protection, flood risk, emergency preparedness, and emergency contact information. Link to one another's websites and social media sites to amplify message.	In conjunction with Flood Awareness Campaign led by NDWR, CWSD, NOAA -NWS Reno specifically address flood risk and local jurisdictions have websites as well which also link to these websites. Information is also posted on County Websites and social media sites.
	34	330	Utilize special Events, River Work Days, and other outreach opportunities in conjunction with FAW working group to raise awareness of flooding hazards and importance of floodplains.	FAW Events occur throughout the year at such events as Oodles of Noodles. , CWSD school outreach program, and during outreach presentations about new flood studies. Also provide flood information at county offices, local businesses, community center.
REDUCE INFRASTRUCTURE IMPACTS (35-39)				
REDUCE INFRASTRUCTURE IMPACTS (35-39)	35	510 540	Investigate opportunities and implement actions when feasible to remove existing restrictions, such as berms or uncertified levees, to allow flood waters to access floodplain.	Topic discussed in CRC meetings but not acted on to date.
	36	510	Limit the use of future management measures such as dams, levees, and floodwalls.	Topic discussed in CRC meetings but not acted on to date.
	37	540	Design future bridges and roads to protect floodplain and accommodate rather than restrict river course changes, and minimize back up of flood water.	Topic discussed in CRC meetings but not acted on to date.
	38		Investigate opportunities to enhance grade control structures.	Topic discussed in CRC meetings but not acted on to date.
	39		Inventory, categorize, and house data regarding public and private drainage and flood control infrastructure in the Carson River Watershed.	Not acted upon to date
ALLUVIAL FAN HAZARD REDUCTION (40-43)				
ALLUVIAL FAN HAZARD REDUCTION (40-43)	40	440	Investigate extent of potential alluvial fan flood damage and include on maps.	Since 2018, several Area Drainage Master Plans (ADMPs) have identified and mapped exisiting flood damage on alluvial fan along the Highway 50 corridor in North Dayton, South Dayton, Stagecoach and North Silver Springs.
	41	440	Conduct Area Drainage Master Plans for alluvial fans which examines infrastructure, land use, sediment transport to identify & identify alternative to mitigate and/or reduce risk.	Since 2018, several Area Drainage Master Plans have provided base level engineering data along the Highway 50 corridor in North Dayton, South Dayton, Stagecoach and North Silver Springs. In Lyon County, these plans are adopted into the county's hazard mitigation plan. Several have been added to a flood hazard web viewer.
	42	440 530	Implement studies to inform and motivate land use planning & development which protects high risk areas, and/or allows flood waters and debris flows to safely move through fan flood zones;	The county considers data from ADMPs to inform and motivate land use planning in the Carson River Watershed.
	43		Define and implement means to protect existing open alluvial fans from development and where development exists, implement recommendations associated with SA#'s 38-40 to limit further development and/or alleviate hazards in high risk areas.	Lyon County updated drainage guideline to further encompass ADMPS.
MINIMIZE STORMWATER IMPACTS (44-49)				
MINIMIZE STORMWATER IMPACTS (44-49)	44	450	Retain and infiltrate stormwater to reduce flood risk, capture groundwater and improve water quality.	New Suggested Action
	45	450	Plan for and mitigate cumulative effects of existing watershed urbanization, including stormwater runoff, to reduce flood	Topic is discussed in CRC meetings; and potential projects throughout the county have been discussed in the process of updating Discovery report. Dayton Valley ADMP will identify alluvial fan flooding as it relates to urbanization.
	46	450	Incorporate GI/LID methods to reduce stormwater flooding on site in all development and redevelopment proposals.	No requirements for LID in Lyon County; however, Lyon County will be considering adding LID language to their floodplain ordinance. Through CRC process, county worked with CWSD to create Low Impact Development in the Carson River Watershed. http://www.cwsd.org/wp-content/uploads/2015/07/2015-04-07-LID-Carson-Watershed.pdf
	47	450	Adopt model LID ordinances created for Watershed.	LID Ordinance being conducted through CWSD with 208 Funding.
	48	320 450	Utilize best management practices to reduce stormwater/ urban runoff and mitigate stormwater flooding.	Not acted upon to date
	49	320 450	Protect and buffer natural drainage ways (existing green infrastructure) from development to ensure historic and natural flows are maintained.	No update, new suggested action

SA #		CRS	SUGGESTED ACTION	Storey County 2023 Update
PROTECT FLOODPLAIN NATURAL FUNCTION AND VALUE (1-8) - Refer also to Stewardship Plan Table 8.8				
PROTECT FLOODPLAIN NATURAL FUNCTION AND VALUE (1-8)	1	320 420 510	Maintain Living River approach to retain river system in a more natural state that allows the river to access its floodplain. Recognize that not all areas of the river system can be allowed to migrate freely due to special designation (i.e., Superfund area) and/or existing infrastructure.	The Regional Floodplain Management Plan was adopted by Storey County in 2018. The Living River approach is one of the main goals of the plan. The county continues to partcipate in the Carson River Coalition (CRC) stakeholder process.
	2	350 410	Develop, support and implement a good neighbor floodplain management policy that recognizes cumulative impacts and actions by one property owner can impact upstream, adjacent and downstream property owners.	The Regional Floodplain Management Plan was adopted by Storey County in 2018 which states a good neighbor floodplain management as one of it policies. .
	3	420	Investigate, identify, and implement areas where stream zone buffers would provide multi-objective benefits for river system and downstream communities.	Storey County has identified open space areas that meet multi-objective goals; refer to Suggested Action (SA) #6. The Carson River Mercury Superfund Site also constrains development in Storey County.
	4	310 410 530	Manage development in special flood hazard areas and other flood hazard areas (those known flood hazard areas not included on most current FIRMs) to provide public safety and protect the natural functions and benefits of floodplain lands.	Not applicable as Storey County does not have any mapped special flood hazard areas along the Carson River or Six-Mile Canyon creek..
	5	320 450	Promote and utilize best management practices as a means of protecting riparian habitat.	While Storey County lands are not adjacent to the Carson River, Storey County has worked with The Nature Conservancy to restore and maintain McCarren Ranch Preserve. This preserve encompasses 11 miles and over 800 acres along the Truckee River. This project demonstrates the County's work to utilize BMPs as a means of protecting riparian habitat.
	ECOSYSTEM SERVICES IMPORTANT to MAINTAINING LIVING RIVER APPROACH			
	6	350 420	Consider Floodplain and flood hazards ecosystem service objectives which preserve open floodplain lands when selecting acquisition targets and establishing management strategies for open spaces.	See response to SA #5 above.
	7	520	Identify and promote options for landowner incentive programs, such as floodplain leasing program and conservation easements that provide compensation to landowners providing ecosystem services and seek funding mechanisms.	N/A in Storey County
	8	420 520	Retain lands that preserve floodplain storage which maintain and/or restore connection of river with floodplain through land acquisition, conservation easements, local open space programs, TDR and PDR Programs, and other protection methods. Pursue protection of additional acreage in flood prone areas (See UNCE 2015, Floodplain Protection Inventory for the Carson River)	See response to SA #5 above.

SA #		CRS	SUGGESTED ACTION	Storey County 2023 Update
HIGHER REGULATORY STANDARDS (9-11)				
HIGHER REGULATORY STANDARDS (9-11)	9	430	Periodically review county ordinances that include floodplain protection as a purpose, account for the loss of floodplain storage volume, and mitigate losses through a variety of methods.	Storey County did not opt to change ordinances. The floodplains are already developed. Storey included the community to weigh-in on the decsion.
	10	430	Investigate, promote, and implement of additional flood protection measures that go beyond minimum FEMA requirements, such as improving community rating system.	Storey County did not opt to change ordinances. The floodplains are already developed. Storey included the community to weigh-in on the decsion.
	11	430	Development and adoption of consistent floodplain management ordinance language and consistent use of hydraulic model of Carson River system.	Storey County did not opt to change ordinances. The floodplains are already developed. Storey included the community to weigh-in on the decsion.
FLOOD DATA INFORMATION AND MAINTENANCE (12-21)				
FLOOD DATA INFORMATION AND MAINTENANCE (12-21)	12	410 440	Establish and adopt funding source, and protocol / procedures to consistently update watershed-wide unsteady state modeling to identify flood water storage requirements and to look at the cumulative effects of watershed development.	N/A; the Carson River does not flow through Storey County.
	13	440	Support FEMA's Map Modernization Program and encourage FEMA to update FIRMs with current and future conditions. Significant verification of topography and other variables should be conducted prior to release of draft FIRMs.	This element is ongoing with FEMA.
	14		Participate in FEMA's Cooperating Technical Partner Program.	CWSD continues to be a Cooperating Technical Partner & Counties provide input through CRC stakeholder process.
	15	410 440	Collect and Maintain up-to-date and consistent data collection which includes updating flood studies as needed and conducting new studies for significant water courses and alluvial fan areas. This data should be used to update FEMA maps and/or fill local data gaps. Complete delineation of the floodway throughout river system and incorporate into FIRMs.	Even though the Carson River does not flow through Storey County, up to date and consistent data collection provides accurate information for planning and hazard mitigation.
	16	410 440	Update flood studies and maps after significant flooding events.	Though not in the Carson River corridor, it is important to update ADMPs after flash floods. In 2017 Mark Twain Community in North Dayton Valley experienced flash flooding. In winter 2022-2023, there was exceptional low elevation snow. A rain on snow storm in March created unforseen winter flooding which closed Six Mile Canyon for 2 days because debris flowed over the road.
	17	410 440	Update and Maintain Elevation Reference Marks (ERM) should be as permanent monuments using NAVD88 Datum which matches base flood elevations on FEMA FIRMs.	There is a need for updated ERM's. There is a chance that they are incorrect and need to be reaffirmed.
	18	410 440	Develop and maintain master list of ERMs provide-to interested parties.	The need for master list of ERMs was affirmed in the CRC process.

SA #		CRS	SUGGESTED ACTION	Storey County 2023 Update
FLOOD DATA INFORMATION AND MAINTENANCE (12-21)				
FLOOD DATA INFORMATION AND MAINTENANCE (19-21)	19	350 410 440	Develop and coordinate photo-monitoring program (on-the-ground and aerial) on a watershed level to consistently document flooding and flood hazards.	Storey County does not currently have a photo-monitoring program or process for documenting floodning and flood hazards. However, crews that respond to such events are required to take pictures on the scene.
	20	350 410 440	Establish and maintain rain gage data network in each local jurisdiction.	N/A. Storey County does not curretnly maintain any rain gages. However, they would be helpful prediction tool in the steep topography of the Virginia City, Gold Hill and Six Mile Canyon. did express high intrest. Desired locations for rain gages include Mt. Davidsion, Six-mile, Mark Twain, Long Valley Creek, and Summit Street.
	21		Evaluate potential impacts due to climate variability which could include changing storm patterns, rainfall amounts, and snow levels, adding uncertainty to future conditions.	Storey County needs baseline data before it can determine if climate variability is impacting the county.
CHANNEL MIGRATION AND BANK EROSION MONITORING (22-29)				
CHANNEL MIGRATION AND BANK EROSION MONITORING (22-29)	22	410	Document/map and update known and projected hazard areas including channel migration hazards and incorporated into planning processes.	Even though the Carson River does not flow through Storey County, it is important to document channel migration and other flood hazards withn the county.
	23	440	Conduct LiDAR and/or aerial photography (on a watershed level) on a 5-year basis, or as needed, to provide updated information on channel movement and floodplain condition.	The USGS / FEMA LiDAR update provided up to date topography for its recent Area Drainage Master Plans.
	24	430	Conduct research and establish appropriate building set-backs in flood hazard areas to reduce severe hazards from channel migration.	Even though the Carson River does not flow through Storey County, set backs in flash flood channels could reduce flood hazards withn the county.
	25	410 440	Conduct and document channel cross-sectional surveys to track long term changes in river channel.	Even though the Carson River does not flow through Storey County, it is important to conduct cross-sectional surveys to track lo9ng terms changes in flash flood channels.
	26	410 440	Identify unstable stream banks and areas with high potential for erosion.	Even though the Carson River does not flow through Storey County, it is important to identify unsteady stream banks and areas with high potential for erossion along ephemeral streams.
	27	510	Promote the use of non-structural, bio-engineering (soft-engineering utilizing natural materials) techniques in river restoration projects in combination with other proven methods.	The creek in Six - Mile canyon shares its space with the Highway from Virginia City to Dayton. The need to keep the highway open limits the use of non-structural and other soft engineering techniques for channel restoration in this area.
	28	440 510	Update the 1996 Fluvial Geomorphic Assessment and create a sediment transport model of the Carson River.	N/A in Storey County portion of the Carson River Watershed, as the Carson River does not flow through Storey County.
	29	440 510	Create a baseline study that informs management and project decisions regarding flood risks, damages, and ecosystem impacts.	N/A in Storey County portion of the Carson River Watershed, as the Carson River does not flow through Storey County.

	SA #	CRS	SUGGESTED ACTION	Storey County 2023 Update
			FLOODPLAIN AND FLOOD HAZARD OUTREACH AND EDUCATION (30-34)	
FLOODPLAIN AND FLOOD HAZARD OUTREACH AND EDUCATION (30-34)	30	330	Continued implementastion of watershed-wide outreach and education program about floodplain importance and flooding hazards.	Storey County staff participates in Flood Awareness outreach efforts throughout the year. Outreach and Education is more frequent when issues appear. The county will continously provide education to the public through news letters, Sheriffs Night out, and social media. Message boards are also updated frequently in highly trafficed buildings.
	31	330	Promote and participate in Annual Flood Awareness Week (FAW) and events throughout the year with the objective of providing information about protection of floodplains, flooding and flood hazards to the general public.	Storey County staff participates in FAW planning and typically issues a flood awareness week proclamation in November.
	32	330	Develop and update media in conjunction with FAW working group (social media, videos, brochures, web content, press releases etc.) for distribution throughout watershed with consistent messages and information for the general public.	Shares information posted on CWSD.org and Nevada Floods.org, and County Websites and social media sites during flood awareness week and other times if it is pertinent.
	33	330	Promote FAW partner websites (e.g., NevadaFloods.org, National Weather Service, CWSD, and county websites) which provide information on the Regional Floodplain Management Plan, floodplain protection, flood risk, emergency preparedness, and emergency contact information. Link to one another's websites and social media sites to amplify message.	In conjunction with Flood Awareness Campaign led by NDWR, Storey County provides SWAG items and informational materials where the public can take it home. Staff frequently refills bulletin board with Ready,gov and Nevadaflood.org informatioon.
	34	330	Utilize special Events, River Work Days, and other outreach opportunities in conjunction with FAW working group to raise awareness of flooding hazards and importance of floodplains.	FAW Events occur throughout the year at such events as Sheriff's Night Out, Agricultural Safety Day at the Carson City Fair, CWSD school outreach program, and during outreach presentations about new flood studies. Also provide flood information at county offices, local businesses, community center.
			REDUCE INFRASTRUCTURE IMPACTS (35-39)	
REDUCE INFRASTRUCTURE IMPACTS (35-39)	35	510 540	Investigate opportunities and implement actions when feasible to remove existing restrictions, such as berms or uncertified levees, to allow flood waters to access floodplain.	N/A in Storey County
	36	510	Limit the use of future management measures such as dams, levees, and floodwalls.	N/A in Storey County
	37	540	Design future bridges and roads to protect floodplain and accommodate rather than restrict river course changes, and minimize back up of flood water.	N/A in Storey County
	38		Investigate opportunities to enhance grade control structures.	N/A in Storey County
	39		Inventory, categorize, and house data regarding public and private drainage and flood control infrastructure in the Carson River Watershed.	Area Drainage Master Plans (ADMP) in the county inventory and categorize public and private drainage and infrastructure.

SA #		CRS	SUGGESTED ACTION	Storey County 2023 Update
ALLUVIAL FAN HAZARD REDUCTION (40-43)				
ALLUVIAL FAN HAZARD REDUCTION (40-43)	40	440	Investigate extent of potential alluvial fan flood damage and include on maps.	The county has completed 2 Area Drainage Master Plans - one in Dayton Valley and one that encompasses Virginia City and Six-Mile Canyon. Storey County has used the information from these plans to guid their planning and update has been completed and the county plans on updating additional areas as funding is availble. Area Drainage Master Plan (ADMP) has been completed for Dayton Valley, Virginia City, and Six-mile Canyon. There are continious flash flooding events due to steep terrain and alluvial fans in the county.
	41	440	Conduct Area Drainage Master Plans for alluvial fans which examines infrastructure, land use, sediment transport to identify & identify alternative to mitigate and/or reduce risk.	Area Drainage Master Plan (ADMP) has been finalized for Dayton Valley, Virginia City, and Six-mile Canyon.
	42	440 530	Implement studies to inform and motivate land use planning & development which protects high risk areas, and/or allows flood waters and debris flows to safely move through fan flood zones;	Area Drainage Master Plan (ADMP) has been finalized for Dayton Valley, Virginia City, and Six-mile Canyon.
	43		Define and implement means to protect existing open alluvial fans from development and where development exists, implement recommendations associated with SA#'s 38-40 to limit further development and/or alleviate hazards in high risk areas.	Storey County has adopted Area Drainage Master Plans and uses them in its planning.
MINIMIZE STORMWATER IMPACTS (44-49)				
MINIMIZE STORMWATER IMPACTS (44-49)	44	450	Retain and infiltrate stormwater to reduce flood risk, capture groundwater and improve water quality.	Storey County built a new stormwater system with a USDA grant. Stormwater retention is complicated due to the steep terrain from the mountains in the area.
	45	450	Plan for and mitigate cumulative effects of existing watershed urbanization, including stormwater runoff, to reduce flood	Storey County completed an overhaul of the Water and Stormwater System in Virginia City with USDA funding. Prior to the funding they were on the same system.
	46	450	Incorporate GI/LID methods to reduce stormwater flooding on site in all development and redevelopment proposals.	Storey county development is limited because of private land and geogrphy. Therefore, it is difficult encourage and incorporate LID pronciples.
	47	450	Adopt model LID ordinances created for Watershed.	Storey County does not plan to utilize LID model ordinances at this thism.
	48	320 450	Utilize best management practices to reduce stormwater/ urban runoff and mitigate stormwater flooding.	Storey County does not plan to utilize BMPs at this thism.
	49	320 450	Protect and buffer natural drainage ways (existing green infrastructure) from development to ensure historic and natural flows are maintained.	No update, new suggested action

APPENDIX F: CHARTER AND FEMA CTP AGREEMENT

Risk MAP Charter for the Carson River Watershed

Purpose:
Working in a close collaborative effort, Carson Water Subconservancy District (CWSD), FEMA Region IX (FEMA), U.S. Army Corps of Engineers (USACE), U.S. Geological Survey (USGS), U.S. Department of the Interior Bureau of Reclamation (USBR), State NFIP Coordinator, State Hazard Mitigation Office, and other partners (as listed on page 5) will identify, assess, communicate, and plan for flood risk within the Carson River Watershed (watershed), which includes portions of Alpine County in California and Douglas, Carson City, Storey, Lyon, and Churchill Counties in Nevada. The flood risk information provided can be used to enhance hazard mitigation plans, make informed decisions to improve resilience after flooding, protect the beneficial functions of floodplains, and raise awareness about local flood risks.

This charter:

- Details the long-term flood hazard mapping vision for the watershed;
- Describes the desired mapping, assessment, planning information, and planning products;
- Describes the assistance that CWSD and FEMA will provide;
- Summarizes local flooding concerns and indicates areas where floodplain changes are expected; and
- Describes the roles and responsibilities of the CWSD, FEMA, and other signatory partners.

Watershed Vision:
In 2008, all counties along the Carson River adopted the "Carson River Watershed Floodplain Management Plan" (FPM Plan) that describes the long-term goals and objectives for floodplain management. These goals are based on identification and mapping of floodplains to create a broad-based awareness of flood hazards and provide the data necessary to support community floodplain management programs. The mapping program will provide many benefits to watershed communities, property owners, and citizens. These include:

- Increased public awareness and action to reduce risk to life and property;
- Ability to build upon flood hazard data and maps produced during the Flood Map Modernization (Map Mod) program;
- Assess present and future risk;
- Address gaps in flood hazard data to form a solid foundation for risk assessment and floodplain management and provide entities with information needed to mitigate flood-related risk;
- Protection of the natural and beneficial function of drainage-ways and floodplains, including trail corridors, parks, recreational areas, wildlife habitat, flood storage, and groundwater recharge; and,
- Encouraging "Good Neighbor Policies" throughout all communities within the watershed.

Mapping and Assessment:
The watershed experiences flooding incidents on an average of every five years. Types of flood hazards include riverine and alluvial fan flooding and debris flows. Major flood events are typically the result of rain-on-snow events. Flood storage in the upper watershed is limited and available storage is not regulated. Therefore, flood flows are not actively managed and large flows can occur downstream. The watershed contains areas of open floodplains that are continually under threat of change and development. The FPM Plan calls for the protection of the natural function of these floodplains, especially lands within Carson Valley, which provide the bulk of the flood storage for the entire watershed.

Based on previous studies, information obtained during community public meetings for the development of the FPM Plan, and discovery meetings for mapping activity statements, a Five-Year Master Mapping Plan was developed for the watershed. The plan identifies the sequence of work to be performed in order to meet the goals and objectives for floodplain mapping and associated assessments and is consistent with the community goals described in the FPM Plan.

Regulatory Products:
FEMA will provide Alpine, Douglas, Carson City, Lyon, and Churchill Counties with the following updated regulatory products to support floodplain management and flood insurance administration.

- **Flood Insurance Study (FIS) Report:** The FIS describes the county's flood history and provides technical information on the study.
- **Flood Insurance Rate Map (FIRM):** The FIRM identifies the county's flood hazard zones, base flood elevations, and floodway boundaries. This map is also used to determine where flood insurance may be required.

Flood Risk Products:
CWSD and partners will work closely with FEMA to produce the products listed below which identify locations and causes of flood hazard changes and quantify the risks associated with those changes. This will allow Alpine, Douglas, Carson City, Lyon, and Churchill Counties to use these updated data and products to make informed hazard mitigation, land use and development, and emergency management decisions.

- **Changes Since Last Flood Insurance Rate Map (FIRM):** Changes since the last FIRM identify areas where the floodplain, floodway, and/or flood zone designations have changed since the previous flood study. Engineering factors that may have contributed to any changes will also be identified.
- **Areas of Mitigation Interest:** Areas of mitigation interest identifies areas where conditions may contribute to the severity of the flood hazard and associated losses. These include areas with a history of flood claims, hydraulic or other structures that contribute to backwater impacts, and areas experiencing land use change or development.

FEMA Resources to Support Flood Mitigation Actions:
FEMA encourages floodplain management activities that exceed minimum requirements through programs such as the Community Rating System (CRS). The watershed currently has two CRS communities, Douglas County and Carson City. FEMA also offers Hazard Mitigation Assistance grant programs that fund eligible mitigation activities which reduce disaster losses and protect life and property from future disaster damage. Information on these programs will be provided, along with other related State, Federal, and association resources throughout the project.

Communication and Coordination:
FEMA, CWSD, and partners will work together to establish a consistent flow of information about project status, timelines, and next steps. In addition to regular status reports, CWSD will coordinate with the counties, cities, and other entities in the watershed. CWSD will establish a Flood Mapping Project Management Team (PMT) that will meet on a regular basis to ensure that the goals of this charter are implemented in a coordinated manner. The PMT includes representatives from all counties, cities, Federal, State, and other governmental entities throughout the watershed. CWSD is also the coordinating entity for the Carson River Coalition (CRC), a large watershed-wide stakeholder group. The CRC will be provided opportunities to review and comment on mapping programs and the implementation of the living river concept as described in the adopted Carson River Watershed Regional Floodplain Management Plan.

FEMA will work with Alpine, Douglas, Carson City, Lyon, and Churchill Counties to enhance their ability to communicate flood hazards and associated risk to people who live and work within the watershed.

Specific meetings for each phase of mapping include:

- **PMT Meetings**: These meetings will focus on setting project expectations, roles and responsibilities of the PMT, and on validating and gathering data.
- **Community Coordination Officer (CCO) Meeting/Open House**: Local officials will be provided with FIS and FIRM information and requirements for map adoption. Meetings will be closely followed by open house meetings where FEMA, CWSD, and local community officials will present project results to local citizens and explain the impact that the results will have on development, planning, and flood insurance.
- **Flood Study Review Meeting**: Local officials, State, Federal, Tribal, and non-governmental entities will be provided the opportunity to view and comment on drafts of the engineering analyses and flood risk data. This meeting may also include highlights of hazard mitigation planning and implementation of best management practices to reduce flood hazards in the watershed.

Roles and Responsibilities:
This Risk MAP Charter represents a good-faith effort by all parties to share data, communicate findings, and plan mitigation activities to protect the communities within the watershed from flood risk. It is not legally binding nor does it preclude a community from participating in the FIRM appeal process. The parties listed in the signature block

below agree to collaborate on flood hazard identification activities, risk analysis products, and will consult with each other to integrate contributions into flood hazard identification efforts. It is intended to provide a common "Good Neighbor" strategy to address flood hazards and increase resilience within the watershed.

FEMA and CWSD will provide local officials with regular updates on project status, the data and products described above, and outreach guidance to include local awareness of flood risk. These efforts will better enable local communities to take action to reduce risk, through the adoption of the maps, development or enhancement of mitigation plans, and increased communication with citizens to inform them of their risk and the steps that they can take to mitigate that risk.

Alpine, Douglas, Carson City, Lyon, and Churchill Counties, and other entities will provide input and updates throughout the study process to verify data and ensure that the information accurately represents their communities.

CWSD, FEMA, and local officials agree to communicate as needed over the course of each project outlined in the mapping program to review project milestones, outcomes, and impacts. CWSD and the PMT will meet at least twice a year to discuss, plan, and coordinate all mapping program projects.

If for any reason an entity who is a signatory to this document wishes to withdraw their participation from the Risk MAP Charter, they may do so at any time by submitting a written request to CWSD.

We, the undersigned, agree to work together to implement this Risk MAP Charter for the Carson River Watershed to the best of our abilities and within our legal authorities and delegations.

Chuck Roberts, Chairman
Carson Water Subconservancy District
Date Signed: 2/28/12

Sally Ziolkowski, Director
FEMA Region IX Mitigation Division
Date Signed: 2/13/2012

Alicia Kirchner, Chief
USACE Sacramento District,
Planning Division
Date Signed: 3-15-12

Kim Davis, NFIP Coordinator Jason King, State Engineer
Nevada Division of Water Resources
Date Signed: 12/28/12

Elizabeth Ashby
Nevada Department of Public Safety
State Hazard Mitigation Office
Date Signed: 23 Feb 2012

Henry Skip Veatch, Chairman
Board of Supervisors
Alpine County, California
Date Signed: 2/21/2012

Lee Bonner, Chairman
Board of Commissioners
Douglas County, Nevada
Date Signed: 3/9/12

Bob Crowell, Mayor
Carson City, Nevada
Date Signed: 2/14/2012

Chuck Roberts, Chairman
Board of Commissioners
Lyon County, Nevada
Date Signed: 2/23/12

Norman Frey, Chairman
Board of Commissioners
Churchill County, Nevada
Date Signed: February 15, 2012

Kenneth Parr, Area Manager
U.S. Bureau of Reclamation
Lahontan Regional Office
Date Signed: 04/16/12

Ernest Schank, President of the Board of Directors, Truckee-Carson Irrigation District
Date Signed: 4/11/2012

Jon Mittelstadt, Meteorologist in Charge
National Oceanic & Atmospheric Administration
National Weather Service - Reno, NV
Date Signed: 4-26-2012

Alpine, Douglas, Carson City, Lyon, Storey, and Churchill Counties, and other entities will provide input and updates throughout the study process to verify data and ensure that the information accurately represents their communities.

CWSD, FEMA, and local officials agree to communicate as needed over the course of each project outlined in the mapping program to review project milestones, outcomes, and impacts. CWSD and the PMT will meet at least twice a year to discuss, plan, and coordinate all mapping program projects.

If for any reason an entity who is signatory to this document wishes to withdraw their participation from the Risk MAP Charter, they may do so at any time by submitting a written request to CWSD.

We, the undersigned, agree to work together to implement this Risk MAP Charter for the Carson River Watershed to the best of our abilities and within our legal authorities and delegations.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be signed and intend to be legally bound thereby.

STOREY COUNTY

Marshall McBride, Chairman — Date
Storey County Board of County Commissioners

10-4-16

ATTEST:

Vanessa Stephens, Clerk-Treasurer

Cooperating Technical Partners
Memorandum of Agreement

FEDERAL EMERGENCY MANAGEMENT AGENCY

and the

CARSON WATER SUBCONSERVANCY DISTRICT, NEVADA

AGREEMENT is made on *(date)* June 6, 2005, by these parties: Carson Water Subconservancy District and the Federal Emergency Management Agency (FEMA).

BECAUSE the National Flood Insurance Program (NFIP) established by the National Flood Insurance Act of 1968 has several purposes, the most significant being

- To better indemnify individuals from losses through the availability of flood insurance;
- To reduce future flood damages through community floodplain management regulations; and
- To reduce costs for disaster assistance and flood control.

BECAUSE a critical component of this program is the identification and mapping of the nation's floodplains to create a broad-based awareness of the flood hazard and to provide the data necessary for community floodplain management programs and to actuarially rate flood insurance;

BECAUSE the Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program (NFIP) and is authorized by §1360 of the National Flood Insurance Act of 1968, as amended (42 U.S.C. 4101), to establish and update flood-risk zone data in floodplain areas. Further, in the identification of flood-prone areas, FEMA is authorized to consult with, receive information from, and enter into agreements or other arrangements with the head of any State, regional, or local agency;

BECAUSE FEMA encourages strong Federal, State, regional, and local partnerships for the purposes of reducing flood losses and disaster assistance; and FEMA and its State, regional, and local partners have determined that it is advantageous to encourage and formalize greater cooperation in the flood hazard identification and mapping processes; and many communities and the agencies that serve them have developed considerable technical capabilities and resources that provide the opportunity to improve and expand the collection, development, and evaluation of flood hazard data; and

BECAUSE the Carson Water Subconservancy District has expressed a desire to perform certain functions in the flood hazard identification process and has provided evidence that it has sufficient technical capability and will dedicate the resources necessary to perform those functions.

NOW THEREFORE, it is mutually agreed that the parties enter into this agreement to work together to create and maintain accurate, up-to-date flood hazard data for the counties of Douglas, Carson City, Churchill and Lyon, Nevada and Alpine, California, subject to the terms and conditions recited below.

1. CONSULTATIONS

The parties shall collaborate on flood hazard identification activities and shall consult with each other to fully integrate each other's contributions into flood hazard identification efforts.

2. EVALUATION AND REPORTING

The parties shall annually review the partnership created by the agreement to determine and document the activities undertaken to maintain accurate flood hazard data.

3. RESOURCE COMMITMENT

The parties agree to commit the appropriate human, technical, and available financial resources sufficient to coordinate effectively with all entities impacted by flood hazard identification efforts to implement this agreement.

4. STANDARDS

Unless otherwise agreed to by the parties, all flood hazard identification activities will be accomplished in accordance with the standards documented in *Guidelines and Specifications for Flood Hazard Mapping Partners*, dated April 2003, and all subsequent revisions.

5. SPECIFIC INITIATIVES

When specific initiatives, projects, or activities are to be performed, they will be forward through and negotiated by the Carson Water Subconservancy District and shall be attached as negotiated Mapping Activity Statement (MAS) items. For this Memorandum of Agreement to go into effect, no MAS items are required.

6. TERM

The respective duties, responsibilities and commitments of the parties in this agreement shall begin on the date this Agreement is signed by the parties and may be periodically renewed, revised, or terminated at the option of any of the parties. The parties agree that a 60-day notice shall be given prior to the termination of this agreement.

THEREFORE, each party has caused this Agreement to be executed by its duly authorized representatives on the date mentioned above.

Carson Water Subconservancy, Authorized Representative*

4/21/2005
Date

FEMA authorized representative

06/6/05
Date

* The Carson Water Subconservancy District is composed of the following entities:

Carson City, Nevada
Churchill County, Nevada
Douglas County, Nevada
Lyon County, Nevada
Alpine County, California

APPENDIX G: CARSON RIVER FLOODPLAIN MANAGEMENT PLAN ADOPTION DOCUMENTS

COUNTY OF ALPINE
Board of Supervisors

MINUTE ORDER 2025-11

BOARD OF SUPERVISORS
COUNTY OF ALPINE

TO: Deborah Neddenriep, Carson Water Subconservancy District

FROM: Alpine County Board of Supervisors

RE: Action on July 15, 2025; Action Item 10.1

10.1. Presentation by Carson Water Sub Conservancy District regarding the 2025 Carson Rive Floodplain Management Plan (CRFMP) and request to adopt the 2025 update to the Carson Rive Floodplain Management Plan- Community Development Director

At the regular meeting of the **ALPINE COUNTY BOARD OF SUPERVISORS** held on July 15, 2025, it was:

MOTION Evan Mecak / SECONDED David Griffith adopting the 2025 to the Carson River Floodplain Management Plan.
AYES: Charles Dobson, Irvin Jim, Terry Woodrow, David Griffith, Evan Mecak;
MOTION PASSED.

DATED: Aug. 8, 2025

TEOLA L. TREMAYNE
Alpine County Clerk and ex officio Clerk of
the Board of Supervisors

P.O. Box 158 / 99 Water Street, Markleeville, CA 96120 (530) 694-2281 / Fax (530) 694-2491
Email County Clerk: clerk@alpinecountyca.gov

Churchill County
Agenda Report

Date Submitted: May 29, 2025

Agenda Item #: Appointments - C
Meeting Date Requested: July 16, 2025

To: Board of County Commissioners
From: Debbie Neddenriep, Water Resource Specialist 2
Subject Title: Consideration and possible action re: Adoption of the 2025 update to the Carson River Floodplain Management Plan.

Type of Action Requested: Adopt

Does this action require a Business Impact Statement? No

Findings of Fact Motion: N/A

Recommend Board Action: motion to re-adopt the Carson River Floodplain Management Plan with 2025 update.

Discussion: Ed James, General Manager for CWSD, will present the 2025 Carson River Floodplain Management Plan (CRFMP) for county adoption. Previous iterations were adopted by Churchill County in 2008, 2013, and 2018. The presentation will describe the plan goals, objectives, and strategic actions. The update was multi-year process that included several meetings with various floodplain administrators in the watershed and other interested stakeholders, interviews of county staff and other stakeholders like Nevada Division of Water Resources (NDWR). Comments were solicited and incorporated into the final plan.. Below is a link to the full draft report:

2025 Carson River Floodplain Management Plan

Due to the size of appendices, it is provided on a separate link:

2025 Carson River Floodplain Management Plan Appendices

For your convenience a summary of the main report should be included with the Board package. At the Board meeting, staff will go over the plan. Below is a summary of some of the changes to the plan.

a. Significantly updated document formatting. Edited plan for accuracy and reading ease.
b. Updated and added to Table of Contents, tables, figures, and abbreviations.
c. Sections 3.1.2. and 4.8 - Expanded Stormwater section to include LID solutions.
d. Added NEW Section (Section 5 – Pathways to Overcome Barriers to Mitigation)
e. County Suggested Actions (SA's) were cleaned up and stormwater SA's were re-worded.

17. SHERIFF

17.a FOR DISCUSSION ONLY: PRESENTATION OF A BIANNUAL REPORT ON CARSON CITY JAIL CONDITIONS AND INFORMATION CONCERNING DEATHS OF PRISONERS WITHIN THE JAIL.

(9:37:01) – Mayor Bagwell introduced the item. Undersheriff Jarome Tushbant and Lieutenant Matthew Smith gave background, and Lieutenant Smith reviewed the Staff Report and the accompanying State of the Jail presentation, noting that no deaths had occurred at the jail in the past six months. Both also responded to clarifying questions. Supervisor White inquired about detox situations, and Lieutenant Smith explained that detoxification from Fentanyl had been one of their most frequent issues, adding that those inmates are immediately referred to the medical staff or the hospital. Supervisor Schuette specifically highlighted and praised the efforts of the Family Services Unit. This item was not agendized for action.

18. PUBLIC WORKS

18.a FOR POSSIBLE ACTION: DISCUSSION AND POSSIBLE ACTION REGARDING A PROPOSED RESOLUTION ADOPTING THE CARSON RIVER WATERSHED REGIONAL FLOODPLAIN MANAGEMENT PLAN 2025 UPDATE ("PLAN").

(9:54:04) – Mayor Bagwell introduced the item. Ed James, General Manager of the Carson Water Subconservancy District (CWSD), reviewed the Carson River Watershed Regional Floodplain Management Plan's 2025 update, which is incorporated into the record, including the Plan goals, objectives, and strategic actions. The Supervisors thanked Mr. James, and Mayor Bagwell entertained public comments; however, none were forthcoming. She then entertained a motion.

(10:07:29) – Supervisor Schuette moved to adopt Resolution No. 2025-R-20. Supervisor Giomi seconded the motion.

RESULT:	**APPROVED (5-0-0)**
MOVER:	Supervisor Schuette
SECONDER:	Supervisor Giomi
AYES:	Supervisors Giomi, Horton, Schuette, White, and Mayor Bagwell
NAYS:	None
ABSTENTIONS:	None
ABSENT:	None

(10:08:38) – Mayor Bagwell recessed the meeting.

(10:14:58) – Mayor Bagwell reconvened the meeting. A quorum was still present.

19. COMMUNITY DEVELOPMENT

Churchill County
Agenda Report

i. Added an additional SA (#49): "Protect and buffer natural drainage ways (existing green infrastructure) from development to ensure historic and natural flows are maintained."

Appendices substantially modified include:
Appendix A Floodplain Management Plan Update/Revision Process and Meeting Notes
Appendix C ONLY Appendix E of 2018 Risk MAP Discovery was updated. This section updates future data needs.
Appendix D Updated and added CWSD Project Report Links, FEMA County Flood Insurance Rate Maps (FIRMs) Links
Appendix E Updated County Progress on Suggested Actions (2023)
Appendix G Adoption of CRFMP – these documents will be added after county adoption.

Appendices that received no modification:
Appendix B Rapid Evaluation

Community Rating System (CRS) Addendum: A CRS crosswalk will be created for this plan and incorporated as an addendum to this document. CWSD is currently waiting to make this CRS crosswalk as there have been significant changes proposed to the rating system. This document is intended to assist CRS communities document floodplain management plan credits.

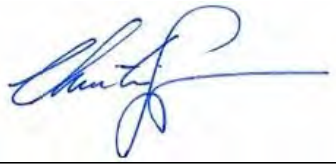
The revised CRFMP was adopted by the CWSD Board, so Staff is taking this plan to watershed counties for their possible adoption of 2025 Regional Floodplain Management Plan.

Recommended Conditions: Explanation of Impact: This plan is intended to be a guideline to managing the Carson River Floodplain. Suggested actions have been provided and shaped by all stakeholders in the Carson River watershed. Previously all counties located in the Carson River watershed had adopted the CRFMP 2018 version.

Alternatives: No action.

Prepared By: Diane Moyle, Administrative Assistant

Reviewed By:



Date: July 08, 2025

Christian Spross, County Manager

Churchill County
Agenda Report

Joseph Sanford, Deputy District Attorney — Date: July 10, 2025

Sherry Wideman, Comptroller — Date: July 10, 2025

Board Action Taken:

Motion: Approve

1) Eric Blakey — **Aye:** 2

2) Myles Getto — **Nay:** 0

(Vote Recorded By)

The submission of this agenda report by county officials is not intended, necessarily, to reflect agreement as to a particular course of action to be taken by the board; rather, the submission hereof is intended, merely, to signify completion of all appropriate review processes in readiness of the matter for consideration and action by the board.

RESOLUTION NO. 2025R-076

A RESOLUTION TO ADOPT THE CARSON RIVER WATERSHED REGIONAL FLOODPLAIN MANAGEMENT PLAN SUPPLEMENTAL UPDATE

WHEREAS, the Carson River flows through Douglas County and is a valuable natural resource; and

WHEREAS, Douglas County recognizes that flooding has and will continue to cause economic losses and threats to human life and health throughout the entire Carson River Watershed; and

WHEREAS, allowing the Carson River to access its floodplain provides public safety, slows flood waters, reduces peak flows, provides recharge to groundwater basins, and protects wildlife habitat; and

WHEREAS, a regional approach to floodplain management benefits Douglas County and all other communities in the Carson River Watershed; and

WHEREAS, the Carson River Watershed Regional Floodplain Management Plan Supplemental Update provides a variety of strategies for floodplain management and protection of floodplain function.

NOW, THEREFORE, the Board of County Commissioners hereby resolves to adopt the 2025 Carson River Watershed Regional Floodplain Management Plan Supplemental Update and will strive to work cooperatively with the Carson Water Subconservancy District and other organizations and communities to continue to implement the suggested actions presented in the Plan.

ADOPTED this 21st day of August, 2025 by the following vote:

VOTE: Ayes Commissioners:

Gardner

Tolbert

Hales

Rice

Tarkanian

Nays Commissioners:

Absent Commissioners:

Sharla Hales, Chairwoman
Douglas County Board of Commissioners

ATTEST:

Amy Burgans
Douglas County Clerk-Treasurer

Mechanical Code, 2024 Uniform Plumbing Code, 2024 Northern Nevada ICC Amendments and 2024 Lyon County Amendments effective January 1, 2026; and other matters properly related thereto.

Community Development Director Gavin Henderson and the Commissioners reviewed the changes proposed in the ordinance that were discussed previously. The changes are as follows;

15.239.02: AMENDMENTS; ADMINISTRATIVE AND TECHNICAL:

G. Table R301.2 shall be amended to set the minimum frost line depth at 18 inches for elevations less than 5,000 feet and 24 inches for elevations greater than or equal to 5,000 feet.

15.239.02: AMENDMENTS; ADMINISTRATIVE AND TECHNICAL:

A. Section E3901.4.2 of the Residential Code and section 210.52 (2) of the 2023 National Electric Code shall be amended to require the installation of receptacle outlets at all island ~~and peninsular~~ countertops in accordance with adopted electrical safety standards. The use of future wiring provisions as a substitute for required receptacles shall be prohibited.

XXX. E3901.4.2 shall be amended so receptacle outlets shall not be required within peninsular countertops measuring less than six (6) feet in length, as measured from the connecting wall to the outer edge of the countertop. Where this exception applies, future wiring provisions, such as capped conductors, conduit stubs, or unused outlet boxes intended for future receptacles in the peninsular section, are expressly prohibited.

Chairman Keller asked for public comment and there was none.

Comm. Hockaday moved to approve an ordinance amending Lyon County Code Title 15, Chapter 239, Section 1, Section 2, and Section 5, thereby adopting the 2024 ICC Building codes, 2023 National Electric Code, 2024 Uniform Mechanical Code, 2024 Uniform Plumbing Code, 2024 Northern Nevada ICC Amendments and 2024 Lyon County Amendments effective January 1, 2026; and other matters properly related thereto as presented and recommended today, Comm. Hendrix seconded and the motion passed 5-0.

7.d. Time Certain for 9:45 AM: For Possible Action: To adopt the 2025 Carson River Floodplain Management Plan as a planning-level document to guide floodplain management, watershed coordination, and regional implementation efforts within the Carson River Watershed.

Lindsey Marsh from the Carson Water Subconservancy District gave a presentation discussing the Carson River Floodplain Management with details including the purpose of the plan, the history of the plan, the counties who have adopted the plan, what the plan provides, the Carson River Coalition main message and the flood hazard mitigation strategies.

Chairman Keller asked for public comment and there was none.

Comm. Hendrix moved to adopt the 2025 Carson River Floodplain Management Plan as a planning-level document to guide floodplain management, watershed coordination, and regional implementation efforts within the Carson River Watershed, Comm. Cassinelli seconded and the motion passed 5-0.

8. Commissioners/County Manager Reports

STOREY COUNTY BOARD OF COUNTY COMMISSIONERS MEETING

7 /1/2025 10:00 AM

26 SOUTH B STREET, VIRGINIA CITY, NV

MEETING MINUTES

JAY CARMONA *CHAIRMAN*	CLAY MITCHELL *VICE-CHAIRMAN*	DONALD GILMAN *COMMISSIONER*
ANNE LANGER *DISTRICT ATTORNEY*		JIM HINDLE *CLERK & TREASURER*

Roll Call

Commissioners Carmona, Gilman, and Mitchel present – quorum established.

Total Attendance: 39

1. **CALL TO ORDER CLOSED SESSION MEETING COMMENCING AT 9:15 A.M.** Call to Order Closed Session meeting pursuant to NRS 288.220 for the purpose of conferring with county management and legal counsel regarding labor negotiations with the Storey County Employees' Association Comstock Chapter, AFSCME Local 4041. This meeting will begin at 9:15 a.m. immediately before the general meeting of the Board of Storey County Commissioners.

3. **CALL TO ORDER REGULAR MEETING AT 10:00 A.M.**
Commission Chairman Carmona called the meeting to order at 10:00 a.m.

4. **CONVENE AS THE STOREY COUNTY BOARD OF COUNTY COMMISSIONERS**

5. **PLEDGE OF ALLEGIANCE**

6. **PUBLIC COMMENT (No Action):** None

7. **DISCUSSION/FOR POSSIBLE ACTION:** Consideration and possible approval of the agenda for the July 1, 2025, meeting.

9. **BOARD COMMENT** (No Action - No Public Comment)
   - Commissioner Carmona said county resident Patricia Favre passed away.

10. **DISCUSSION ONLY:** Presentation by Milt Stewart, Chief Executive Officer, NevadaWorks, on workforce development programs and regional impact.

    Business Development Director Lara Mather introduced Milt Stewart, CEO of NevadaWorks.

    Mr. Stewart said NevadaWorks is the designated Workforce Development Board for Northern Nevada and oversees funding and coordination of job training initiatives to support both job seekers and employers. It has a board, and a council and staff implement decisions of the board.

    He said they are involved in skills training designed to meet the needs of employers. They serve both employees and employers and have hubs where employees can find resources, work with other agencies and search for jobs. They can train and upscale for jobs and assist employers in matching applicants with jobs.

    He described how they use data, how thye works with residents and employers, and listed the number of people who have been helped.

    He said there is a tech hub to bring employees up to speed on the necessary technology, specifically to aid young workers, and they are partnering with UNR on technology aptitude development.

    He said there are about 25,000 jobs and the same number of applicants, but they don't match in training and skills. They have worked with TMCC and WNC to provide training.

    Public Comment: None

11. **DISCUSSION/FOR POSSIBLE ACTION:** Ed James, General Manager for CWSD, will present the 2025 Carson River Floodplain Management Plan (CRFMP) for county adoption. Previous iterations were adopted by Churchill County in 2008, 2013, and 2018. The presentation will describe the plan goals, objectives, and strategic actions. The update was a multi-year process that included several meetings with various floodplain administrators in the watershed and other interested stakeholders, interviews of county staff and other stakeholders like Nevada Division of Water Resources (NDWR). Comments were solicited and incorporated into the final plan. See link to Plan and Appendices. See https://www.cwsd.org/floodplainmanagement/ to view plan.

    Carson Water Subconservancy District Director Ed James said the flood plain management plan is to reduce flood risks. In 1997 there was a major flood on the Carson River, so they

formed a coalition to deal with water issues. They worked with government, agencies, business and residents.

He said in 2008 the organization primarily focused on the river, but now they are focusing on the flood plain as well. It is a bigger issue because of development. Had we planned 40-50 years ago, we would not have the flooding we have today. When you build in an alluvial fan and we block the natural flow patterns with development, we see more flooding with more damage.

This plan developed with Storey County is a guideline and it gives a broad view of how flooding impacts the watershed.

Mr. James reviewed the plans 8 strategies and recommended 49 actions. He showed photos of storm damage. Flash floods and river flooding are both problems for the area.

Public Comment: None

Motion: I, Commissioner Mitchell, move to re-adopt the Carson River Floodplain Management Plan with 2025 update. **Seconded by:** Donald Gilman. **Vote:** Motion passed unanimously.

12. **DISCUSSION/FOR POSSIBLE ACTION:** Consideration and possible approval of modification and extension of Collective Bargaining Agreement Between Storey County (Employer) and the Storey County Employees Association AFSCME Local 4041 Comstock Chapter (Union).

    Human Resources Director Brandie Lopez said recent negotiations went smoothly, and updates involve COLA increases of 1.625 percent in the first year, 2 percent in the second year and 3 percent in the third year.

    Public Comment: None

    Motion: In accordance with the recommendation by staff and the tentative agreement between Storey County (Employer) and the Storey County Employees Association AFSCME Local 4041 Comstock Chapter (Union), I, Commissioner Mitchell, hereby move to approve the 2025-2028 Collective Bargaining Agreement between the parties. **Seconded by:** Donald Gilman. **Vote:** Motion passed unanimously.

13. **DISCUSSION/FOR POSSIBLE ACTION:** Consideration and Possible Approval of a Memorandum of Understanding (MOU) Amending Article 7 (Compensation Practices) of the Collective Bargaining Agreement Between Storey County and the Storey County Sheriff's