

Hildale

Hildale is a community that was settled by pioneers for agriculture in the mid-1800s along the Utah/Arizona Border in eastern Washington County. The community lies in the Short Creek Valley and the Arizona Border separates the city from neighboring Colorado City. Hildale and neighboring Colorado City share many services, resources, and infrastructure. Hildale City incorporated in 1963.

The northeast border of the community is a series of cliff faces, which includes several outdoor recreation opportunities, including Water Canyon, which draw visitors to the area.

Demographics

The 2020 census indicates that the Hildale population is 1,127, a decrease of more than 50% from the previous three censuses, as described in Figure 330 and Figure 331. Several factors could contribute to this number, both related to data challenges and changes in the local community make-up. Hildale has seen a significant turnover in residential tenure in the community, with longtime residents with large families leaving the city, and smaller sized families moving into or remaining in the community.

The City may have experienced challenges in residents completing the census due to Covid-19 and the potential for public concerns about privacy or the questions being asked in the survey. A census information committee which was to encourage participation was stalled early in discussion. The City is considering a request to review the 2020 census to better engage the community.

Hildale's population has observed steady growth from 1980 to 2010, with rates between 31% and 43% each decade. Despite the documented decline in the 2020 census, the average population change by decade is 33.9%, showing that overall, the community has grown since incorporation. Population projections for the county have been completed by the Kem C. Gardner Institute describe that Washington County is expected to see an 229% increase in population between 2015 and 2065. If applied to Hildale, the community could see around 9,626 people living in the community in the next 45-years¹⁹.

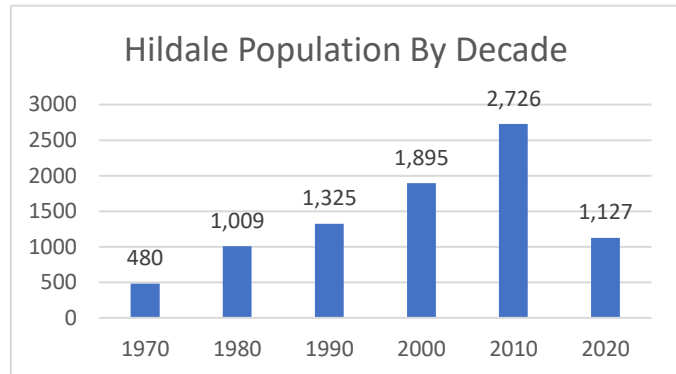


Figure 330: Hildale Population by Decade

Source: US Census Bureau

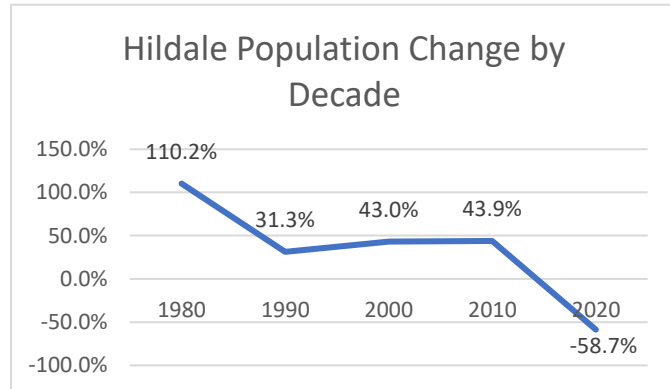


Figure 331: Hildale Population Change

Source: US Census Bureau

¹⁹ This estimate is created using the 2015 ACS population estimate for Hildale, which was 2,926, and adding 229% of this population estimate to the population for that year.

Economy

Hildale has an economic history of agriculture, which has been maintained in the community culture today. Figure 332 describes an analysis of the share of jobs by industry from the US Census Bureau OnTheMap tool, according to the 2018 American Community Survey estimates. Industries with the largest share of jobs in the community include construction, manufacturing, and retail trade. The community has limited jobs in the mining, extraction, arts, and recreation industries.

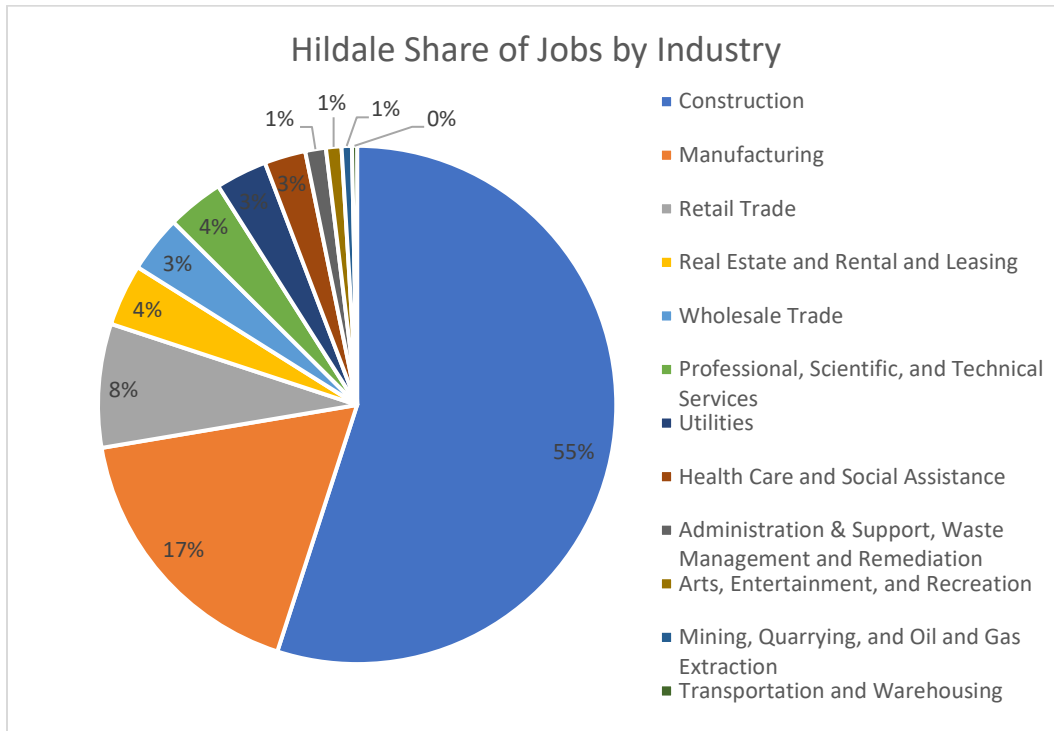


Figure 332: Hildale Share of Private Primary Jobs by Industry

Source: US Census Bureau

Development

The Hildale City General Plan describes development trends in the community as of 2016. Development is concentrated between the highway and public lands to the north and east. Most of the land is either vacant, open space, or agriculture. Residential development in the community is comprised of mostly single-family homes.

The City has indicated that water utilities continue to see new connections, demonstrating that there is new development in the community. Infill is a significant source of development in the community, with new residential properties being constructed regularly in town. The community also expects continued development outside of the downtown, in the northwest corner of the community where several hundred homes are proposed to be built in the next seven years.

The town has also annexed a large portion of land into the city boundaries in fall of 2021. The Annexation boundary extends north and west along the boundary with Apple Valley. This addition has brought in approximately four-square miles of land to the city boundary Figure 333 illustrates the area added to the town.

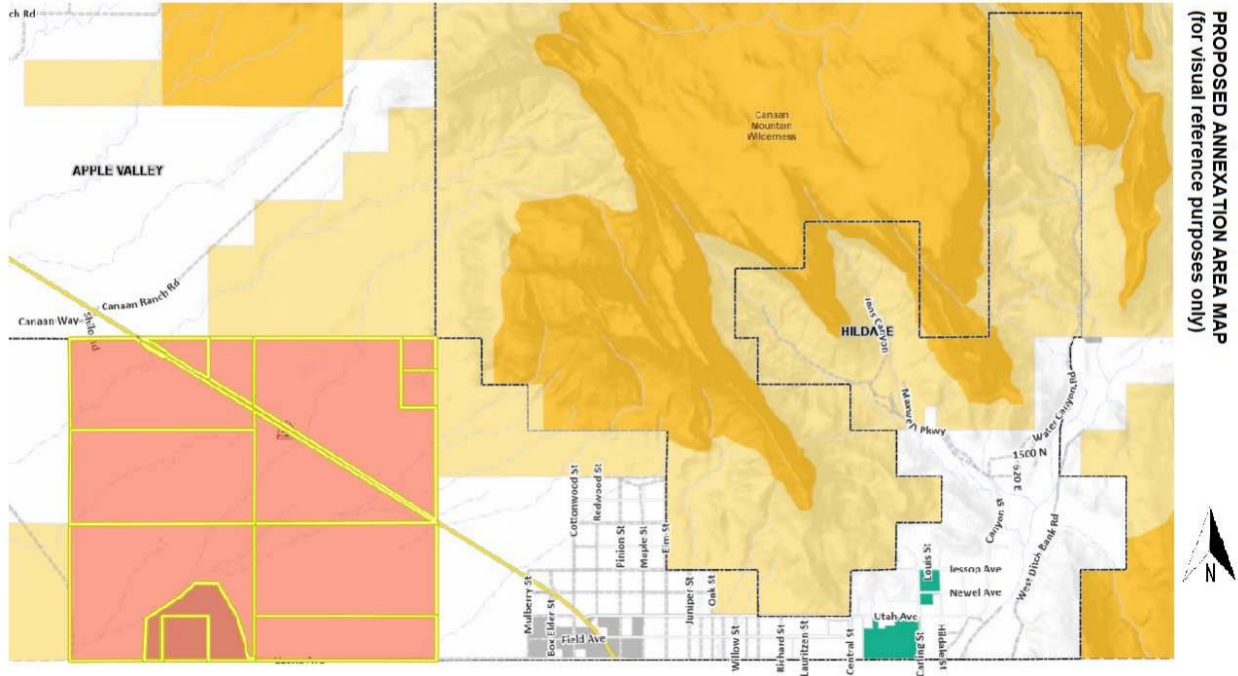


Figure 333: Hildale Proposed Annexation Map

Source: Utah Public Meeting Notice Website for Hildale City

Community Capabilities

Hildale is governed by a mayor and city council, who engage in legislative activities for the community. A planning commission reviews new development permit applications, zone change activities, and contribute to the community general plan.

City administrative staff include a city manager, planner, treasurer, recorder, public works, and building and planning staff. Hildale provides several emergency services to the community, including fire, EMT, and law enforcement. The Hildale-Colorado City Utility Department operates wastewater, water, and gas utilities for residents. Hildale City operates a municipal fiber network which provides internet service to residents through participating Internet Service Providers.

Critical infrastructure includes the water, electric, gas, internet, and other communication systems in the community. There is a high-pressure natural gas line at the propane facility owned by the city. The structure is elevated and protected by fencing.

Plans and Policies

Hildale has developed plans and policies which set goals, objectives, and laws for the community. Several of these documents describe natural hazards in the goals, objectives, and laws, which have been summarized here. The following section provides an overview of Hildale plans and policies as they relate to natural hazards. Additional plans may exist which were not made available for review.

Please review the community plans in full to understand current policies and ordinances. The section below is for summary purposes only.

Codes and Ordinances

Several of the community codes and ordinances detail requirements to address natural hazard challenges in the community. Ordinances address problem soils, landslide, earthquake, flooding, and drought using policy. Said ordinances describe where structures can be built relative to identified hazard risk areas, requirements for developing spaces which may be exposed to hazards, technical reporting for hazards, routine requirements to identify and mitigate hazardous geology, and recommendations that the city would like to see of development, new and existing. See the Hildale Municipal ordinances for details about ordinances addressing natural hazards.

General Plan

The Hildale General Plan describes the long-term vision for the community. Elements of the plan describe goals, policies, and actions to meet this long-term vision. Natural Hazards are described as challenges to the community that impact residents, public safety, property, and other essential assets in the community. The General plan describes challenges and strategies to address flooding, wildfire, severe weather, and drought. Actions include coordinating with federal, state, interstate, and regional partners. Some actions identify specific areas of the community which are challenged by natural hazards, specifying actions to suit an identified location. Actions range from creating and adopting policy for the community to addressing hazards through structural changes and collaboration with other agencies.

Risk Assessment

Hildale is at risk to several natural hazards addressed in this Natural Hazard Mitigation Plan. Five County has worked with the Hildale planning team to develop a ranking the highest risk hazards based on probability, frequency, and local exposure of the hazard. Table 367: Hildale Hazard Risk describes the relative risks of hazards in the community.

Table 367: Hildale Hazard Risk

HAZARD	RISK
DROUGHT	1. High
FLOOD	2. High
RADIUM	3. High
SEVERE WEATHER	4. Moderate
WILDFIRE	5. Moderate
EARTHQUAKE	6. Moderate
LANDSLIDE	7. Moderate

RADON	8. Low
PROBLEM SOIL	9. Low

A detailed description and mapping of each of the natural hazards that impact Hildale can be found in this chapter, concluding with a mitigation strategy for the community. The mitigation strategy aims to reduce the risks and vulnerabilities in the community to natural hazards described in this plan and has been developed by the local planning team.

Five County assessments for Hildale include reviewing the exposure that critical facilities, residential parcels, parks, and roads have to the natural hazards that impact the area. Critical facilities include schools, medical facilities, fire stations, and police stations and law enforcement facilities.

Drought

The Five County region has recorded seven instances of extended drought conditions since 1895 that have impacted the region. The hazard history is described in the Hazard Identification and County section of this plan, as Drought is a regional hazard. The southwest is no stranger to drought, however as the region continues to grow, extended drought can have greater negative impacts. Utah entering an extended period of drought, with 2020 being the driest year on record, there are implications from this natural hazard on the regional economy and people in the area.

Both tourism and agriculture economies would be impacted by a drought event, which can create dry, hot conditions. Drought may also impact the local water supply, for the City includes wells and spring water. Tourism and related industries are portions of the economy in Washington County. A University of Colorado report indicated that perceived risk of hazards from visitors can influence their selection of a destination. Perceptions included low water for river trips or wildfire risk, both of which are influenced by drought.

Drought conditions create visibility and air and water quality concerns as well. Dry soils can blow in the wind, increasing dust in the air which people breathe in. Increased wildfire risks can also lead to more smoke and ash in the air. Dust, smoke, and ash impact water quality.

Drought is connected to other natural hazards, primarily wildfire. Dry fuels can increase the severity of wildfire risk and wildfire events. Changes in the vegetation in an area due to lack of water can lead to invasive species and bare soils which can result in flooding, debris flow, and landslide events when water does flow on drought impacted areas.

Hazard History

Washington County and Hildale City are part of the Dixie Climate area. This area is roughly made up of geographically and climate similar areas to compare temperature, water content, and other measures. The Washington County section describes the palmer drought index for the Dixie Climate area up to 2020. The Palmer Drought Index relies on average precipitation. According to this table, there have been several instances of extended drought conditions in the area.

Local reporting from the Hildale-Colorado City Water System describes that water levels in the well serving the community are 100-feet below normal levels during the 2021 water year. This is reflected in other communities throughout the state of Utah who are experiencing deficits and shortage in their normal water supply.

Further challenges to the community's water include the prevalence of radium at above allowable levels in the community wells. Radium contamination is described further in the Radium section of this plan; however, it is important to identify the compounding conflicts which water quantity and contaminants can pose on a community's water system.

Flood

Flooding events are common in the southwest, especially flash flooding as severe summer thunderstorms produce rapid downfalls of rain. Dams in the region contribute to potential flooding hazard as failure could inundate an area downslope. Figure 334 depicts the flood and dam inundation exposure in Hildale. Dam inundation is not mapped in Hildale. The 100-year floodplain is observed along several of the creeks in the eastern portion of the community. Washes in the community commonly are dry throughout the year, but fill with water and runoff during severe storms. These areas are identified by the community as a great concern for flooding locally.

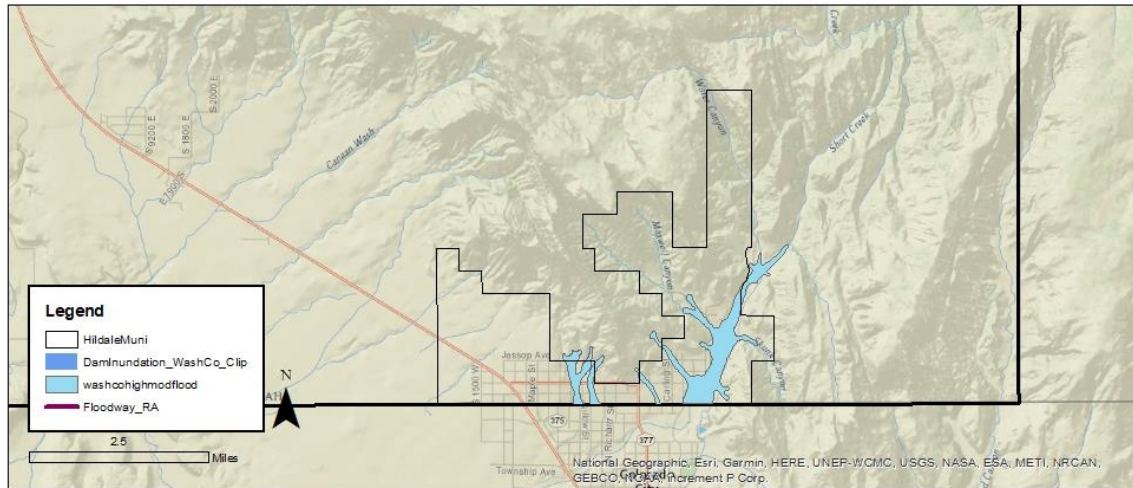


Figure 334: Hildale Floodplain and Dam Inundation Exposure

Source: Flood Insurance Rate Map, AGRC

Table 368 describes that Hildale residential parcels are at greatest exposure to the mapped floodplain. Residents, visitors, and personal property may be vulnerable to flooding impacts. A portion of critical facilities are exposed to flooding which can impact operations during a flood event.

Table 368: Hildale Exposure to Flooding and Dam Inundation

Critical Facilities	Parcels			Road Miles	Rail Miles	Local Parks
	Commercial	Residential	Total			
25.0%	10.9%	39.6%	34.3%	11.8%	N/A	N/A

Source: Floodplain Map, Washington County Assessor, UDOT, AGRC.

National Flood Insurance Program

Hildale property, assets, and homes outside of the mapped zones are not free of flooding risk. Since the inception of the National Flood Insurance Program (NFIP), approximately 25% of all paid claims were not located in a special flood hazard area. (Insurance Information Institute, 2020) The National Flood Insurance Program has provided flood related assistance in rebuilding and repairing structures following flood damages since 1978. Communities must participate in the NFIP for their residents and businesses to purchase insurance. This involvement requires certain policies and practices for the floodplain. Participation in the NFIP can reduce the cost of recovery following flooding.

Table 369: Hildale NFIP Participation and Claims Paid

Total Premium	V-Zone	A-Zone	# Policies	Total Coverage	Claims since 1978	Total Paid since 1978
\$9,722	0	8	9	\$1,360,900	0	\$0

Source: FEMA NFIP Insurance Report, Repetitive Loss/BCX Claims, and Community Status Book Report; accessed July 23, 2020.

Hildale participates in the NFIP and had a Flood Insurance Rate Map (FIRM) developed in 2009. Table 369 describes the number of flood insurance policies, and dollar value insured and claimed since participation began. Hildale has not reported repetitive losses and the community does not participate in the Community Rating System (CRS). The community received a Community Assistance Visit in 2015 and a Community Assistance Contact in 2019 from FEMA.

Hazard History

The National Oceanic and Atmospheric Administration (NOAA) collects data about reported flooding and severe weather, which is used for this plan. Monsoon rains occur in the late summer and fall, which bring a rapid and heavy rainfall and can lead to flooding events, damaging structures, overwhelming existing infrastructure, and moving debris throughout the City. The area also sees winter snowstorms, which can cause flooding from rapid melting and runoff, which are documented in the severe weather section. Table 370 describes the flooding events which have impacted Hildale and the surrounding area.

Table 370: Hildale Reported Flood Events

Date	Damage/Injury	Description
8/29/2000	\$52,000	A monsoon caused flooding throughout Washington County. Damages include \$2,000 in crop damage.
10/21/2004	None Reported	A thunderstorm system caused flooding throughout southwest Utah, including much of Washington County. Hildale reported flooding in basements and creeks during this event.
9/14/2015	\$750,000 20 deaths 3 Injuries	A thunderstorm caused flash flooding initially in Short Creek, flooding highway 59. A second flood swept vehicles off the road, killing thirteen occupants. Damages included damage to homes, vehicles, utilities, and roads throughout the community.

Source: NOAA Storm Database, New York Times, ABC4

Review of news sources show the 2015 flash flood, which occurred in Hildale, is Utah’s most deadly flash flood event on record. (Smith, Floods: Utah’s deadliest natural disaster, 2020)

Flood risks can be increased by certain natural hazards, like wildfire or drought, which can burn or kill vegetation, reducing the amount of water absorbed by the ground, which can in turn result in landslides or debris flows. Long-term climate trends indicate that severe weather events are expected to become less frequent but increase in magnitude, which will influence flooding locally.

Radium

Radium is a naturally occurring radioactive metal which forms as the result of the decay of uranium and thorium in the environment. As radium decays, it becomes the element Radon, which is a gas which can pose health hazards covered elsewhere in this plan. Radium is present in the environment, generally at low levels, posing little threat to humans. Radium can be introduced to the environment in high quantities after certain types of mining, oil and gas piping, and other types of human activity.

When Radium is concentrated in high levels, exposed persons are vulnerable to long term health impacts. High levels of radium in the environment can create a hazard to humans and has been attributed to increased risk for several diseases, including lymphoma, bone cancer, lung cancer, increased risk to tissue and organ cancers, leukemia, and aplastic anemia depending on the type of exposure (US EPA, 2002).

Radium 226 and 228 are on the list of contaminants which are monitored by the Environmental Protection Agency (EPA) in compliance with the Safe Drinking Water Act. The EPA has established a maximum contaminant level (MCL) of 5 picocuries per liter (pCi/L) of combined radium-226 and radium-228 in drinking water (US EPA, 2002).

Hazard History

Radium has been documented in the Hildale-Colorado City Water System's Power Plant Well exceeding the EPA contaminant level for Radium-228. The Utah Department of Environmental Quality submitted a Notice of Violation to Hildale City in 2019, documenting that the running annual average of the contaminant was nearly twice the allowable limit at the well, which makes up most of the system's water source. In response to receiving the notice of violation, the community was required to inform the public of the contamination and begin addressing the problem. Hildale has worked with engineers to develop a plan to address the water challenges, which outlines the current problem and a selection of alternatives. The plan will be coupled with a Water Master Plan, which will describe needs and capital projects system wide.

Radium contamination has the potential to impact the entire community and neighboring Colorado City for users who are connected to the public culinary water system. Given that this problem is immediate and ongoing, the community has ranked this as a high-risk hazard in their risk assessment.

Severe Weather

Severe weather often affects a region or county at large and can be difficult to accurately document, as coverage often relies on local documentation and reporting to NOAA or other weather agencies. There is not GIS data to show where or how severe weather will impact Hildale, however our analysis assumes that severe weather events will impact the whole of the community, residents, facilities, infrastructure, businesses, and property.

Hildale is in a valley at the foot of several canyons, which sees summers marked by heat, dry weather, and rapid downfalls of monsoon rains. The area has recorded snow during winter months.

Thunderstorms are the weather hazard that frequently impact Washington County, which can produce hail, high winds, rain, and lightning.

Hazard History

NOAA reports that there have been 451 severe weather events reported for Washington County between 1950 and 2020. While NOAA does not have severe weather events reported for Hildale, such events have occurred in the community, impacting roads, infrastructure, property, and residents. Namely, some of the flash floods which have impacted the community have been caused by heavy rain fall. Severe winds and thunderstorms are common to Washington County and can damage structures and economic assets, delay traffic, and block roads.

Extreme heat is a challenge throughout the southwest, causing personal injury and death. Certain activities and jobs can place additional risk to heat exposure, including recreation and outdoor jobs during the hottest months. Two such events are described in Table 371, and while the deaths reported did not occur in Hildale, extreme heat was likely observed region wide.

Table 371: Severe Heat Record

Date	Damage/Injury	Description
7/4/2013	3 deaths	Hot temperatures contributed to the death of three hikers in Garfield and Kane Counties.
7/21/2013	1 death	Hot temperatures killed a hiker in Kane County.

Source: NOAA Storm Database

Severe weather events are frequently occurring in this region and are likely to impact Hildale in the future. Winter storms, high wind and snow can cause damages to structures and infrastructure. The flooding events caused by weather events are reported in the flooding section of this assessment.

Wildfire

Hildale is a small city in southeastern Washington County. Hildale is bounded by dramatic mesas and cliffs to the north and Colorado City to the south. The community also has water shed and drinking water assets from the canyons to the north, which provides culinary water to the community. The area is largely surrounded by open space and unincorporated County. Nuisance weeds, like cheat grass, are identified as a fuel type throughout the community which contribute to the rapid spread of fires in the community.

Figure 335 maps the wildfire risk using data obtained from the Oregon Department of Forestry on the Utah Wildland Risk Assessment Portal. Mapping completed by the Five County AOG describes those areas in and surrounding Hildale that are at moderate to extreme risk to wildfire. The metrics used to determine risk rating can be found in the Hazard Identification section of this plan.

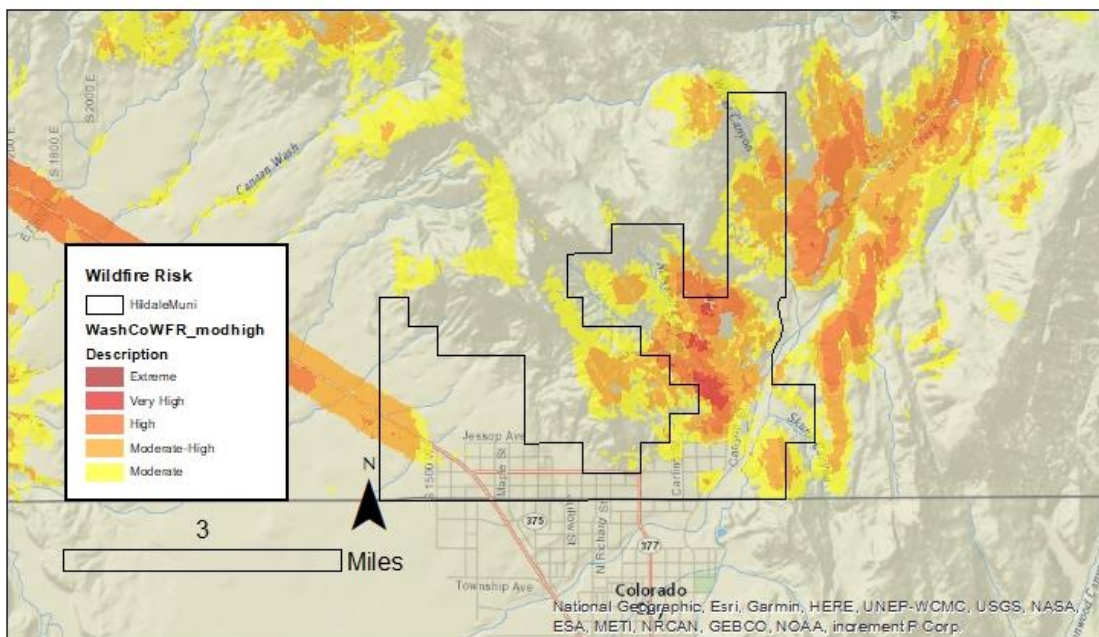


Figure 335: Hildale Wildfire Risk

Source: Oregon Department of Forestry, AGRC.

Table 372 further describes the community’s risk by measuring community assets that fall in identified risk areas. Exposure to wildfire risk areas of moderate or greater ranking impacts parcels and miles of roadway in Hildale, which could damage property, impact public health and safety, or impact local economies. Residential and commercial parcels see the most exposure, with over 20% of parcels exposed, which can impact health and safety of residents and pose risks to property. Wildfires that interact with roadways can challenge response and recovery efforts and the travel of people and goods.

Table 372: Hildale Wildfire Risk

Hildale Exposure to Wildfire Risk						
Critical Facilities	Parcels			Road Miles	Rail Miles	Parks
	Commercial	Residential	Total			
0.0%	21.8%	29.4%	28.0%	17.2%	N/A	N/A

Source: Oregon Department of Forestry, Washington County Assessor, Utah AGRC.

The community describes that there is very little wildland urban interface, outside of the Water Canyon area and in the creek bed. The creek has a natural fire break and there are no homes nearby. Some commercial and residential development is present in Water Canyon and are at elevated risk of wildfire, compared to much of the rest of the community. An identified wildfire risk comes with the recently annexed land in the northwest of the community, which has added area with flammable pinyon and juniper fuels and some nearby subdivisions.

Hazard History

Several agencies track and manage wildfire data, leading to some differences in the record. This plan references the Utah Wildfire Info database, which records recent wildfires from 2017 to present and fires designated under Fire Mitigation Assistance Grant program from FEMA. No significant wildland fires documented on either source have impacted Hildale as of July 2020. The City referenced smaller fires which have impacted yards and structures, or smaller wildfires in the community.

Wildfire impacts air and water quality and can affect public health through airborne ash and smoke. Individuals with respiratory disease, athletes, or people using outdoor spaces can be impacted by smoke and ash in the air. This ash settles on the ground and riparian areas, affecting water quality for a region. Riparian areas and drinking water assets can be at risk to settling debris from burning.

Wildfire can have economic impacts through damage to infrastructure and structures. In this area of Southern Utah, where public lands are an asset to a local economy, damage in these spaces can impact industries for several seasons, including tourism.

Wildfires can also cause and have heightened risks depending on other ongoing climate, weather, and geologic conditions. Wildfires can cause or exacerbate flash flooding, landslides, debris flows as burned area does not have vegetation to secure the soil, allowing it to wash away in a flood or landslide. Drought hazards can contribute to conditions which lead to heightened wildfire risk, with excessively dry vegetation and low water levels. Changing climate conditions will also contribute to wildfire risk long-term as dry conditions are expected to continue. Drought, flash flooding, and landslides all pose risks to Hildale, and it is essential to be aware of the interrelated nature of these hazards.

Earthquake

Utah has regular seismic activity, reporting several earthquakes annually. Earthquakes in Utah tend to be small and barely felt in communities, but there are several faults in the state that have the potential to produce severe earthquakes. The Southwest has a history of large earthquakes which cause impacts. Figure 336 shows the mapped earthquake epicenters and fault lines in Washington County. Neither the Utah Geological Survey nor US Geological Survey have identified faults in the community. The closest fault is located approximately 16 miles east in Kane County, in the Sevier/Toroweap fault zone. Given the location of the faults, a large earthquake on either or both faults would disrupt transportation to and from the community, potentially isolating Hildale and nearby communities during an event.

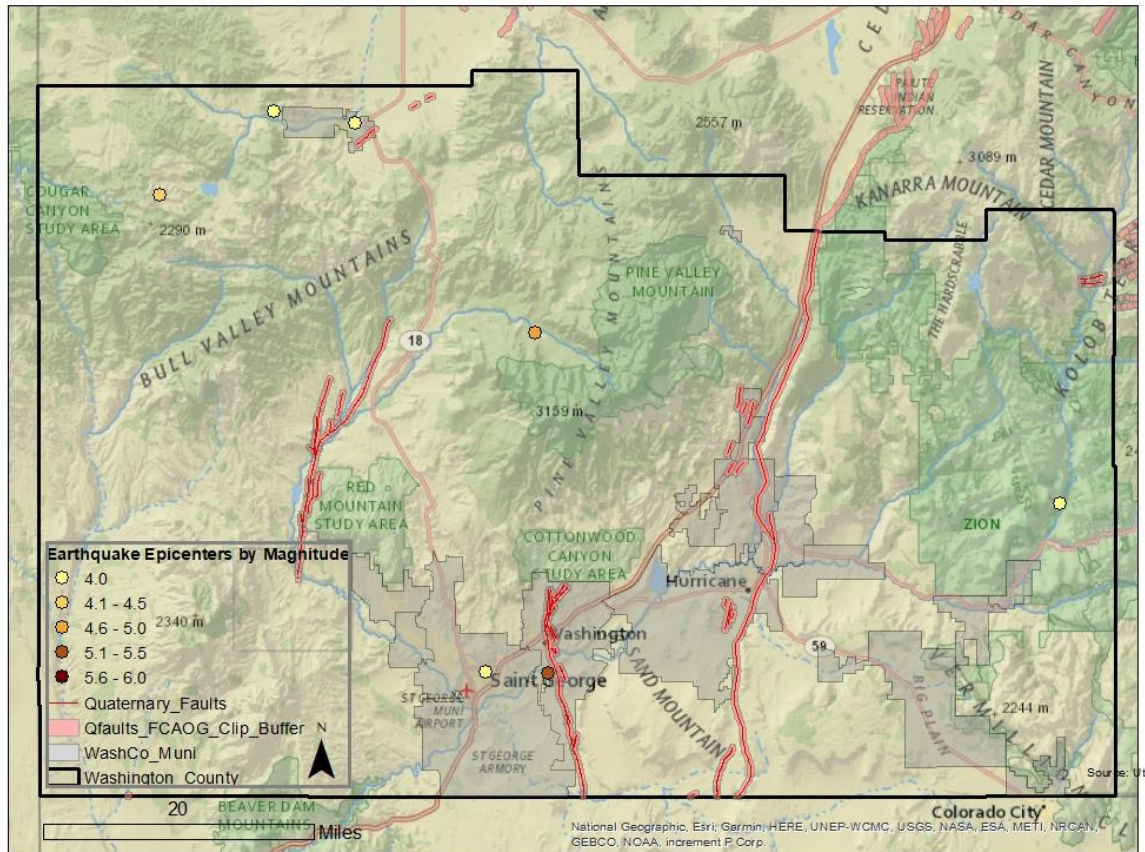


Figure 336: Washington County Earthquake Epicenter and Quaternary Faults

Source: UGS, Garfield County Assessor, AGRC

Since there are no mapped quaternary faults in the community, an assessment of the assets that are within a quarter mile of quaternary faults cannot be completed.

Ground Shaking

Earthquakes can produce ground shaking or tremors at different magnitudes. The shaking can be a hazard for structures, infrastructure, and natural features, triggering a myriad of other hazards.

An identified vulnerability to earthquakes in the region includes structures built before 1975, when seismic code requirements were adopted by the State of Utah. According to Washington County

Assessors data, 75 structures were built before the adoption of seismic code requirements in Hildale, approximately 25% of the total structures in the city boundaries. One critical facility is identified as being constructed pre-1975. Southern Utah has a pride in their pioneer history, which often includes preservation of historic buildings. Preservation should include retrofitting of structures to ensure the safety of those inside and outside of structures made from unreinforced masonry during a shaking event.

Hazard History

The University of Utah Geology Departments and the US Geological Survey document seismic history, which has been used for this plan. To focus on severe earthquake events, Five County includes earthquakes with magnitudes of 4.0 or greater. The University of Utah and USGS sources documented magnitude differ slightly in their measurement.

Earthquake events which cause strong shaking have been documented throughout the southwest. Only one earthquake event has an epicenter documented near Hildale, as described in Table 373.

Table 373: Hildale Earthquake Epicenter Record

Date	Location	Magnitude
1936	17.5 miles north of Hildale in Zion National Park	4.05

Source: USGS, University of Utah

Earthquakes are generally not triggered by other natural hazard events prevalent in the Southwest, although they can be caused by human activities like drilling or mining or volcanic eruptions. Several hazards can be caused by earthquakes, including flooding, landslide, and wildfire. Liquefaction is also a potential outcome of large earthquakes or ground shaking events, where strong shaking causes the soil to become fluid. There is not data available about liquefaction susceptibility for Hildale.

Landslides

The mountainous and cliff side topography common in the southwest are where landslides typically occur. The landscape in Southwestern Utah, marked by mesas, cliffsides, and valleys can see landslides and rockfall over time. Figure 337 maps the landslide susceptible areas in Hildale. Hildale is outside of the Utah Geological Survey’s updated mapping study boundary.

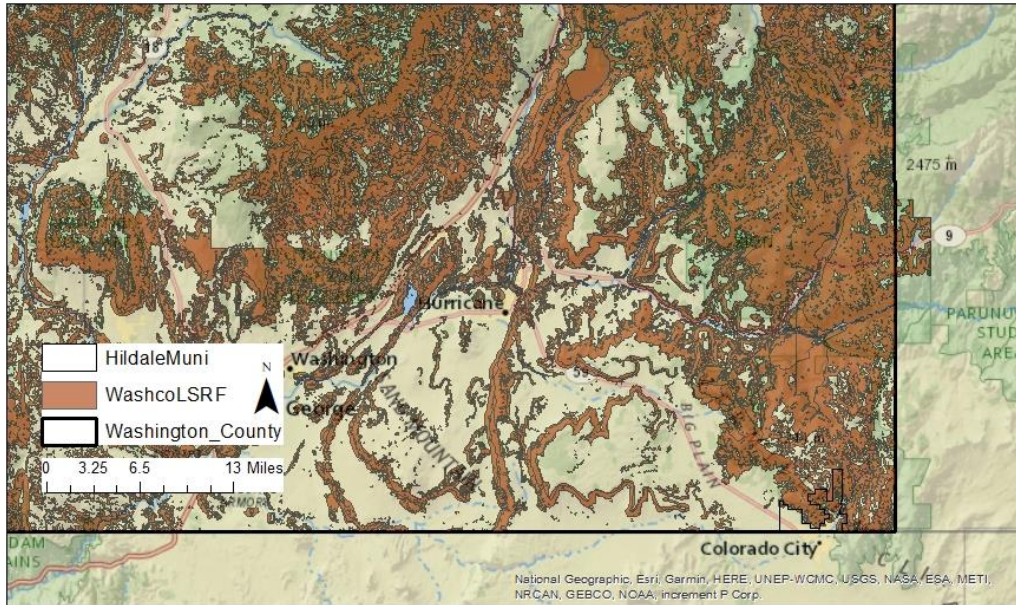


Figure 337: Hildale Landslide Susceptibility

Source: Utah Geological Survey

Hildale is exposed to landslide susceptible areas primarily in the north and eastern portions of the community, where the community is bounded by canyons and cliffsides. There are few homes and commercial endeavors in this area. The community identified a cut back hillside near a road. Oversaturation, wind, or shaking on this slope could put debris on the road causing delays and damages.

Table 374 describes the exposure of community assets to landslide susceptible areas. Exposed assets in the community include critical facilities, commercial and residential parcels, and road miles. People and property are vulnerable to landslides, which can damage homes, vehicles, and cause injury or death. On roadways, landslides can place debris on or cause damage to roadways. Such damages can block traffic and make access to the community a challenge. Future growth in the community could place new construction in susceptible areas without proper planning.

Table 374: Hildale Landslide Susceptibility Exposure

Hildale Exposure to Landslide Susceptible Areas						
Critical Facilities	Parcels			Road Miles	Rail Miles	Parks
	Commercial	Residential	Total			
25.0%	12.7%	17.1%	16.3%	8.9%	N/A	N/A

Source: Utah Geological Survey, Washington County Assessor, AGRC.

Hazard History

State and federal sources, and news sources do not describe landslides impacting people and property in Hildale as of this writing. Local documentation describes a 2019 landslide which occurred in the community. This event did not impact people or property but does demonstrate the potential for these hazards. Future development in landslide areas may increase risks to the community.

Several factors contribute to the potential or increased risk of landslides. Landslide events can trigger or be triggered by other natural hazard events. Earthquake, drought, flooding, wildfire, and severe weather can cause or worsen landslide events as the soil content and vegetation destroyed during these events. Landslides can likewise lead to flooding as ground materials can block or change flood and drainage areas.

Radon

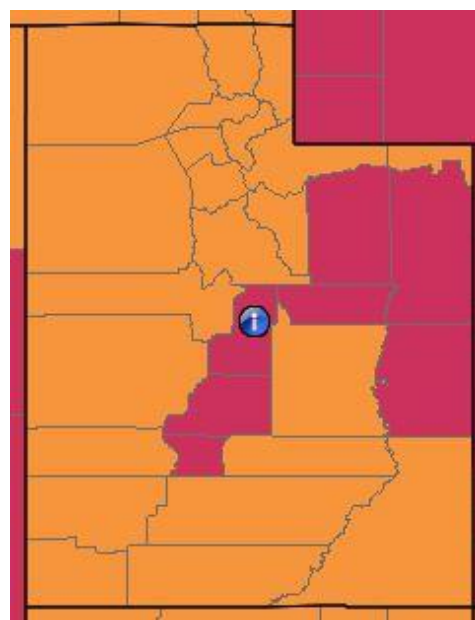
Radon is a leading cause of lung cancer and is the natural hazard that kills more people in the State of Utah. Indoor radon concentrations are common throughout the State of Utah, especially in homes, where people spend most of their time in the day. The Environmental Protection Agency has identified that Southwestern Utah is expected to have an average indoor level between 2.0 and 4.0 pCi/L of air, illustrated by Figure 338. At this level, mitigation is recommended, although mitigated indoor levels below 2.0 are difficult to achieve. There is no known level at which radon concentrations become more or less of a risk, as there is no safe level of radon exposure.

Occurrence and concentrations of radon depend on the soil content, structures foundation, and time spent in a space. Radon is a gas emitted from uranium deposits underground. Radon gas travels through the ground to the surface and can enter homes, become trapped and concentrating. Concentrations of radon gas are unhealthy for humans. Outdoor spaces are not a risk as the airflow dilutes radon.

Radon is not healthy at any level and is annually the natural hazard that kills the most people in Utah. Despite this indicator, few people are aware of radon risks and consequences. Increased public information about radon and reported at home testing results can help to inform the public and residents. Mitigation can be affordable, especially when completed in pre-construction phases.

While radon occurrence data can be difficult to acquire for communities, a 2019 report from the Utah Department of Environmental Quality describes short term radon testing by zip code and County. It is important to understand that testing and mitigation are site specific, based in part on the location and geology, but also the age and quality of the structure (Division of Radiation Control, 2019). The data from this report should not be used to determine where testing or mitigation should or should not be applied.

Table 375 describes the reported findings from short term radon testing across Washington County. The countywide average test result is 2.2 pCi/L of air. While this average is within the radon estimate for the region, radon tests with high levels of radon in the air have been reported which would require mitigation for human occupation of a space. The takeaway from this data is that radon gas has been identified in structures in the County and that testing, and information is necessary to understand and reduce risk.



Radon

Radon Data

- Zone 1: Counties with predicted average indoor radon screening levels greater than 4 pCi/L
- Zone 2: Counties with predicted average indoor radon screening levels from 2 to 4 pCi/L
- Zone 3: Counties with predicted average indoor radon screening levels less than 2 pCi/L

Figure 338: Estimated Indoor Radon Level Zones-Utah

Table 375: Washington County Short Term Radon Testing Reported

Percent of tests with levels <4 pCi/L	Percent of tests with levels \geq 4 pCi/L	Maximum Radon Level Reported	Average Radon Level Reported	Number of Tests
88.3%	11.7%	31.9 pCi/L	2.2 pCi/L	797

Source: Utah Department of Environmental Quality, Division of Radiation Control 2019.

There is not a hazard history for radon beyond the testing record, with even less being available at the City level. Knowing that Radium is a risk in the community and that basements are common in structures in the City, there is the potential locally for radon concentrations indoors. Increased testing and reporting would improve the understanding of radon risks and vulnerabilities for home and property owners. While estimates of radon levels in the County can be helpful to describe the problem, individual testing is the only way to understand the potential risk and exposure of radon gasses for a residence or structure. Testing and mitigation of radon should be done with the consultation of a Radon mitigation specialist.

Problem Soils

Hildale's Codes and Ordinances describe certain situations which would require a soils or geotechnical report for development, and they also reference a need to ensure that soils do not have swell-shrink or soluble characteristics pre-construction. Figure 339 illustrates where the Utah Geological Survey has mapped problem soils for Washington County. As demonstrated by the map, problem soils have not been mapped in the Hildale municipal boundaries.

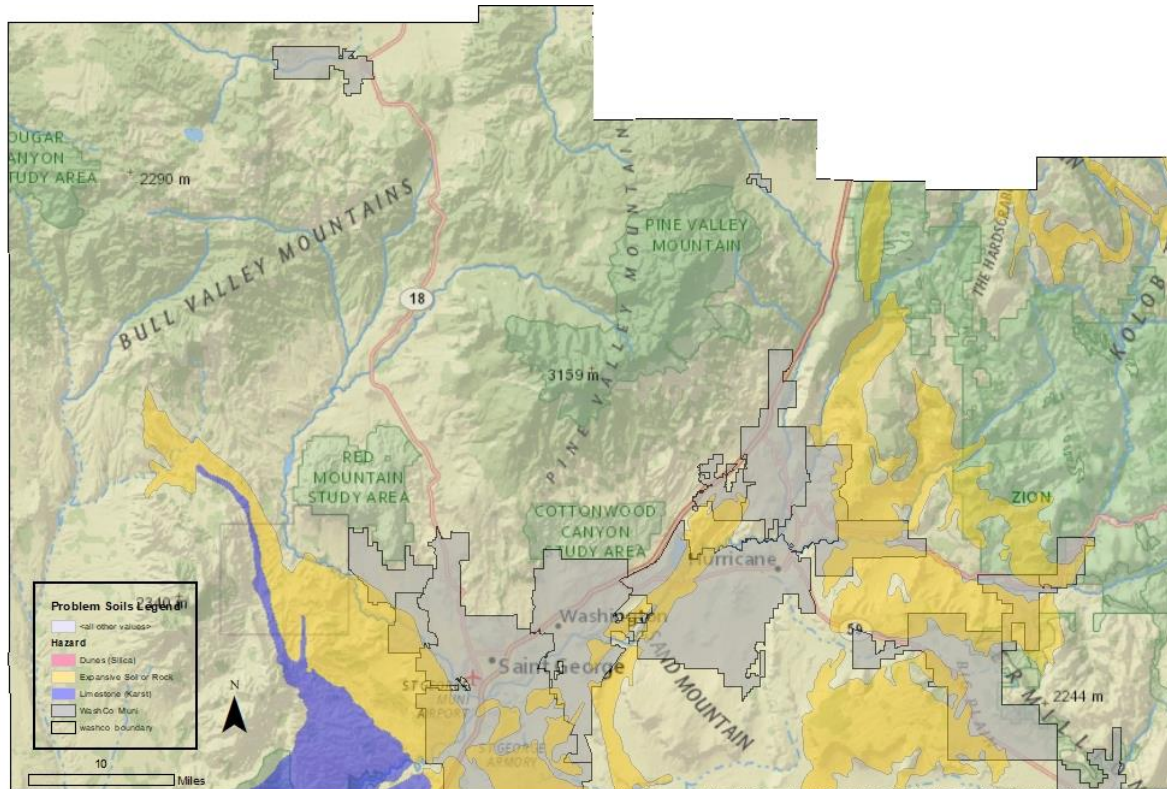


Figure 339: Washington County Problem Soils Map

Source: UGS, AGRC

Hildale City Code includes requirements for new construction to conduct testing and mitigate problem soils, like expansive soils, to develop a site. The City also describes impacts of blue clay expansive soils on building foundations in the area, causing the foundation to crack and building to shift with the underground soils expansion and contraction. Several of these structures are vacant.

UGS has developed new mapping for other communities in the region, which may provide a clearer picture of the challenges that exist to construction and development, including the presence of soil types such as clay, which can be challenging to the region. Hildale is not inside the study boundaries at the time that this plan was written.

The community and the county do not have a comprehensive record of problem soil impacts, although building permits should include a description of where studies were required, indicating whether problem soils have been discovered on a site and what types of mitigation were completed. Anecdotal evidence of community impacts has been described. While the impacts have not caused bodily injury or

death, problem soils cause economic damages, requiring structural repair or causing structures to sit vacant in the community.

Summary

Hildale is at risk to wildfire, landslides, earthquake, flooding, drought, severe weather, problem soils, and radon. Vulnerabilities identified potential economic impacts from supply chain delays, access, or traffic impacts on the tourism industry in the area following a natural hazard event. Residents are at risk to injury and property damage from several natural hazards. The only hazard that exposes critical facilities in the community is wildfire. Visitors to recreational areas have been impacted by severe weather and have the potential to be impacted by flooding, drought, landslides, and wildfires based on the risk assessment.

Mitigation Strategy and Actions

Hildale has participated in previous iterations of the Five County Multi-Jurisdictional Natural Hazard Plan and identified strategies to mitigate natural hazard risks. Table 376 describes progress made on Hildale’s mitigation strategy as detailed in the 2016 iteration of the Natural Hazard Mitigation Plan.

Table 376: 2016 Hildale Mitigation Strategy

Hazard	Objective	Action	Timeline	Funding Source	Progress
Flood #1	To reduce flooding risk at the community level.	Clear debris and other material from all waterways.	Ongoing	Related public/private property owners.	Still Needed.

Source: 2017 Five County Association of Governments NHMP

To address the risks and vulnerabilities identified in this chapter, Hildale has assembled several actions, addressing each of the natural hazards that they are at risk to. These actions are informed by the risk assessment. Each action in Table 377 includes the following elements:

- Hazard ID- an alpha numeric identifier for the hazard being addressed by the action.
- Goal- the goal section identifies the regional goal that the action meets. Goals set by the region are found in Figure 340.
- Objective- a mid-level description of the purpose for the action.
- Action- Summarizes a specific activity in the community that addresses natural hazard risks.
- Priority- priority description for each action determined through the STAPLEE method indicated by L=low, M=moderate, and H=high.
- Timeline- The estimated amount of time to implement the action.
- Cost- The estimated cost of implementing the action, indicated by L=low, M=moderate, and H=high
- Funding Source- Potential options to pay to implement the action.
- Responsible party- The organization, agency, or entity who will be necessary to implement an action. Potential partnerships are included in this section and are organizations or persons who could support successful implementation of the action.

Plan Goals

Goal 1- Protect life & property

Goal 2- Secure critical infrastructure

Goal 3- Public education and outreach

Goal 4- Partnership and coordination

Goal 5- Emergency response

Goal 6- Protect the natural environment

Figure 340: Regional Plan Goals

Table 377: Hildale 2022 Mitigation Strategy

Hazard	Goal	Objective	Action	Priority	Timeline	Cost	Funding Source	Responsible Agency
Multi Hazard #1	5	Plan for emergency response	Update Emergency Operations Plan.	L	2-years	M	Hildale City	Hildale City
Flood #1	1, 2, 6	Infrastructure and Public Safety	Construct erosion reduction measures on Water Canyon Road.	M	5-years	H	Hildale City	Hildale City
Flood #2	1, 2, 6	Use natural systems to mitigate hazards.	Construct erosion reduction measures on Short Creek.	M	5-years	H	Hildale City	Hildale City
Flood #3	2, 5	Use enforcement mechanisms for public safety.	Control and enforce illegal dumping in Short Creek.	H	1-year; ongoing	L	Hildale City	Hildale City
Flood #4	1, 2	Community planning to limit hazard exposure.	Adopt an erosion hazard ordinance to protect vulnerable areas prone to erosion.	M	1-year	L	Hildale City	Hildale City
Wildfire #1	6	Use natural systems to mitigate hazards.	Vegetation restoration in Short Creek and washes to reduce flammable fuels and protect the creek.	M	Ongoing	L	Hildale City, DNR.	Hildale City
Wildfire #2	6	Use natural systems to mitigate hazards.	Continue invasive species and fuels management practices in the city.	H	Ongoing	L	Hildale City, DNR.	Hildale City
Wildfire #3	2	Community planning for mitigation.	Adopt Wildland Urban Interface Code.	M	1-year	L	Hildale City	Hildale City
Earthquake #1	2	Infrastructure and Public Safety	Engage in seismic retrofits of city owned buildings constructed before the adoption of the Utah Building Code.	M	5-10-years	M	Hildale City, CIB, FEMA.	Hildale City
Problem Soil #1	1, 2, 4	Acquire updated data for the city to inform decisions.	Work with the Utah Geological Survey to complete updated mapping of problem soil risks in the community.	L	5-years	L	Hildale City	Hildale City