

ANNEX K: DENVER WATER

K.1 Community Profile

Denver Water proudly serves high-quality water and promotes its efficient use to 1.4 million people in the city of Denver and many surrounding suburbs. Established in 1918, the utility is a public agency funded by water rates and new tap fees, not taxes. It is Colorado’s oldest and largest water utility.

Dillon Dam, located in Summit County, is a critical part of the Denver Water collection system, however, Summit County is not a part of the Denver Water’s service area. Refer to the countywide maps in Chapter 3 and in Annex A.

K.2 Hazard Identification and Profiles

Representatives of Denver Water identified the hazards that affect the Denver Water’s properties in Summit County and summarized their geographic location, probability of future occurrence, potential magnitude or severity, and planning significance specific to Denver Water properties and its facilities (see Table K-1). In the context of the countywide planning area, there are no hazards that are unique to Denver Water.

Table K-1 Denver Water—Hazard Summary

Hazard Type	Geographic Location*	Probability*	Magnitude*	Hazard Rating
Avalanche	Isolated	Highly Likely	Limited	Low
Dam Incidents	Small	Unlikely	Catastrophic	Medium
Drought	Large	Likely	Critical	High
Earthquake	Large	Occasional	Limited	Low
Erosion/Deposition	Small	Likely	Limited	Low
Flood	Small	Likely	Critical	High
Hazardous Materials Release	Isolated	Unlikely	Catastrophic	Medium
Landslide, Mudflow/Debris Flow, Rock Fall	Isolated	Occasional	Critical	Medium
Lightning	Small	Likely	Critical	Medium
Pest Infestation (Forest and Aquatic)	Large	Likely	Critical	High
Severe Winter Weather	Large	Highly Likely	Critical	Medium
Wildfire	Medium	Highly Likely	Catastrophic	High
Wildlife-Vehicle Collisions	Small	Likely	Negligible	Low
Windstorm	Large	Likely	Limited	Low

*See Section 3.2 for definitions of these factors

Information on past events for each hazard can be found in Section 3.2 Hazard Profiles in the body of this document.



K.3 Vulnerability Assessment

The intent of this section is to assess Denver Water’s vulnerability separately from that of the planning area as a whole, which has already been addressed in Section 3.3 Vulnerability Assessment in the main plan. For more information about how hazards affect the County as a whole, see Chapter 3 Risk Assessment.

Denver Water’s Asset Inventory in Summit County

Table K-2 lists critical facilities and other community assets identified by Denver Water as important to protect in the event of a disaster.

Table K-2 Denver Water—Critical Facilities and Other Community Assets

Name of Asset	Hazard Specific Info/Comments
Dillon Dam	Dam Failure, Drought, Earthquake
Robert’s Tunnel	Earthquake

Source: Denver Water

Vulnerability by Hazard

This section examines assets at risk to hazards ranked that vary from the risks facing the entire planning area and estimates potential losses. Denver Water’s exposure to most hazards in Summit County does not differ significantly from that of the County as a whole, but the focus of vulnerability assessment is on those hazards that have the potential to impact the District’s water infrastructure.

Dam Incidents

Dillon Dam is a critical part of the Denver Water’s Collection System and is used for storage. The dam was not constructed as a “flood control dam”. The dam is classified as a high hazard dam that has the potential to impact Silverthorne and other downstream areas. The likelihood and impacts of an incident at Dillon Dam are discussed in Section 3.2.2. Failure of the dam is unlikely but would have extensive consequences both in terms of economic losses to Denver Water, as well as the loss of the water resource for a period of time. Outside of potential effects to Denver Water infrastructure, failure of the dam would also result in damage to downstream communities and property and potential loss of life. Dillon reservoir could also be impacted by failure of dams in the Blue River and Tenmile watersheds. Depending on the type or severity of the incident, this could result in water quality impacts and possibly lead to spillway flows or concerns for the integrity of the Dillon Dam.

High Flow Releases from Dillon Dam (>10-year recurrence)

One of the more significant hazards to the public would be high flow releases out of Dillon Dam due to large natural inflows due to heavy snow and/or inclement weather, though it is highly unlikely there would be more released than what is coming in naturally.



The downstream floodplain in the Town of Silverthorne and Summit County is highly developed, and Denver Water has witnessed flooding impacts around the 10-year recurrence interval discharge (high probability, significant magnitude). Denver Water has invested time working with the Town of Silverthorne and Summit County to inform the communities of these risks, including significant public outreach efforts related to high flows.

Flood

The Planning Area below the dam, is prone to high flows along the rivers from heavy snowmelt runoff and intense rainfall. When significant runoff rain and events occur, Denver Water is responsible for managing Dillon Dam to maintain reservoir capacity, including releasing water to relieve pressure on the dam structure. This could result in high flows in communities such as Silverthorne, which have become highly developed in the floodplain downstream of Dillon Dam.

Drought / Water Shortage

The most significant impacts associated with drought and water shortage for Denver Water are those related to water intensive activities such as wildfire protection and municipal usage. Denver Water will utilize their Water Shortage Response Plan during water shortage events. This plan contains progressive stages that can be enacted. These stages contain voluntary and mandatory conservation measures in addition to specific curtailments of water usage for specific industries. Denver Water uses various indicators when deciding to enact restrictions. These indicators include geographical, environmental and economic conditions on the western slope. An important note is restrictions and subsequent reductions in usage will not increase water in streams and waterways in Denver Water's collection system. Revenue shortages, water quality issues and recycled water availability are all potential impacts during water shortage events. In addition, a lack of available water can also lower reservoir levels, which exposes more shoreline to erosion. This can result in increased water treatment costs. During an extraordinary, long-term water shortage event, hydropower availability may be at risk.

Pest Infestation (Forest/Aquatic)

Aquatic infestations of the zebra and quagga mussels have been found in waterways across the western United States. In Summit County they have been found in the past in the Green Mountain Reservoir and have posed a threat to Dillon Reservoir. Both are multiuse reservoirs opened to recreational activities such as boating, which is a leading cause of bringing the invasive mussels into waterways.

While the mussels or aquatic nuisance species haven't been found in Dillon Reservoir, Denver Water pays for boat inspectors who are trained in identifying aquatic nuisance species training to inspect all boats prior to entering the water, especially if from out of state. According to the HMPC in addition to boats kayaks are also a concern for infestation.

In August 2017, the quagga mussel was found in the Green Mountain Reservoir after years of being threatened by the invasive species and monitoring of the reservoir. Since 2017, the Reservoir is considered a 'suspect' reservoir for infestation. Between 2008 and 2017, eight total reservoirs in Colorado were confirmed to have mussel's present including the Willow Creek and Shadow Mountain Lake in neighboring Grand County.



Various beetle epidemics over the years have affected the watershed and contributed to fuel loading for wildfires.

Wildfire

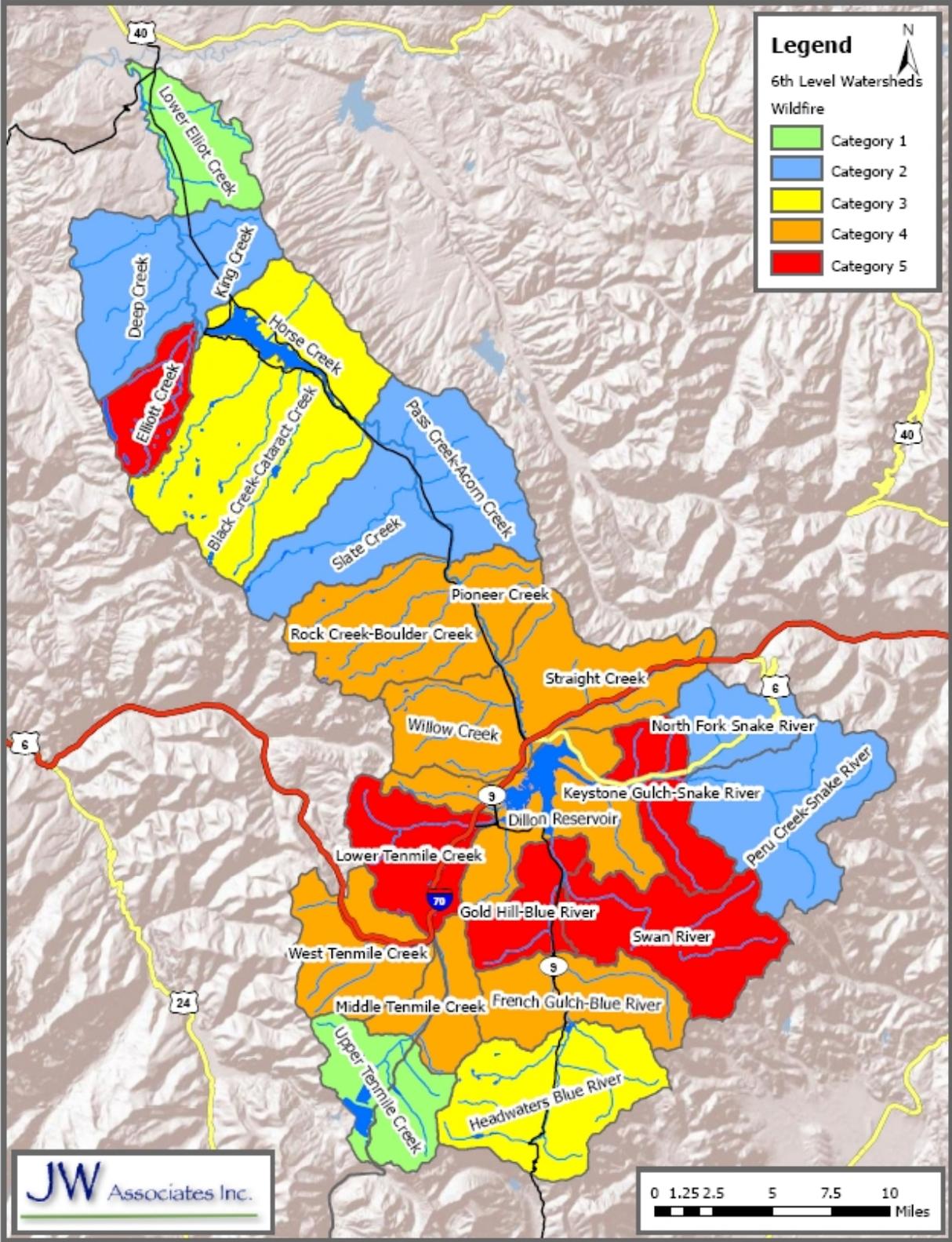
Watersheds and the numerous associated reservoirs in the county could be significantly impacted by high severity wildfire, which could have cascading impacts on water quality and Denver Water infrastructure. For example, the damage to Strontia Springs Reservoir caused by siltation from the 1996 Buffalo Creek Fire took fifteen years to complete and cost Denver Water over \$30 million.

Watersheds on the steep western slope of the Front Range feed directly into reservoirs and are of highest concern for wildfire impacts. The Blue River Wildfire/Watershed Assessment (JW Associates, Inc. 2011) "identifies and prioritizes sixth-level watersheds based on their hazards of generating flooding, debris flows, and increased sediment yields following wildfires that could have impacts on water supplies" (pg. 1). Figure K-1 shows the Blue River watershed wildfire hazard ranking.

Watersheds can be considered as assets in their own right. Consultation with those water supply agencies with facilities, reservoirs, and properties should be included in mitigation discussions, and are in fact required to take part since the passage of Colorado House Bill 09-1162. Further consultation with members of a Burned Area Emergency Response Team may provide further guidance in mitigating and preparing for the effects of wildfire in a watershed.



Figure K-1 Blue River Watershed Wildfire Hazard Ranking



Source: JW Associates, Inc., Blue River Wildfire/Watershed Assessment 2011



Continued growth of Summit County’s population will generally mean an expanded WUI and potential exposure of buildings and people. It is important that CWPPs, EOPs, and other planning documents and regulations remain current to ensure improved community adaptation to the fire prone environment in which they are being built. Denver Water is working with local offices of emergency management, including Summit County, to address wildfire hazards.

Growth and Development Trends

Denver Water does not have authority to manage growth or development within its district outside of Denver Water property. As the population continues to grow in Summit County, but more importantly the Front Range, so too will the demand for water growth and reliance on Denver Water assets, particularly during times of drought.

K.4 Capability Assessment

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. The capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation outreach and partnerships, and other mitigation efforts.

Regulatory Mitigation Capabilities

Regulatory mitigation capabilities include the planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities. Table K-3 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Denver Water. Many of the regulatory capabilities used by local jurisdictions are not applicable to Denver Water.

Table K-3 Denver Water—Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
General or Comprehensive plan	N/A	
Zoning ordinance	N/A	
Subdivision ordinance	N/A	
Growth management ordinance	N/A	
Floodplain ordinance	N/A	
Other special purpose ordinance (stormwater, steep slope, wildfire)	N/A	
Building code	N/A	
Fire department ISO rating	N/A	
Erosion or sediment control program	N/A	



Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Stormwater management program	N/A	
Site plan review requirements	N/A	
Capital improvements plan	Yes	
Economic development plan	N/A	
Local emergency operations plan	Yes	Denver Water Emergency Operations Plan developed in 2012, reviewed and updated on regular basis
Other special plans	Yes	Drought Response Plan Watershed Management Plan Crisis Communications Plan Climate Adaptation Plan Integrated Resource Plan FERC Emergency Action Plans (EAPs) on all dams. EPA Emergency Response Plans (ERPs) treatment and distribution plans. Continuity of Operations Plans Facility Security Plans
Flood insurance study or other engineering study for streams	N/A	
Elevation certificates (for floodplain development)	N/A	
Other		

Administrative/Technical Mitigation Capabilities

Table K-4 identifies the personnel responsible for activities related to mitigation and loss prevention in Denver Water.

Table K-4 Denver Water—Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	yes	External Affairs	Watershed Scientist
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	Engineering	
Planner/engineer/scientist with an understanding of natural hazards	Yes	External Affairs	Drought planners Watershed Scientist
Personnel skilled in GIS	Yes	IT/GIS	
Full time building official	N/A		
Floodplain manager	N/A		
Emergency manager	Yes	Emergency Management Section	
Grant writer	No		



Personnel Resources	Yes/No	Department/Position	Comments
Other personnel	Yes	Water resource engineers and drought planners	
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	Yes	IT/GIS	
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	Yes	IT /Local Dispatch Centers	<p>Internal Warning Systems/Services: Everbridge System Controls Denver Water is responsible for managing the water system and will notify first response agencies when emergencies arise</p> <p>External: Local Systems. First Response Agencies are responsible for notifying their populations of impacting emergencies</p>
Other	Yes	Boat Inspectors	Trained inspectors look at each boat and kayak for signs of Aquatic Nuisance Species before they are allowed to enter Dillon Reservoir.

Fiscal Mitigation Capabilities

Fiscal mitigation capabilities are financial tools or resources that Denver Water could or already does use to help fund mitigation activities. Denver Water has received funding for forest management and watershed health improvements through the Colorado State Forest Service and U.S. Forest Service (USFS)

Mitigation Outreach and Partnerships

Denver Water has various outreach and partnerships including public education programs related to water conservation, drought response, water quality, and a very active youth education program focusing on a variety of water-related topics.

Coordination Efforts include:

- Denver Water’s External Affairs division consists of Customer Relations, Communications & Marketing, Government & Stakeholder Relations, Conservation, Treated Water Planning, Demand Planning and Water Resources. This group provides a plethora of planning and outreach with local partners. They provide media relations, social media, marketing, publications, internal communication, stakeholder relations, government relations, community outreach, and website communications for both our combined service area of 1.4 million people and for the communities where Denver Water’s



watersheds and facilities are located. Denver Water is an active participant in the Summit County Wildfire Council and leverages the From Forests to Faucets Partnership with the County's Strong Future Funds administered through the Council.

- Denver Water's Emergency Management, Safety & Security section partners with local OEMs and local law enforcement agencies to work closely on planning, response, recovery and mitigation efforts in order to build a resilient community that can respond to emergencies, to share public safety messages around flood/runoff safety, to create a culture of preparedness and foster an understanding of Denver Water's operations and constraints.

Denver Water uses the following communication and coordination methods to conduct public outreach:

- "Dillon Dam Outflows" community e-newsletter
- Dillon Dam Spring runoff committee
- Dillon Dam Security Taskforce committee
- Direct mail/collateral to at-risk property owners downstream of Dillon (e.g., post cards promoting local EM resources and sign-ups for our e-newsletter).
- TAP stories, videos and infographics across all social media channels, which provide content and opportunities for local partners to adapt for use on their social media channels.
- Partnerships with County Emergency Management and offering content for their annual safety guide
- Presentations to community groups, the annual State of the River event, Emergency Manager's Town Halls, etc.
- Expert interview(s) on local PATV station.
- Proactive media pitches to local publications and websites.

Past Mitigation Efforts

Denver Water has partnered with local emergency management agencies to participate in local emergency management programs – planning (i.e., hazard mitigation planning), training and exercises; response, recovery and mitigation efforts. Denver Water has incorporated the FEMA process for plan development including after-action reviews and improvement items all to enhance the planning, response and mitigation efforts in order to build a resilient utility. Denver Water has partnered with the U.S. Forest Service to improve forest and watershed conditions in parts of Colorado by implementing hazardous fuels treatments and removing hazardous biomass. Forests play a role in protecting areas important to surface drinking water. USFS maps these areas using GIS before working with Denver Water on fuels treatment projects. This effort is part of the From Forests to Faucets Program.

Opportunities for Enhancement

Based on the capability assessment, Denver Water has several existing mechanisms in place that already help to mitigate hazards. There are also opportunities for Denver Water to expand or improve on these policies and programs to further protect the community. Future improvements may include providing training for staff members related to hazards or hazard mitigation grant funding in partnership with the County and Colorado Division of Homeland Security and Emergency Management (DHSEM) or the Colorado Water Conservation Board (CWCB). Additional training opportunities will help to inform staff



and board members on how best to integrate hazard information and mitigation projects into Denver Water policies and ongoing duties. Continuing to train Denver Water staff on mitigation and the hazards that pose a risk to the district will lead to more informed staff members who can better communicate this information to the public. Another opportunity for enhancement includes continued relationship building with county and local government staff to raise awareness of preparedness resources and mitigation techniques in the event of high-water flows.

K.5 Mitigation Goals and Objectives

Denver Water has adopted the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 4 Mitigation Strategy.

K.6 Mitigation Actions

Denver Water identified and prioritized the following mitigation actions based on the risk assessment. Background information on how each action will be implemented and administered, such as ideas for implementation, responsible agency, potential funding, estimated cost, and timeline also are included.



Mitigation Action: Denver Water—1 Update Drought Management Plan

Jurisdiction:	Denver Water
Action Title:	Update drought management plan
Hazard(s) Mitigated:	Drought
Priority:	High
Issue/Background:	Updating the drought management plan will allow Denver Water to identify risks to their infrastructure and critical facilities and reduce the impacts of water shortages.
Ideas for Implementation:	
Responsible Agency:	Denver Water
Partners:	CWCB
Potential Funding:	
Cost Estimate:	Staff time
Benefits: (Losses Avoided)	Reduce drought impacts to people and critical facilities; build resiliency to drought.
Timeline:	Ongoing
Status:	Continue- Not Completed. Action added in 2013



Mitigation Action: Denver Water—2 Public Outreach in Summit County

Jurisdiction:	Denver Water
Action Title:	Public outreach efforts in Summit County
Hazard(s) Mitigated:	Multi-Hazard
Priority:	Low
Issue/Background:	The Denver Water government stakeholder group would like to partner with Summit County stakeholders to rebuild relationships and provide networking and education for the public. Denver Water OEM has additional ideas and information on public education efforts as they related to FERC requirements.
Ideas for Implementation:	Summit County Strategic Comms Plan used to assist with alert/notification, response efforts and overall information sharing.
Responsible Agency:	Denver Water Emergency Management
Partners:	Summit County OEM, participating jurisdictions
Potential Funding:	Denver Water
Cost Estimate:	Staff time, developing and printing public information materials.
Benefits: (Losses Avoided)	Strengthen partnership between Denver Water and Summit County; keep public informed.
Timeline:	Ongoing
Status:	Continue – Not completed. Action added in 2013. Refer to Summit County Strategic Communications Plan to assist with alert/notification, response efforts and overall information sharing.



Mitigation Action: Denver Water—3 GIS Mapping Coordination Project

Jurisdiction:	Denver Water
Action Title:	Develop GIS mapping coordination project to show damages based on dam EAPs, flood maps, and county floodplains
Hazard(s) Mitigated:	Dam Failure
Priority:	Low
Issue/Background:	COEM is in the process of developing a “reference guide” for all 600+ dams in Colorado for local emergency managers to access and use for local planning efforts. Denver Water has inundation maps, included in their AOP for local officials to use in order to develop local notification and evacuation plans.
Ideas for Implementation:	
Responsible Agency:	Denver Water
Partners:	COEM, CO DNR – Division of Water Resources, Summit County
Potential Funding:	Denver Water
Cost Estimate:	Staff time
Benefits: (Losses Avoided)	Improve dam failure notification and evacuation procedures in Summit County; protect life safety
Timeline:	
Status:	Completed. Action added in 2013.



Mitigation Action: Denver Water —4 Watershed Management Program: From Forests to Faucets Partnership

Jurisdiction:	Denver Water
Action Title:	Watershed Management Program: Forests to Faucets Partnership
Hazard(s) Mitigated:	Multi-Hazard, Wildfire, Flood, Drought, Pest Infestation (Forest and Aquatic)
Priority:	High
Issue/Background:	Denver Water has committed funding through the Forests to Faucets Partnership for forest treatments and wildfire risk reduction activities in priority watersheds. This funding is administered and matched by USFS and CSFS as part of the Partnership and can be used on National Forest and non-federal lands.
Ideas for Implementation:	Coordinate with Summit County Wildfire Council
Responsible Agency:	Denver Water
Partners:	USFS and CSFS
Potential Funding:	Denver Water. Approximately \$1 million per year – can vary
Cost Estimate:	Project dependent.
Benefits: (Losses Avoided)	Wildfire risk reduction and forest resiliency in priority watersheds for drinking water supply and community protection.
Timeline:	Partnership/watershed management started in 2010 and timelines goes through 2022
Status:	New in 2020. In progress, began in 2010.



Mitigation Action: Denver Water —5 Runoff Season Public Education and High Flow Awareness

Jurisdiction:	Denver Water
Action Title:	Implement Summit County Runoff Season Safety Strategy Communications Plan
Hazard(s) Mitigated:	Flood
Priority:	Low
Issue/Background:	Through continued education and awareness, we'll contribute to a preparedness culture in Summit County where at-risk property owners better understand Denver Water's operations and constraints, and their place on the flood risk spectrum.
Ideas for Implementation:	Summit County Strategic Communications Plan used to assist with alert/notification, response efforts and overall information sharing.
Responsible Agency:	Denver Water Public Affairs
Partners:	Summit County OEM
Potential Funding:	Denver Water
Cost Estimate:	Project dependent.
Benefits: (Losses Avoided)	Alert, notification to local first response community for emergency action items and information sharing.
Timeline:	Ongoing
Status:	New in 2020



K.7 Implementation and Maintenance

Moving forward, Denver Water will manage their identified mitigation projects through normal business practices, to track progress of projects. Implementation of the plan overall is discussed in Chapter 5 in the Base Plan.

Incorporation into Existing Planning Mechanisms

The information contained within this plan, including results from the Vulnerability Assessment and the Mitigation Strategy, will be used by Denver Water to help inform updates and the development of District plans, programs and policies.

Integration of 2013 Plan into Other Planning Mechanisms

While Denver Water did not directly integrate risk information from the 2013 into existing planning mechanisms, through various planning committees, Denver Water did review and edit the 2013 mitigation plan and have incorporated improvement in this iteration of the Denver Water annex.

Process Moving Forward

Moving forward, Denver Water may use the vulnerability information to help inform updates and understanding of the hazards that pose a risk and the specific vulnerabilities to the jurisdiction in future capital improvement planning for Denver Water area in Summit County.

As noted in Chapter 5 Plan Maintenance, the HMPC representatives from Denver Water will report on efforts to integrate the hazard mitigation plan into local plans, programs and policies and will report on these efforts at the annual HMPC plan review meeting.

Monitoring, Evaluation and Updating the Plan

Denver Water will follow the procedures to monitor, review, and update this plan in accordance with Summit County as outlined in Chapter 5 of the Base Plan. Denver Water will continue to involve the public in mitigation, as described in Section 5.4 of the Base Plan. Denver Water Manager of Emergency Management will be responsible for representing the District in the County HMPC, and for coordination with County staff and departments during plan updates. Denver Water realizes it is important to review the plan regularly and update it every five years in accordance with the Disaster Mitigation Act Requirements.

