2022

Mohave County Multi-Jurisdictional Hazard Mitigation Plan

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This Plan was developed in cooperation with:

Mohave County

Ft. Mojave Indian Tribe

Hualapai Tribe

Bullhead City

Colorado City

City of Kingman

Lake Havasu City

SECTION 1: INTRODUCTION

1.1 Purpose

This Plan was prepared to guide hazard mitigation to better protect the people, property, community assets and land from the effects of hazards. This Plan demonstrates the communities' and tribe's commitment to reducing risks from hazards and serves as a tool to help decision makers direct mitigation activities and resources. This Plan was also developed to make the participating communities and tribe eligible for certain types of Federal disaster assistance and hazard mitigation grant funding.

1.2 Background and Scope

Each year in the United States, disasters injure or take the lives of thousands of people. Nationwide, taxpayers pay billions of dollars annually to help communities, organizations, businesses, and individuals recover from disasters. These monies only partially reflect the true cost of disasters because additional expenses to insurance companies and nongovernmental organizations are not reimbursed by tax dollars. Many disasters are predictable, and much of the damage caused by these events can be alleviated or even eliminated.

Hazard mitigation is defined by FEMA as "any sustained action taken to reduce or eliminate long-term risk to human life and property from a hazard event." The results of a three-year congressionally mandated independent study to assess future savings from mitigation activities provides evidence that mitigation activities are highly cost-effective. On average, each dollar spent on mitigation saves society an average of $4 in avoided future losses in addition to saving lives and preventing injuries (National Institute of Building Science Multi-Hazard Mitigation Council 2005).

Examples of hazard mitigation measures include, but are not limited to the following:

- Development of mitigation standards, regulations, policies, and programs
- Land use/zoning policies
- Strong building code and floodplain management regulations
- Dam safety program, seawalls, and levee systems
- Acquisition of flood prone and environmentally sensitive lands
- Retrofitting/hardening/elevating structures and critical facilities
- Relocation of structures, infrastructure, and facilities out of vulnerable areas
- Public awareness/education campaigns
- Improvement of warning and evacuation systems

Hazard mitigation planning is the process through which hazards that threaten communities are identified, likely impacts of those hazards are determined, mitigation goals are set, and appropriate strategies to lessen impacts are determined, prioritized, and implemented. This Plan documents the planning process employed by the Planning Team. The Plan identifies relevant hazards and risks and identifies the strategy that will be used to decrease vulnerability and increase resiliency and sustainability.

This Plan was prepared pursuant to the requirements of the Disaster Mitigation Action of 2000 and the implementing regulations set forth in the Federal Register (hereafter, these requirements will be referred to collectively as the DMA2K). While the act emphasized the need for mitigation plans and more coordinated mitigation planning and implementation efforts, the regulations established the requirements that hazard mitigation plans must meet in order to be eligible for certain Federal disaster assistance and hazard mitigation funding un the Robert T. Stafford Disaster Relief and Emergency Act.

Information in this Plan will be used to help guide and coordinate mitigation activities and decisions for future land use. Proactive mitigation planning will help reduce the cost of disaster response and recovery to the community and its property owners by protecting structures, reducing exposure and minimizing overall community impacts and disruption. The community has been affected by hazards in the past and is thus committed to reducing future disaster impacts and maintaining eligibility for Federal funding.

This is a multi-jurisdictional plan that geographically covers the participating communities and tribe(s) within the Mohave County boundaries (hereinafter referred to as the planning area). It is important to note that the Fort Mojave Indian Tribe and Hualapai Tribe have rejoined/joined as participants for this plan update. The following communities participated in the planning process:

- Mohave County
- Ft. Mojave Indian Tribe
- Hualapai Tribe
- Bullhead City
- Colorado City
- City of Kingman
- Lake Havasu City

1.3 Assurances

This Plan was prepared to comply with the requirements of the Robert T Stafford Disaster Relief and Emergency Assistance Act of 1988 (as amended by the DMA); all pertinent presidential directives associated with the U.S. Department of Homeland Security and FEMA; all aspects of 44 CFR pertaining to hazard mitigation planning and grants pertaining to the mitigation of adverse effects of disasters (natural, human-caused, and other); interim final rule and final rules issued by FEMA; and all Office of Management and Budget circulars and other federal government documents, guidelines and rules.

As participants in this Plan, the Fort Mojave Indian Tribe and the Hualapai Tribe assure that they will continue to comply with all applicable Federal statutes and regulations in effect with respect to the periods for which it receives grant funding, in compliance with 44 CFR 13.11(c). This Plan will be amended whenever necessary to reflect changes in Federal laws and statutes as required in 44 CFR 133.11(d).

1.4 Plan Organization

This Plan is organized as follows:

- Section 1: Introduction
- Section 2: Community Profile
- Section 3: Planning Process
- Section 4: Risk Assessment
- Section 5: Mitigation Strategy
- Section 6: Plan Maintenance

SECTION 2: COMMUNITY PROFILES

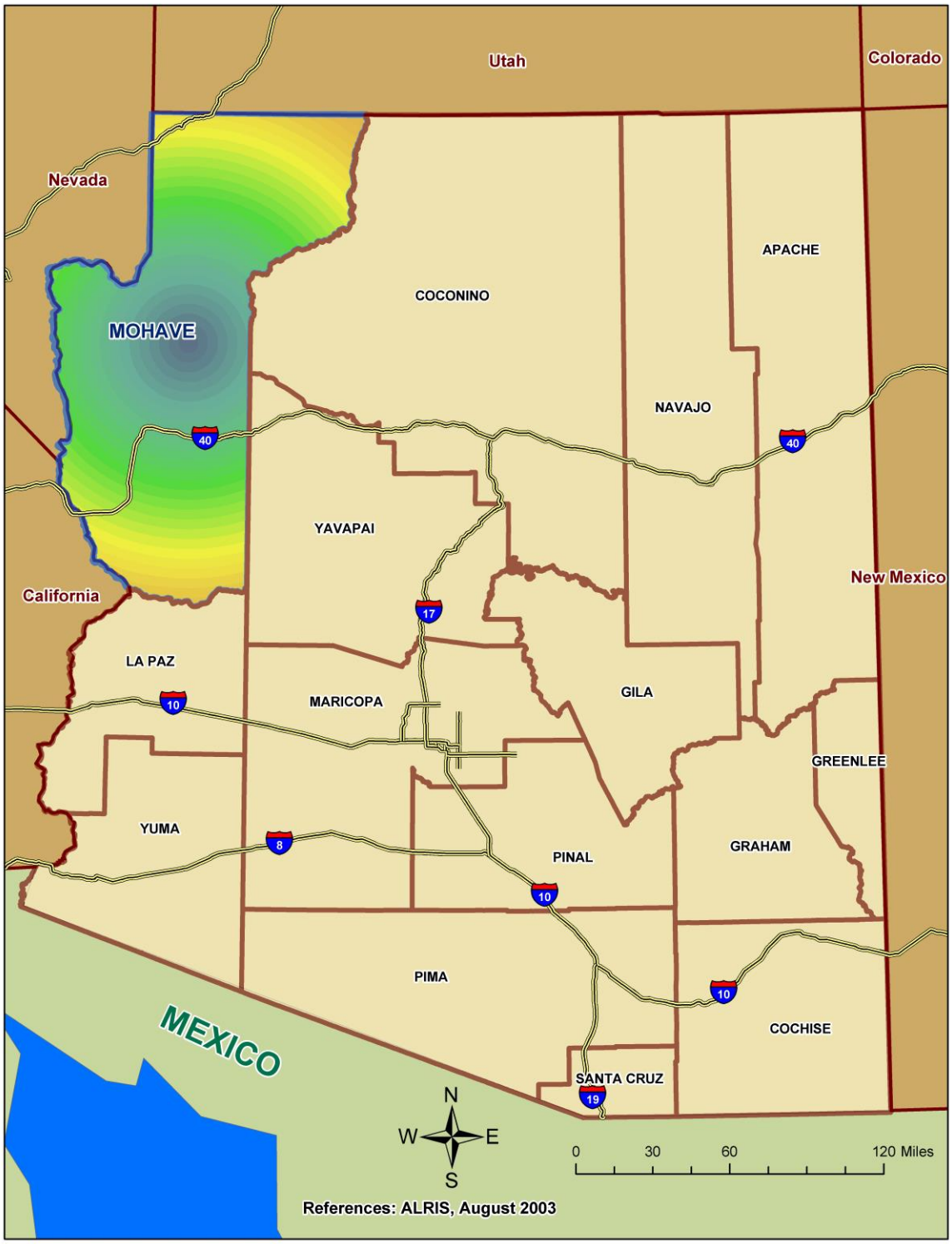
2.1 Mohave County

Geography

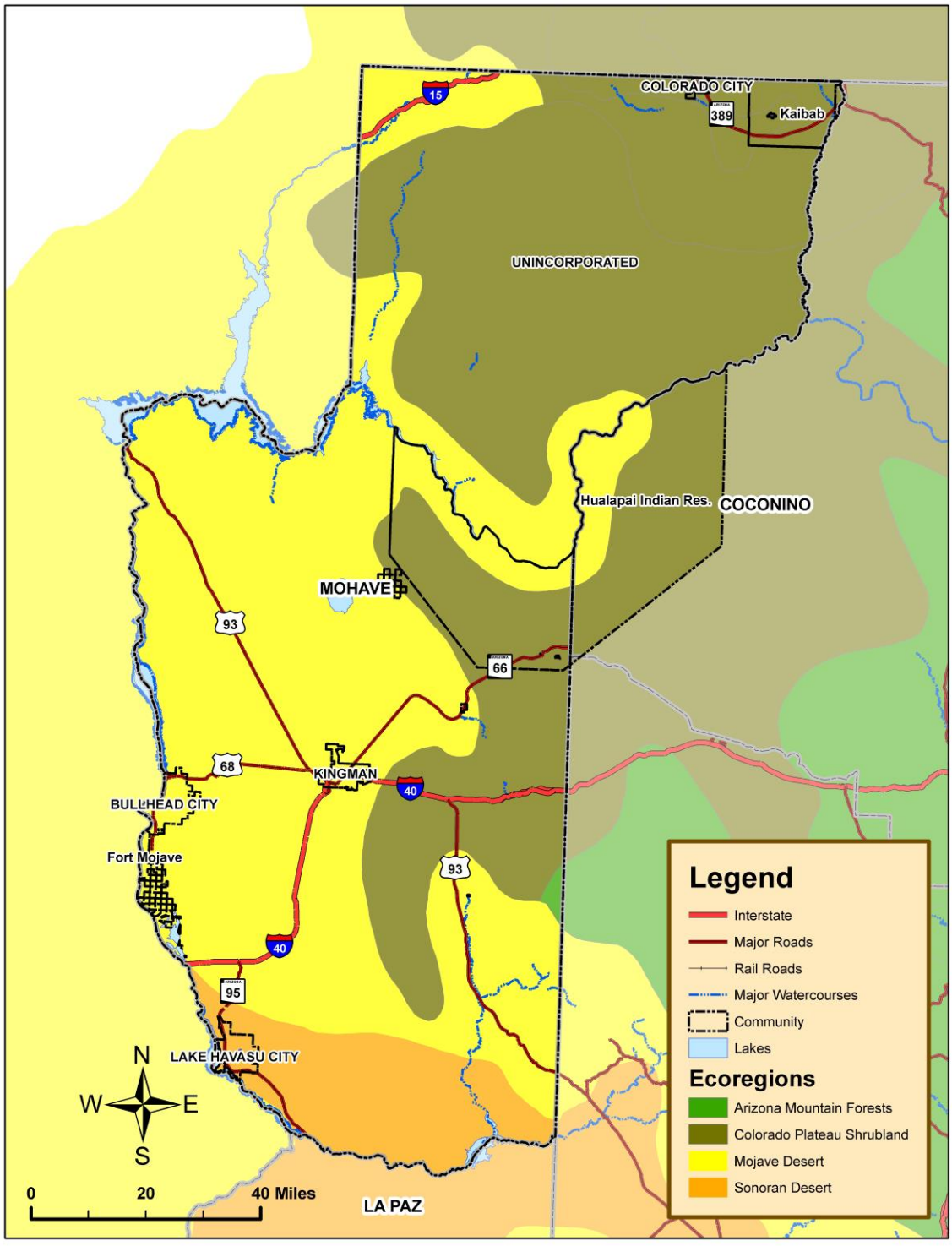
Mohave County is in the northwest corner of Arizona and shares a border with California and Nevada along the Colorado River to the west, and Utah to the north. Its southern border is the Bill Williams River and La Paz County, with Coconino County and Yavapai County sharing the boundary to the east. Mohave County is the second largest county in Arizona, covering 13,479 square miles and is also a great water sports center with over 186 square miles of water and 1,000 miles of shoreline.

Mohave County is bisected in the northern portion by the Grand Canyon and varies in elevation ranging from 500 at the Colorado River to over 8,000 feet atop Hayden Peak in the Hualapai Mountains. The topography varies from flat desert ranges in the eastern portion of the county to rolling, mountainous terrain and deep canyons of the western and northern areas.

Mohave County lies entirely within the Upper and Lower Colorado River Basins. The Upper Colorado River Basin includes the Grand Canyon and Lake Mead. Mountain ranges include the Virgin, Black, and Cerbat ranges. The lower basin includes Lakes Mead and Havasu on the Colorado River and Lake Alamo on the Bill Williams River, a tributary to the Colorado. The lower basin also includes the Hualapai, Peacock, Cottonwood, Aquarius, Bill Williams, Mohave, McCracken, Rawhide, and Artillery Mountains.



Map 2-1: Vicinity



Map 2-2: Terrestrial Ecoregions

Climate

Average temperatures within Mohave County range from below freezing during the winter months to over 112°F during the hot summer months. The severity of temperatures in either extreme is highly dependent upon the location, and more importantly the altitude, within the county. For instance, temperature extremes at Kingman are more moderate than those for the Bullhead City area on the Colorado River. There is a 10° to 15° reduction in temperatures between the upper and lower elevation stations. It is plausible to expect another 10° reduction for areas above 9,000 feet.

Precipitation throughout Mohave County is governed to a great extent by elevation and season of the year. From November through March, storm systems from the Pacific Ocean cross the state as broad winter storms producing mild precipitation events and snowstorms at the higher elevations. Summer rainfall begins early in July and usually lasts until mid-September. Moisture-bearing winds move into Arizona at the surface from the southwest (Gulf of California) and aloft from the southeast (Gulf of Mexico). The shift in wind direction, termed the North American Monsoon, produces summer rains in the form of thunderstorms that result largely from excessive heating of the land surface and the subsequent lifting of moisture-laden air, especially along the primary mountain ranges.

Table 2-1: Average Climate for Kingman

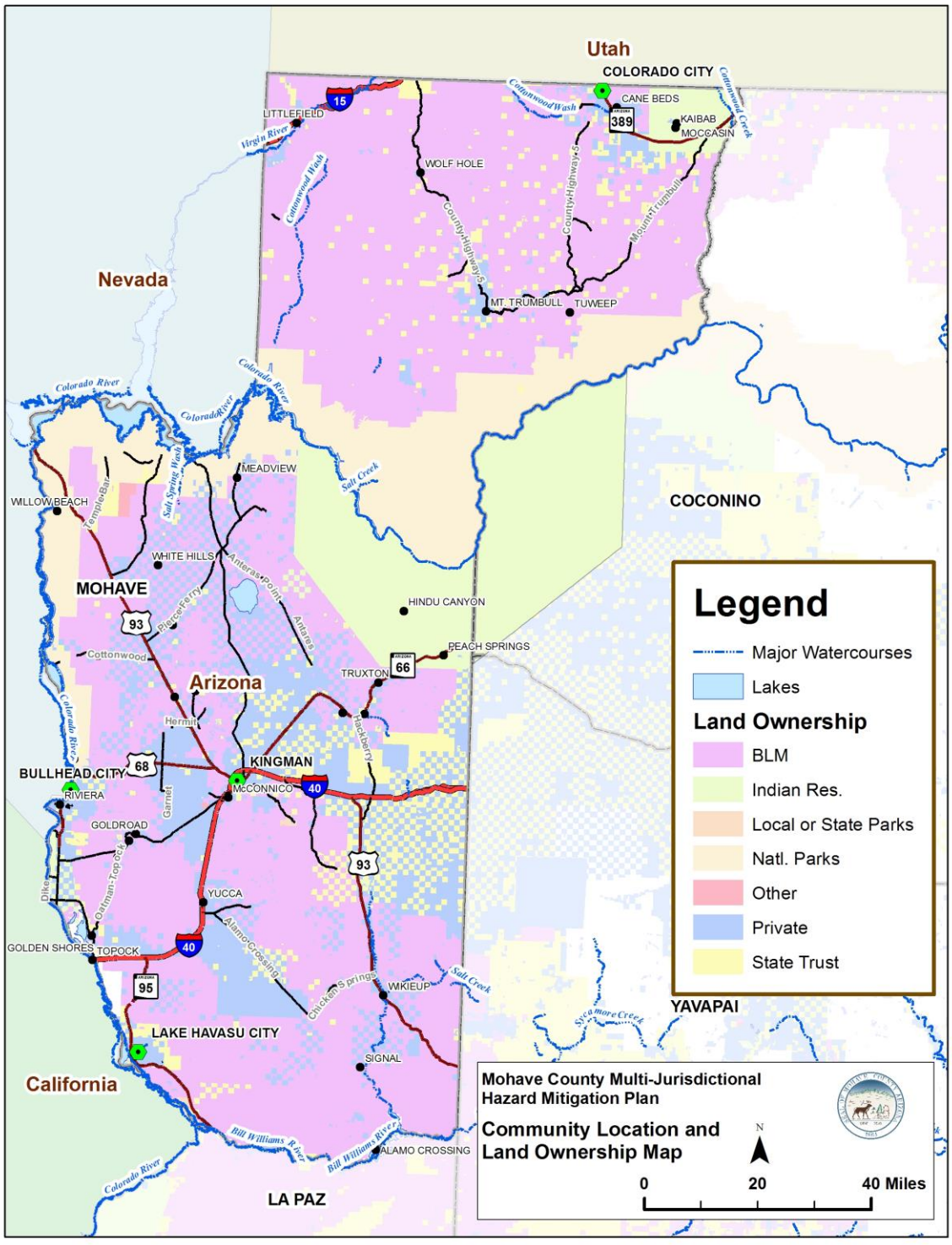
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Avg Max Temp (F)	55	60	64	72	82	93	97	95	89	78	65	56
Avg Min Temp (F)	32	36	39	45	54	64	70	68	62	51	40	33
Avg Precip (in.)	1.3	1	1.4	.5	.3	.2	1.1	1.5	.7	.8	.7	.9
Avg Snowfall (in.)	.2	.7	.3	0	0	0	0	0	0	0	.2	0

Source: Western Regional Climate Center

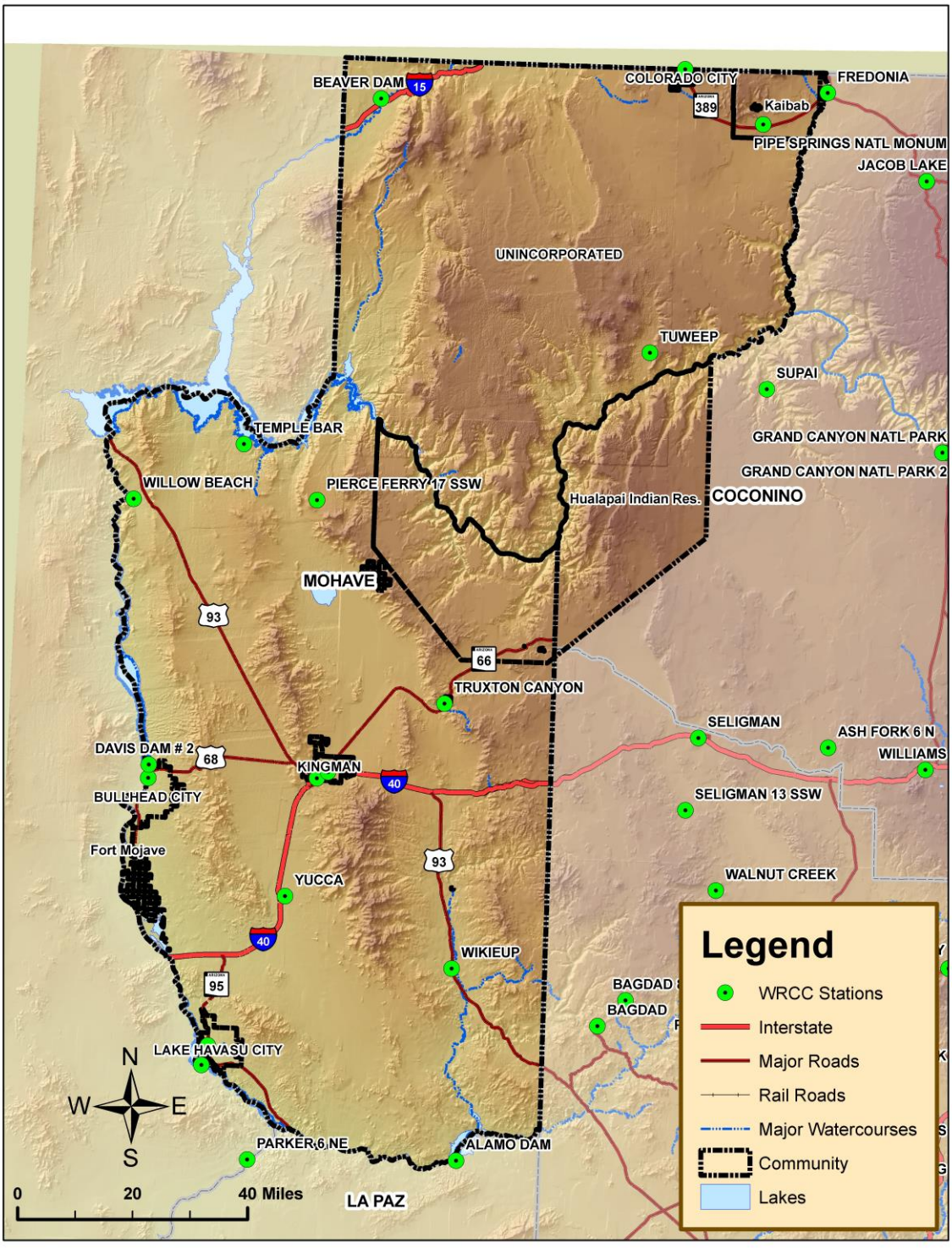
Table 2-2: Average Climate for Colorado City

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Avg Max Temp (F)	48	52	59	67	77	88	93	91	83	71	58	49
Avg Min Temp (F)	24	28	32	37	46	54	61	60	53	42	31	24
Avg Precip (in.)	1.3	1.6	1.6	1	.6	.4	1.2	1.5	1.1	1.1	1.1	1
Avg Snowfall (in.)	4.7	4.1	2.8	1.3	0	0	0	0	0	.3	1.9	3.4

Source: Western Regional Climate Center



Map 2-3: Land Ownership of Mohave County



Map 2-4: General Features of Mohave County

Population

Table 2-3: Estimated Population					
Jurisdiction	**1990**	**2000**	**2010**	**2014**	**2020**
Mohave County	93,497	155,032	200,186	203,361	212,181
Hualapai Indian Tribe	822	1,353	1335	N/A	1,433
Fort Mojave Indian Tribe	454	773	733	733	1,117
Bullhead City	21,951	33,769	39,540	39,364	40,884
Colorado City	2,426	3,334	4,821	4,792	4,836
Kingman	13,208	20,069	28,068	28,549	31,013
Lake Havasu City	24,363	41,938	52,532	53,103	57,464
Kaibab Paiute Indian Tribe	165	196	240	N/A	130
Source: US Census 2020, World Population Review, AZDHS.Gov, Census.Gov					

Economy

The County's major industries are retail, health care, social assistance and construction. The large population centers can attribute much of the growth to tourism and recreational activities along the Colorado River and lakes, the seasonal and full-time migration of retirees, and the rapid growth of the employment opportunities in the gaming industry of Laughlin and Las Vegas, Nevada. The primary employment sectors are trade, transportation, utilities, government, education, and health services. Several mines are in operation or being planned.

For the unincorporated areas of the county, the Mohave County General Plan recognized high rates of growth in the South Mohave Valley, Golden Valley and areas surrounding Bullhead City, Kingman, and Lake Havasu City prior to the economic downturn. Population growth has now slowed to about 1.5% countywide. Over 85% of the land in the County is owned by federal and state governments. Because of the vast size of the County, the public lands do not normally restrict or constrain growth, except where alternating sections of public ownership increases cost of development. The availability or access to water and sewer is the primary restraint of growth.

Government

Mohave County has a five-member Board of Supervisors and a County Manager. City councils with mayors govern the four incorporated cities, and tribal councils govern the three tribal reservations.

Land Use / Ownership

Land ownership within Mohave County is divided between Bureau of Land Management (57.6%), National Parks (13.0%), Private (12.0%), Indian Reservations, (8.3%); US Forest (4.6%), State of Arizona Trust Lands (4.3%), and other (0.5%).

Emergency Management

OEM - Mohave County Division of Emergency Management (MCEM) provides coordination of emergency planning, training, and exercises among all county jurisdictions and emergency services agencies. The four incorporated cities and the three Indian Tribes have designated emergency managers that interact with MCEM and conduct jurisdictional planning.

EAS/IPAWS - The Emergency Alert System and IPAWS can be activated by the Mohave County Sheriff's Office 911 Center or Las Vegas National Weather Service to two commercial radio stations with backup power capability for further transmission to all local stations. An automated phone warning system and text emergency warning is in operation and available for residents to register their phones to receive address specific notifications.

EMT/EMS Services - EMT/EMS services are provided by several fire departments and one private company. Several air ambulance companies service the county.

Law Enforcement - Mohave County Sheriff's Office covers the unincorporated areas and coordinates with the Lake Havasu City, Bullhead City, Kingman Police Departments, and the Colorado City Marshall's Office as well as the three tribal police departments.

Fire - There are two city fire departments and 14 fire districts in the county. The Hualapai Tribe has a fire department and the Ft. Mojave Indian Tribe contracts fire services from one of the fire districts. There are two full fire department hazmat teams along with several trained hazmat technicians in other departments.

Disaster Events

From 2005 to 2013, Mohave County received one state and three federal disaster declarations for major flooding events. From 2013 to 2015, there were three county declared disasters. From 2016-2021, there were three declared emergencies, including the COVID-19 pandemic.

The most flood damage occurred in the three events that impacted the unincorporated Beaver Dam / Littlefield communities in northwest Mohave, including the loss of 16 houses in 2005 and 5 houses in 2010, and in the 2015 flood in Colorado City, which resulted in extensive infrastructure damage and 13 fatalities. Smaller flash flooding events occur in most years but usually result in temporary road closures with minimal infrastructure damage.

Major wind damage, primarily from microbursts, has caused occasional but significant damage to homes, trailers, and utility lines in the Golden Shores, Mohave Valley, Ft. Mohave, and Bullhead City areas. Occasional water and electric outages during the summer have caused concerns for heat related illnesses but are usually too short-lived to cause major problems.

The most well-known historical disaster is the 1973 tank car BLEVE in Kingman that killed 11 firefighters and one civilian. This emphasizes the potential dangers of the large amounts of hazardous materials currently transiting the county on I-40, US 93, and the BNSF Railroad. There are a number of fixed facilities with hazardous materials, including two power plants and a chemical plant, and a significant amount of Hazmat training and planning occurs among all stakeholders.

A major Colorado River flood occurred in the Mohave Valley area in 1983 due to release of water from Davis and Hoover Dams. As of 2015, Lake Mohave and Lake Mead levels are very low, and several years of abundant snowfall in the Rockies will be needed before levels approach the ones that necessitated the 1983 releases. Planning efforts with the Bureau of Reclamation for warning and response to uncontrolled releases from either dam are ongoing, and emergency evacuation plans for individual jurisdictions are in place.

Wildfires are a significant danger to the County. In the Hualapai Mountains a 2013 fire caused the evacuation of the Pine Lake and Pinion Pine communities and Hualapai Mountain Park, although the fire was contained before any residences were damaged. In 2015, a major wildfire in Mohave Valley caused the evacuation of 900 homes and the loss of 11 residences. In 2020 and 2021, there were wildfires that threatened the Pine Lake community and the County Hualapai Mountain Park, the one in 2021 causing an evacuation of that area.

Transportation

Roadways – Main roadways are Interstate Highways 40 and 15, US Highway 93 and State Routes 95, 66, 68 and 389. I-40 crosses into California alongside the BNSF railroad and several gas pipelines at Topock. Interstate 15 traverses a potential bottleneck over several bridges in the Virgin River Gorge in northwest Mohave County. US 93 is the most direct highway route between Las Vegas and Phoenix. Large numbers of tourist buses utilize US 93 from Hoover Dam to Dolan Springs and then Pierce Ferry and Diamond Bar county roads to reach the Grand Canyon West Resort and the Skywalk.

Railways - Burlington Northern Santa Fe Railroad transits the County through Peach Springs on the Hualapai Reservation and Kingman, paralleling Route 66 or I-40 for long stretches. Traffic comprises about 80 trains a

day with considerable hazardous material. Amtrak trains also transit the county with a stop in Kingman; a major Amtrak derailment with numerous minor injuries but no fatalities occurred near Kingman in 1997.

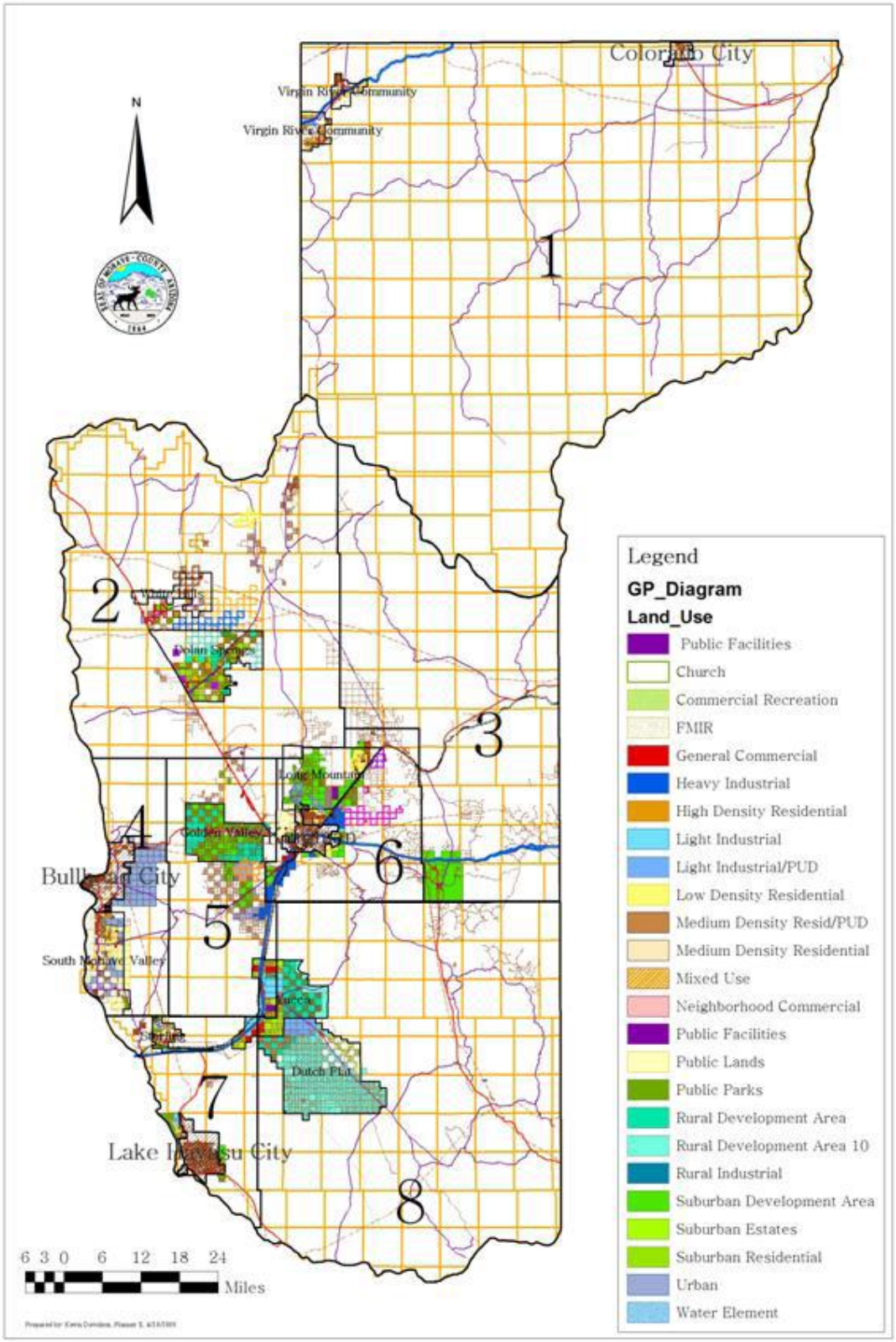
Airports/Air Service - There are large but relatively low traffic airports at Kingman, Bullhead City, and Lake Havasu City, and small airports in the Mohave Valley and White Hills area. Commuter flights have serviced the Kingman airport in the past, and large charter airliners, with a future potential for regularly scheduled service, utilize the Laughlin/Bullhead City Airport to serve the Laughlin tourist trade. The Grand Canyon West Resort on the Hualapai Indian Tribe Reservation has a fixed wing and helicopter airport with considerable tourist flight traffic.

Utilities

Electric - Unisource Electric, Mohave Electric Cooperative, Aha Macav Power

Gas - Unisource Gas, Southwest Gas

Water/Sewer - The four incorporated cities and the three tribes maintain services for their jurisdictions; in addition, there are two County operated water districts. There are numerous private water companies that service rural areas of the County, primarily north and west of Kingman, in the areas south of Bullhead City, and the Arizona Strip.



Source: Mohave County General Plan, 2005, Exhibit VI.1, p 57.

Map 2-5: Countywide Land Use Plan

2.2 Bullhead City

Bullhead City is located along the central-western edge of Mohave County near the common border of Arizona, California, and Laughlin, Nevada. The City is located approximately 218 miles northwest of Phoenix, 62 miles north of Lake Havasu City, and is approximately 35 miles west of Kingman. The city is situated along the east bank of the Colorado River on either side of State Highway 95. Land ownership within the City is primarily private with a few areas of State Trust Land and BLM land.

Bullhead City was originally named Hardyville by the founder, William Harrison Hardy, who was one of the first men to call the area home in the 1860s. At the turn of the century, mining activities ceased, and railroads were constructed from Needles through Yucca to Kingman and farther. Hardyville was soon abandoned and became a ghost town. Eventually, the area resurrected in the early 1940s with the construction of Davis Dam, and was renamed to Bullhead City after Bull's Head Rock, an old landmark and navigation point located along the Colorado River that is now partially submerged by Lake Mohave. The City began as the headquarters for construction of Davis Dam in 1945. Bullhead City incorporated in 1984 with much of the recent growth in the last 30 years is attributable to the successful development of Laughlin, Nevada. [1]

According to Bullhead City's current General Plan[2], land use planning includes various densities of residential, commercial, industrial, and mixed land uses. The City has identified the following four general areas of focus for growth:

- The area surrounding the intersection of Marina Boulevard and Highway 95 that includes some of the City's major retail centers, the City Hall and additional vacant land.
- The original Bullhead City town site, just west of the Airport.
- The Laughlin-Bullhead International Airport.
- The Bullhead Parkway.

Bullhead City's proximity to the Colorado River/Lake Mohave and Lake Mead National Recreation Area offers visitors year-round water sports activities. The 67-mile-long Lake Mohave is the gateway to the Lake Mead area. Lake Mohave offers camping, fishing, water skiing, jet skiing and many other activities which entice visitors to the Bullhead City area.

According to the Arizona Department of Commerce, tourism is the primary economic activity, centering on the Laughlin resort/gaming industry and Colorado River related activities. Currently, the city serves a trade area population that exceeds 144,000. The civilian labor force in 2020 was 17,295 with an unemployment rate of 5.1%. Residential building permits issued, and units constructed in the city over the period of 2011-2021, are shown below. Commercial permits are also provided for comparison.

Development Trends

Ownership of land within Bullhead City is predominantly private (77%), with the remainder being state and federal government (AZ State Land Dept 11%, Bureau of Land Management 8% and National Park Service 4%).

In 2000 Bullhead City's land area comprised 42.9 square miles. With the Laughlin Ranch Annexation in 2005 and Viewpoint in 2007 the City now comprises 59.7 square miles. The amount of undeveloped land is holding steady at approximately 60% just as in the 2002 General Plan. According to the Arizona Department of Administration, Office of Employment and Population Statistics, Bullhead City's population is projected to grow to 54,806 by the year 2025. Planning for future land uses will help guide development decisions over the next decade.

[1] City of Bullhead City

[2] City of Bullhead City

Most of the City's future growth is planned for the Bullhead City Parkway area, Laughlin Ranch area, and in the southern parts of the City, although numerous options exist for infill development and redevelopment in established portions of the City.

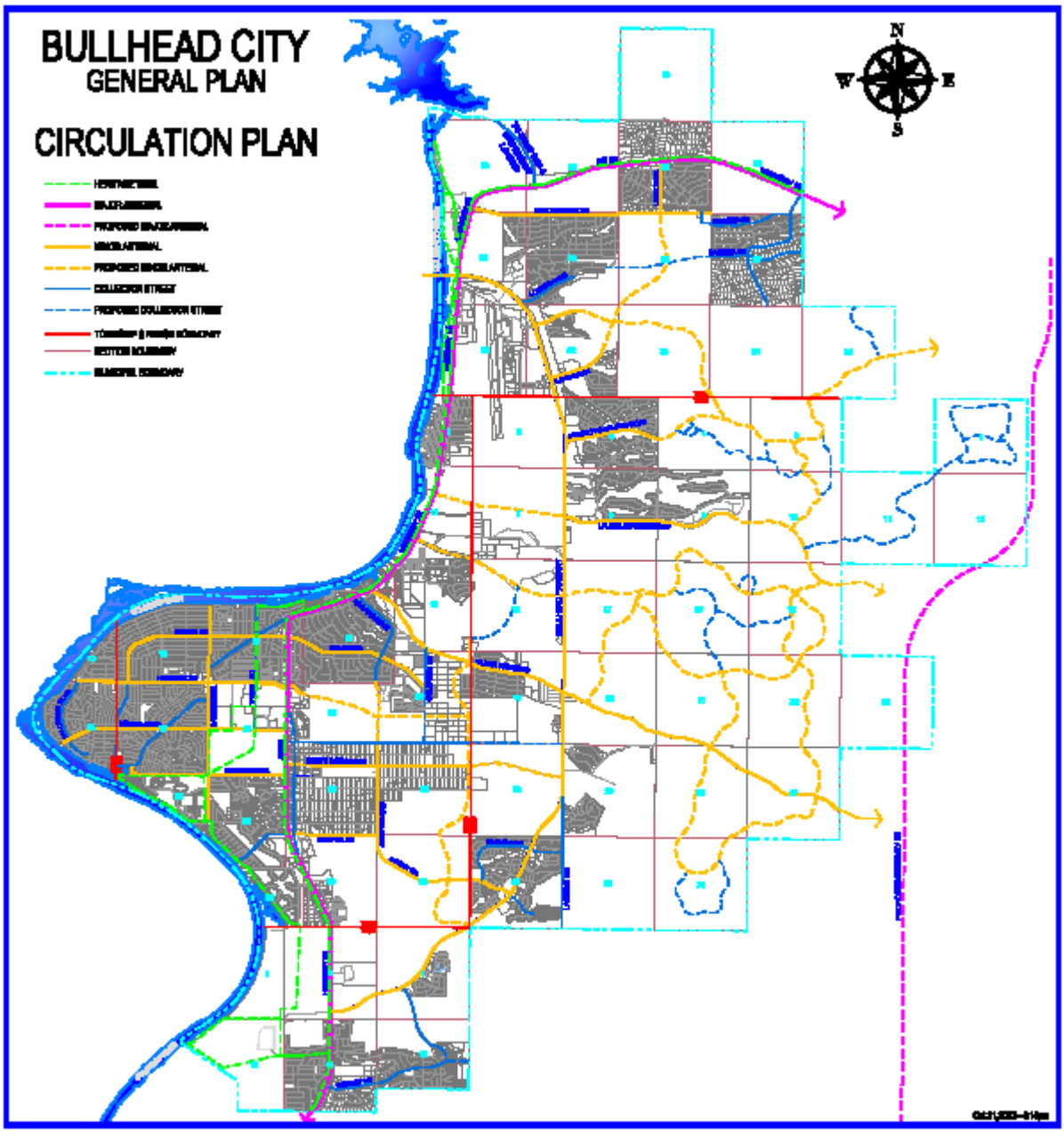
Residential use comprises 56% of the total land use category within the City, followed by 31% public lands, 5% commercial, 5% golf courses/parks/open spaces and 3% industrial.

Table 1
Summary of Zoning by Catergory

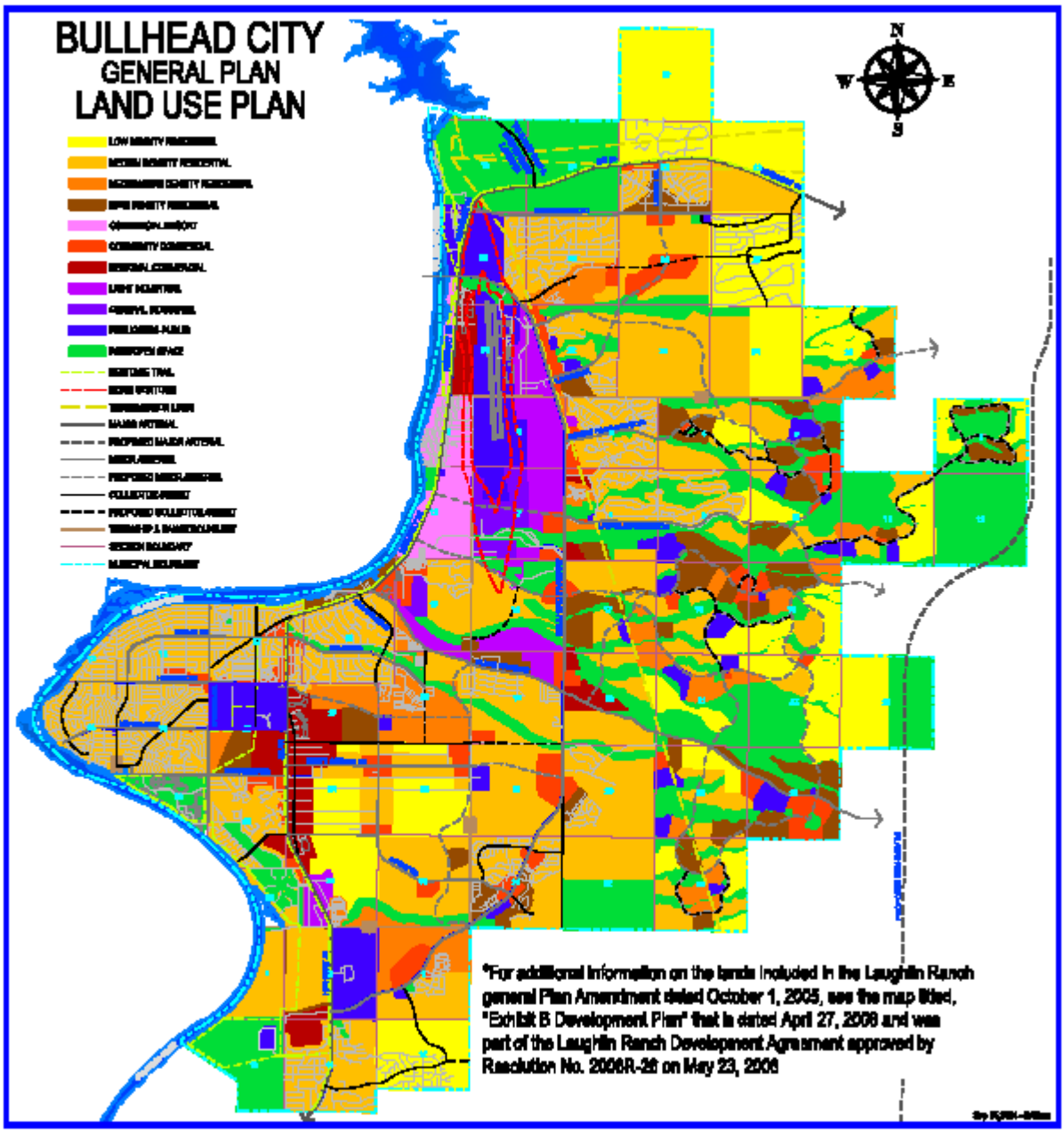
Zoning	Category	Acres	Percent
Residential: Single Family Limited	R1L	14,048	37.8
Residential: Single Family Suburban	R1S	320	0.9
Residential: Single Family Factory Built	R1FB	0	0.0
Residential: Single Family Manufactured Home	R1MH	4,109	11.0
Residential Park	RP	438	1.2
Residential: Multiple Family	R2MF	1,949	5.2
Commercial: Neighborhood Sales & Services	C1	89	0.2
General Commercial	C2	1,713	4.6
Commercial & Minor Industrial	C3	166	0.4
Industrial: General Limited	M1	872	2.3
Industrial: Heavy	M2	181	0.5
Golf Course	GC	569	1.5
Parks/Open Space	P/OS	1,122	3.0
Public Lands	PL	11,608	31.2
Parking	P1	2	0.0
Total		**37,186**	**100%**

*Areas where calculated from digitized zoning polygons are approximate. Parcels may include or exclude streets and other easements, thus total area does not equal incorporated area of Bullhead City.

Source: Bullhead City Planning and Zoning



Map 2-6: Bullhead City Location Circulation Map



Map 2-7: Bullhead City Land Use

CITY OF BULLHEAD CITY
BUILDING DIVISION
ANNUAL REPORT

ITEMS PROCESSED:	FY 2011 -2012	FY 2012 -2013	FY 2013 -2014	FY 2014 -2015	FY 2015 -2016	FY 2016 -2017	FY 2017 -2018	FY 2018 -2019	FY 2019 -2020	FY 2020 -2021
BUILDING PERMITS ISSUED										
Accessory Structures	173	175	204	227	269	219	210	245	217	268
Single Family Residences	30	36	58	79	84	104	144	208	248	402
Multiple Family Residences	0	1	1	3	19	10	12	11	6	7
Commercial	105	84	123	123	112	125	138	114	98	84
Grading	8	5	3	12	9	9	16	28	15	19
Other	347	332	415	529	571	473	447	373	351	442
Floodplain	5	7	6	3	5	3	6	0	6	6
Electrical/Mechanical/Plumbing	256	261	374	504	415	455	474	526	430	469
TOTAL ISSUED	924	901	1,184	1,480	1,484	1,398	1,447	1,505	1,371	1,697
BUILDING PERMIT VALUATIONS										
Accessory Structures	$2,123,267	$1,984,270	$2,918,031	$2,519,689	$3,427,939	$2,724,611	$3,084,149	$2,914,857	$2,892,972	$4,050,134
Single Family Residences	$7,528,113	$8,320,638	$14,320,795	$19,663,942	$19,630,123	$24,678,460	$36,065,810	$49,274,221	$53,437,081	$87,309,728
Multiple Family Residences	$0	$2,599	$2,579	$81,254	$185,781	$50,849	$187,740	$470,794	$32,000	$25,100
Commercial	$6,142,369	$8,702,714	$13,753,468	$7,152,567	$7,062,904	$5,462,560	$59,844,709	$21,789,009	$17,712,686	$9,402,462
Other	$1,336,715	$1,055,421	$1,381,477	$1,546,864	$1,813,038	$1,793,940	$1,648,496	$1,314,276	$1,733,904	$2,713,393
TOTAL VALUATIONS	$17,130,464	$20,065,642	$32,376,350	$30,964,316	$32,119,785	$34,710,420	$100,830,904	$75,763,157	$75,808,643	$103,500,817
BUILDING PERMIT FEES										
Permit Fees	$157,349	$166,829	$239,252	$287,352	$291,986	$311,721	$555,735	$541,151	$556,619	$781,982
Plan Review Fees	$91,706	$106,589	$174,278	$179,661	$184,999	$197,063	$354,912	$346,393	$352,724	$480,912
Engineering Review Fees	-	-	-	-	-	$14,565	$48,665	$22,675	$17,911	$11,475
Sewer App / Tap Fees	-	-	-	-	-	$14,680	$20,670	$31,760	$33,220	$57,340
Less BBIP Bullhead City Business Incentive Program			-	-	-	**($67,987)**	**($400,000)**	**($200,517)**	**($90,946)**	**($4,541)**
Water Resource Fees	$30,739	$35,829	$77,223	$48,725	$40,384	$47,435	$90,019	$100,679	$165,585	$199,676
Laughlin Ranch Development Fee	$1,000	$4,000	$12,000	$14,000	$11,000	$5,000	$16,000	$18,000	$26,000	$0
TOTAL FEES	$280,794	$313,247	$502,753	$529,738	$528,369	$522,477	$686,001	$860,141	$1,061,113	$1,526,844
MISCELLANEOUS										
Building Permit Inspections	5,686	5,266	7,394	8,669	9,704	9,538	9,254	10,303	10,001	11,446
Business License Checks	242	198	263	146	139	134	142	188	150	135
Courtesy and Other No Fee Permits	428	233	195	189	234	167	138	218	139	63
	Fiscal Year End Totals									**Through June 2021**

Source:G:\planning\DSD Reports\FY 2020-2021 Copies\Building Annual Report 2011 - 2021

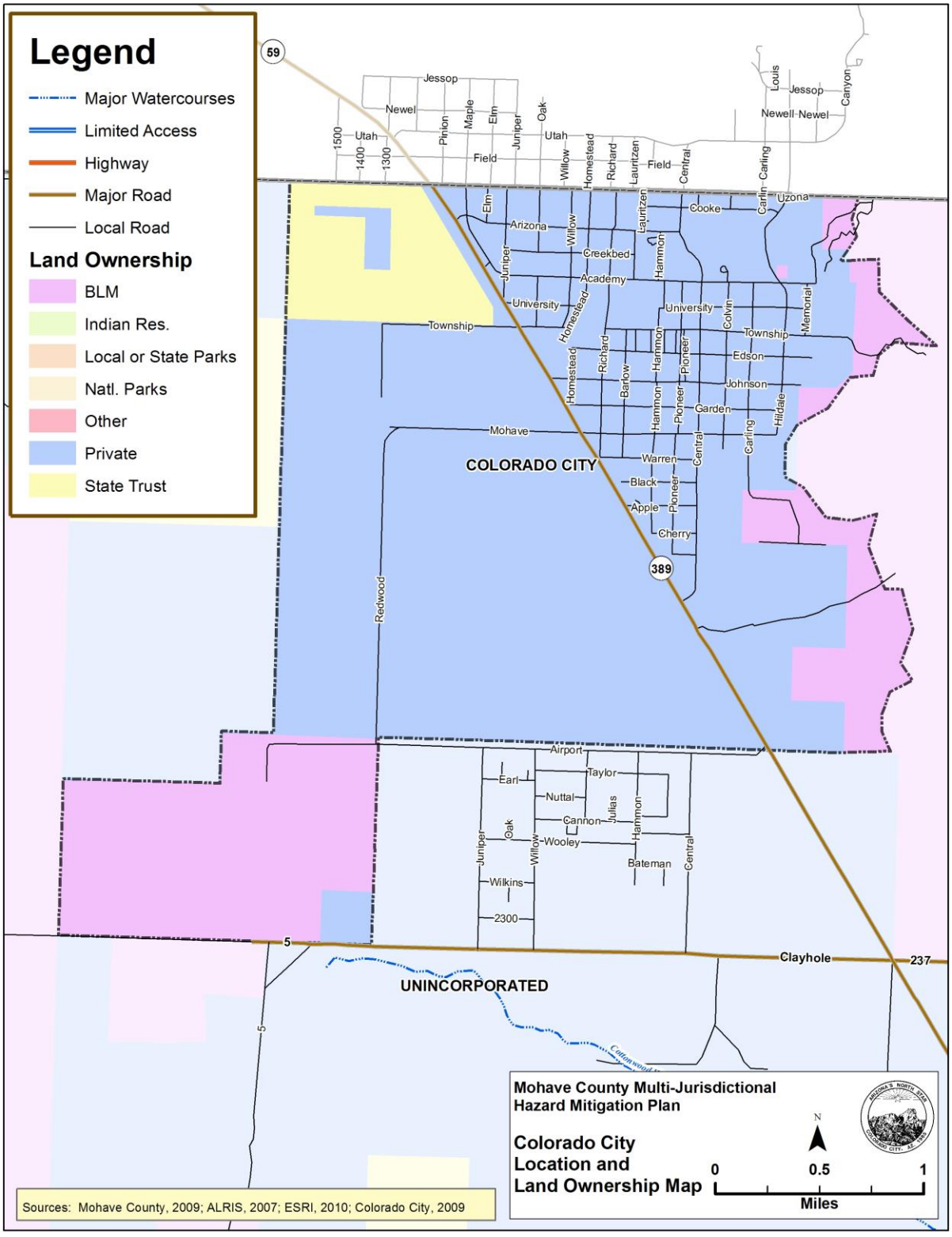
2.3 Colorado City

Colorado City is located on the Arizona-Utah border in the northeastern part of the County and shares a common border with Hildale, Utah. The average elevation is about 5,200 feet. The major highway is State Route 389. Colorado City is located approximately 354 miles north of Phoenix and 162 miles northeast of Las Vegas, Nevada. The North Rim of the Grand Canyon is about 100 miles south. The land surrounding Colorado City is either Bureau of Land Management or State Trust or privately owned.

Colorado City was originally named Short Creek after a nearby intermittent stream that exhibited surface flow for a short distance before disappearing into the sandy bottom of the watercourse. One of the first modern settlers was William Maxwell in 1908. Other early settlers were cattlemen and ranchers, and eventually homesteaders. During the 1930s, a group of religious fundamentalists came from Utah seeking refuge and played a major role in developing Colorado City for what it is today. The community officially changed its name to Colorado City in 1963 and was incorporated in 1985.

According to the Arizona Department of Commerce, the traditional economic focus on agriculture and ranching has gradually changed with growth and urban expansion. The local school district is the largest single employer in town, but manufacturing plants and regional construction provide the most jobs. The neighboring community of Hildale, Utah, has an active industrial park and service industries, which plays an important role in Colorado City's economy. The industrial activities for the most part is in Hildale, while commercial and retail is in Colorado City. The civilian labor force in 2020 was 1,377 with an unemployment rate of 7.1%.

The community is generally mixed use residential, open space and commercial. Developed area residential densities are typically one home per acre. There remain large areas of undeveloped, vacant and open space. Anticipated developments will generally follow the same pattern.



Map 2-8: Colorado City Location and Land Ownership

2.4 Kingman

Early explorers, Captain Lorenzo Sitgreaves and Lieutenant Amiel Whipple, traversed the 35th parallel in 1851, and 1854, examining wagon trail options to California while passing through what would later become Kingman. Naval Lieutenant Edward Beale: commissioned to open a wagon road to California, he first made the trip with the help of camels in 1857 and improved the road two years later. The Civil War interrupted additional work. In 1866, Congress granted a charter to the Atlantic and Pacific Railroad, later taken over by the Atchinson, Topeka and Santa Fe Railroad, to construct a line on or near the 35th parallel. Lewis Kingman: a railroad civil engineer, began the survey west from Albuquerque in 1880. In 1882, on his return trip east, he established the town site of Kingman because of the proximity of natural, perennial, springs, needed for the operation of steam engines. With the completion of the railroad to Kingman on March 27, 1883, and through to California seven months later, land speculation and settlement of the towns along the route began. Early settlers consisted of ranchers, businessmen, and miners exploring the potential of nearby mountains.

Kingman has been the county seat of Mohave County since 1887, when a colorful effort to move it from Mineral Park occurred. Throughout much of its history the mining of gold, silver, turquoise, copper, and later molybdenum were mainstays of the Kingman economy. In the 1920s, one of Kingman's most notable residents, the western actor Andy Devine, was raised in Kingman. His parents owned, ran, and lived in the Beale Hotel on Front Street, later renamed Andy Devine Avenue (Historic Route 66).

The construction of Boulder Dam (later Hoover Dam) and the highway to it in the 1930s, the establishment of a major Air Corps gunnery school at the airport during World War II, and construction of Davis Dam following the war, all provided new residents and employment. Incorporation in 1952; brought paved roads, sidewalks, streetlights, a municipal water system and city parks. The boom in rural subdivisions in the 1960s, many purchased and settled by retirees, and the start of manufacturing and distribution in the late 1960s, brought on a period of tremendous growth.

Following the closing of the copper mines in the late 1970s, Kingman's economy began to diversify. Recently, Kingman has become a regional trade, service, and distribution center for Northwestern Arizona. Its strategic location relative to Los Angeles, Las Vegas, Phoenix, Laughlin, and the Grand Canyon has made tourism, manufacturing, and distribution leading industries. Copper and molybdenum mining made a comeback in the 2000-2010 timeframe.

In the 1970s and early 1980s the Cecil Davis subdivision east of the railroad tracks and south of Southern Avenue was almost entirely built with single family homes. The Kingman Park Estates area also developed in this area. Further north, near Western Avenue and Gordon Drive, the Canyon Shadows subdivision began to develop with single family homes and later with patio home development. In what was outside the city limits at the time, the Kingman Camelback area developed in the 1980s with a mixture of site-built and manufactured homes and the Hualapai Foothills area southeast of Kingman began to develop. Commercial development at this time was centered along Stockton Hill Road and Andy Devine Avenue in the Hilltop area. Interstate 40 was completed in the early 1980s this bypassed the Downtown area and focused commercial development in the Hilltop area. Additional commercial development occurred near the I-40/Highway 93 interchange. By 2000, the population of the City of Kingman had risen to 20,069 from the 13,208 in 1990, and population within the entire Kingman area had reached over 35,000. Beginning in the 1990s, and continuing through the 2000, Kingman began to see a substantial amount of residential and commercial infill development. This was due in part to successful city improvement districts in older, partially developed subdivisions. These included the Gates Avenue Improvement District west of Stockton Hill Road and south of I-40, the Kingman Airport Tract Improvement District north of Airway Avenue, the Greater Kingman Addition Improvement District east of Eastern Street and north of I-40, and the East Golden Gate Improvement District, in the Louise Avenue/Washington Avenue area. Beginning in the early 1990s, the Stockton Hill Road corridor between I-40 and Northern Avenue became the main commercial corridor in Kingman. This began with the addition of the Wal-Mart/Albertson’s shopping center in 1993, followed by numerous other commercial developments and the hospital expansion.

The east Kingman area including the Hualapai Mountain/Fripps Ranch, Rancho Santa Fe and Hualapai Foothills Estates neighborhoods saw tremendous residential growth in the 1990s, and early 2000s. Other new residential development occurred in centralized areas including Silver Ridge and the Walleck Ranch neighborhoods. Finally, new residential development has occurred on the far northern side of the Kingman area including the Chaparral Mesa and Fountain Hills subdivisions.

While most of Kingman's residential development has been in the form of single-family homes, some substantial multiple family developments have occurred since the mid-1980s. These include Kingman Station Apartments with 144 units in Downtown Kingman, Centennial Parkview with 118 units and Parkcrest Village Apartments with 80 units in the Centennial Park area, and Copper Ridge Apartments with 156 units in the Hualapai Mountain Road area. Large scale senior level housing has also occurred most notably near the intersection of Western and Detroit.

Similar growth trends and patterns can be expected in the future with the largest concentration of residential growth occurring on the east side of Kingman and the main area of commercial growth occurring along the Stockton Hill Road corridor primarily from I-40 to Gordon Drive.

In October 2010, the Hoover Dam Bypass was completed and has decreased travel time to Las Vegas by about 30 minutes. The completion of the Hoover Dam Bypass project, located along US 93, has enabled Kingman and other communities to provide affordable alternatives for Las Vegas commuters. The price difference, coupled with the new bypass, has Las Vegas developers making land deals with property owners in Kingman, AZ.

US 93 is being upgraded to four lane freeway standards between Phoenix, AZ and Las Vegas, NV and is scheduled to be designated at Interstate 11. In the summer of 2014, the Arizona and Nevada Departments of Transportation completed the two-year Interstate 11 and Intermountain West Corridor Study. Congress recognized the importance of the portion of the Corridor between Phoenix and Las Vegas and designated it as future Interstate 11 in the recent transportation authorization bill, Moving Ahead for Progress in the 21st Century Act. The study included detailed corridor planning of a possible interstate link between Phoenix and Las Vegas, and high-level visioning for extending the corridor south to Mexico and potentially north to Canada. Some sections of this corridor will be constructed or enhanced in coming years, while much of the corridor remains in the long-range planning phase.

Kingman is still the home of one of the world's most famous and productive turquoise mines. The Mineral Park Mine, in the Cerbat Mountains 14 miles northwest of Kingman, was first mined by Native Americans centuries before Europeans came into the area. Mineral Park was the most extensively worked of three known prehistoric mining sites in the State of Arizona. Chuck Colbaugh found a cache of prehistoric stone tools in the turquoise diggings in 1962. Ithaca Peak and Turquoise Peak are the most famous of the area's mountains containing native turquoise.

Transcontinental Interstate 40, the US-93 CANAMEX corridor, the Burlington Northern & Santa Fe Railroad mainline, and the proximity to the California market makes Kingman a prime site for industries and distributors. The Kingman Airport Industrial Park, with reasonable land costs, and a favorable Arizona tax rate attracts the attention of manufacturers and distributors who wish to establish facilities to serve the western states. Kingman's high-quality, affordable housing, the comparatively low-cost of living, and the pleasant year-round weather are just a few of the positive factors that have attracted new residents.

Location

The City of Kingman is in Mohave County in northwestern Arizona along Interstate 40 and US 93.

Longitude: 114˚ 03' West

Latitude: 35˚ 11' North

Elevation: 3,300-3,800 feet

Kingman is the crossroads of the Southwest. Interstate-40, which is a transcontinental freeway, passes through Kingman. U.S. Highway 93, which is the primary link from Phoenix, Arizona to Las Vegas, Nevada, also

passes through Kingman. The Hoover Dam Bypass Bridge (Mike O'Callaghan – Pat Tillman Memorial Bridge) and the 17 miles of four-lane divided highway south of the Hoover Dam Bypass Bridge significantly improves travel time by resolving the previous back-ups caused by 20 miles of two-lane roadway and the "stop-and-go" traffic across the dam that has plagued this route since the opening of Hoover Dam in 1935.

Kingman is the first city in Arizona after leaving California for eastbound traffic (52-miles from the California border). The next incorporated city on Interstate 40 east of Kingman is 110-miles away (Williams, AZ). On US Highway 93, Kingman is the only incorporated city from Wickenburg, AZ (75-miles south) and Boulder City, NV (80-miles north of Kingman).

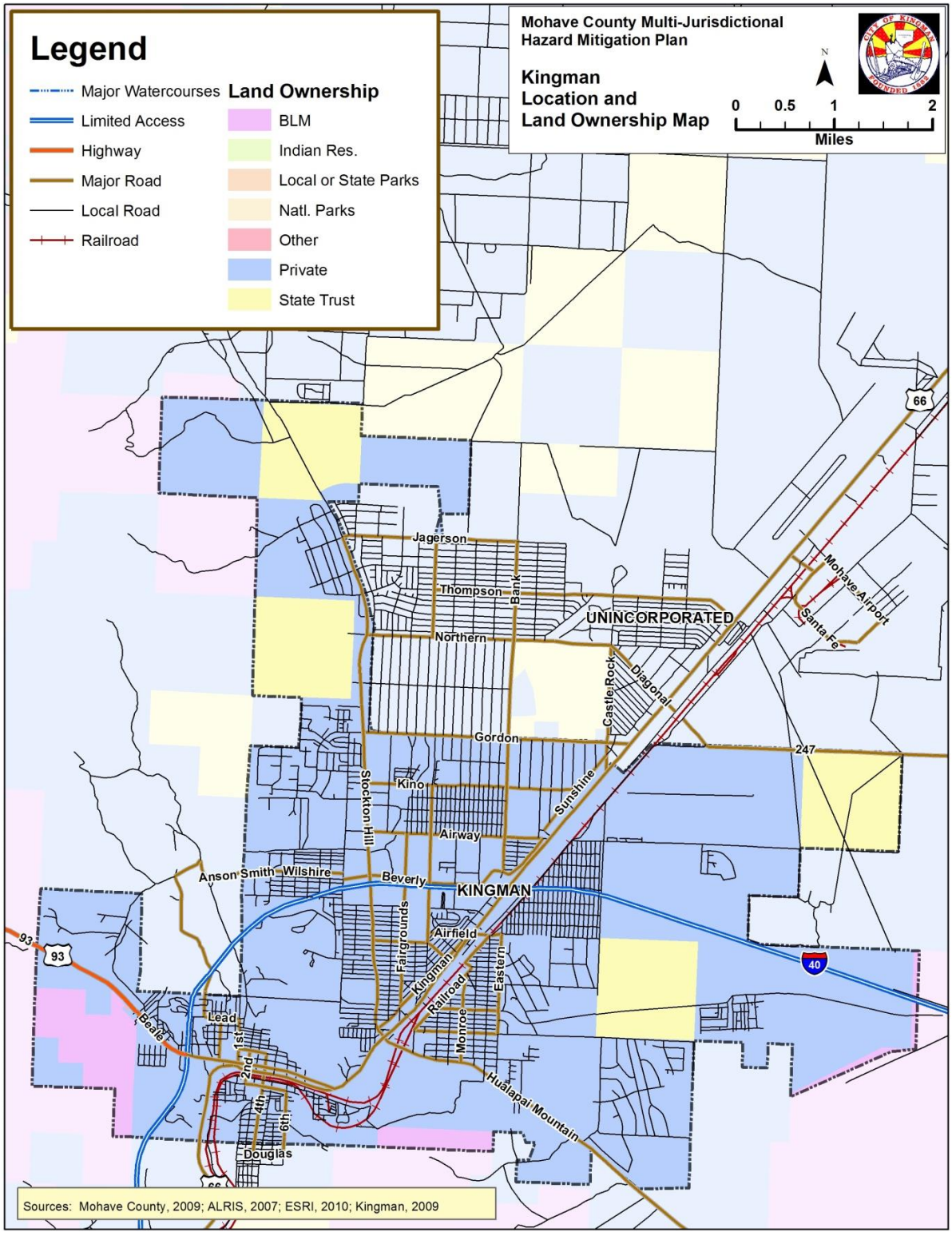
Highway Distances from Kingman

Albuquerque 480 miles	Reno 550 miles
Denver 810 miles	Salt Lake City 520 miles
Las Vegas 100 miles	San Diego 400 miles
Los Angeles 330 miles	San Francisco 660 miles
Phoenix 186 miles	Tucson 300 miles
Flagstaff 143 miles	Chicago 1,821 miles
Yuma 227 miles	New York 2,476 miles

Population

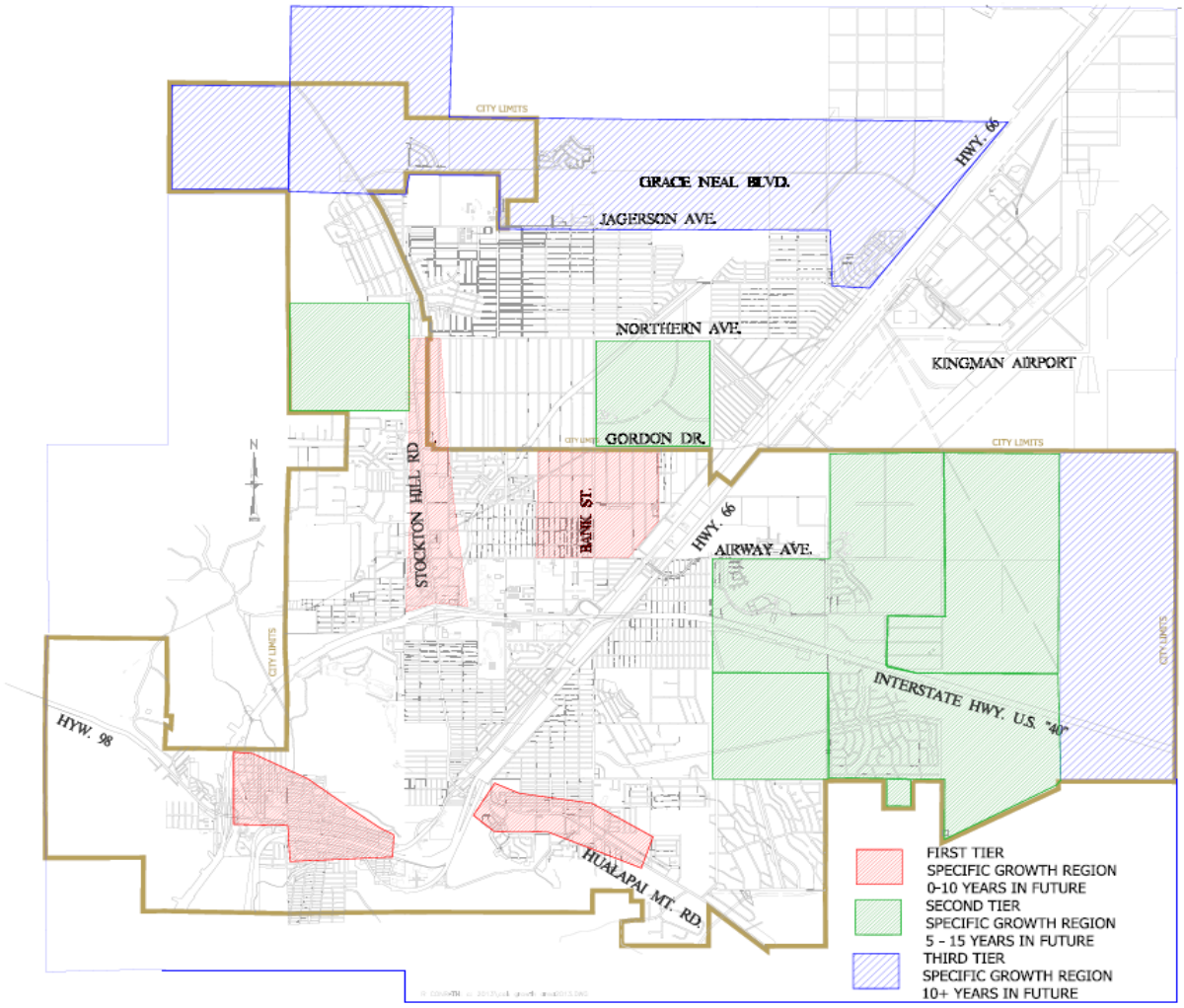
As of the April 2020, United States Census, the official population of the City of Kingman is 31,013. The population for the New Kingman/Butler CDP just to the north and east of the Kingman city limits is 13,933 with the April 2020, census results.

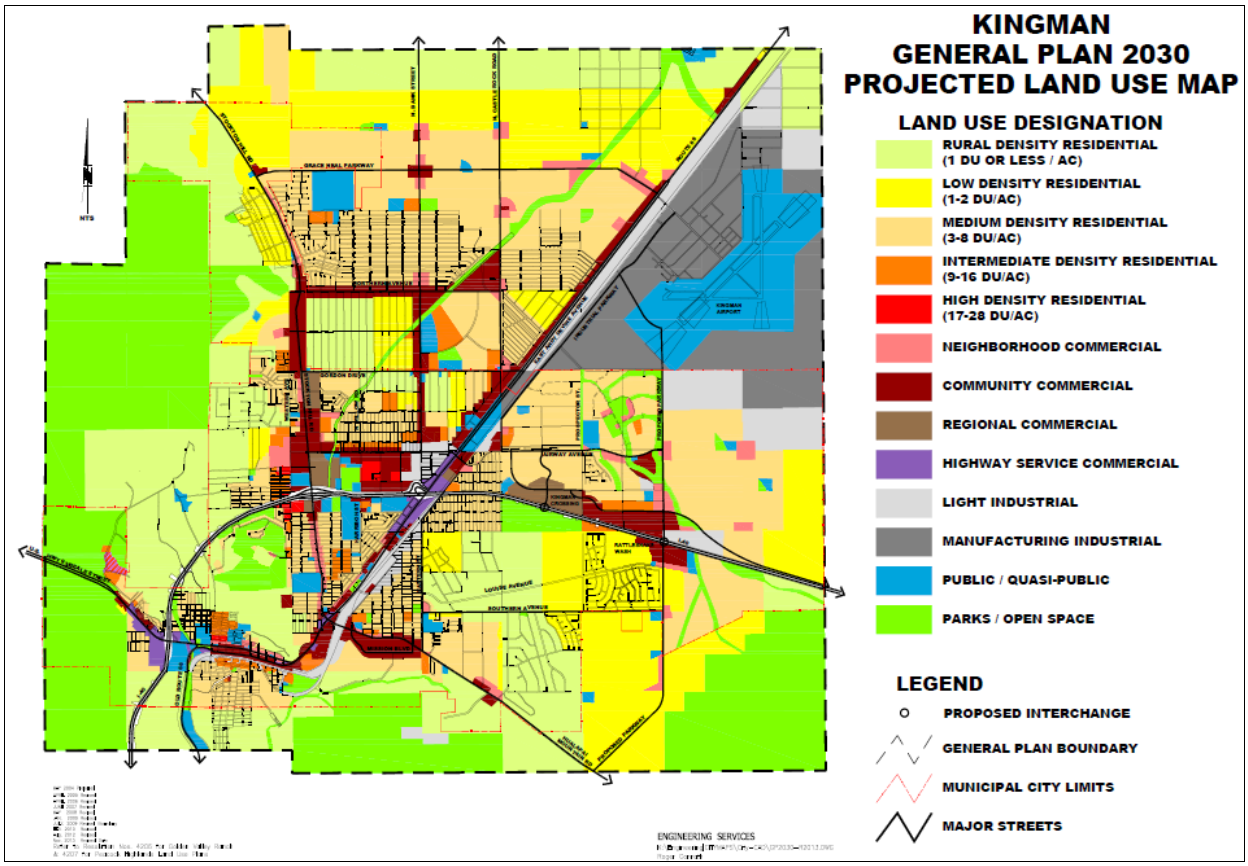
On June 6, 2003, the Lake Havasu City/Kingman area was designated by the US Census Bureau as a Metropolitan Statistical Area, an independent statistical designation no longer associated with the Las Vegas Metropolitan Statistical Area.



Map 2-9: Kingman Location & Land Use

CITY OF KINGMAN
FIGURE 3-1. GROWTH AREA MAP





Map 2-11: Kingman Projected Land Use

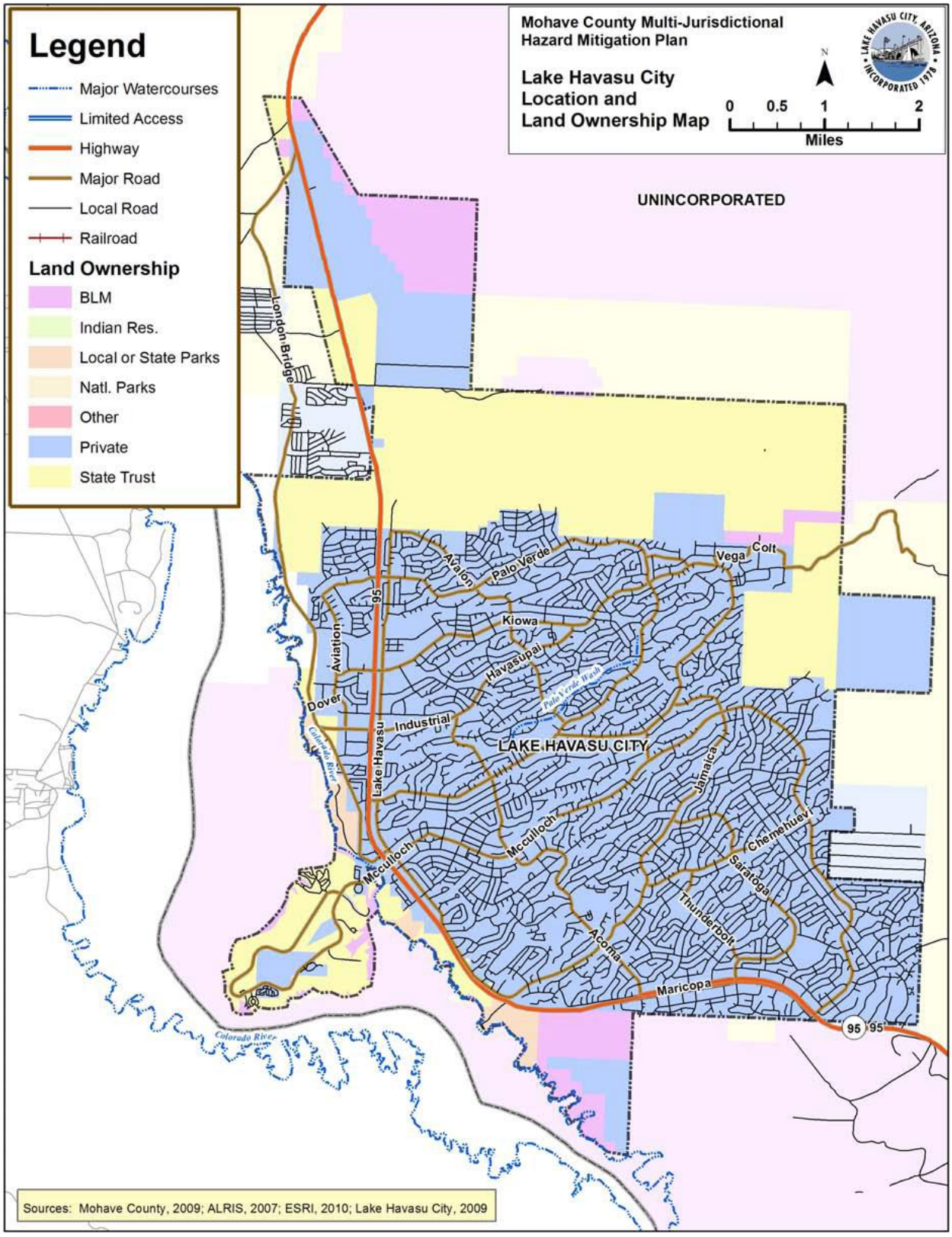
2.5 Lake Havasu City

Lake Havasu City is located along Lake Havasu, formed by the Parker Dam on the Colorado River. It is in southwestern Mohave County along the east shore of the Colorado River/Lake Havasu impoundment of Parker Dam. The Arizona-California border parallels the western city limits with an average elevation of about 575 feet. Lake Havasu City is located approximately 206 miles northwest of Phoenix, 20 miles south of Interstate 40, and 62 miles south of Bullhead City. The City is situated on either side of State Route 95 and is home to the famous London Bridge.

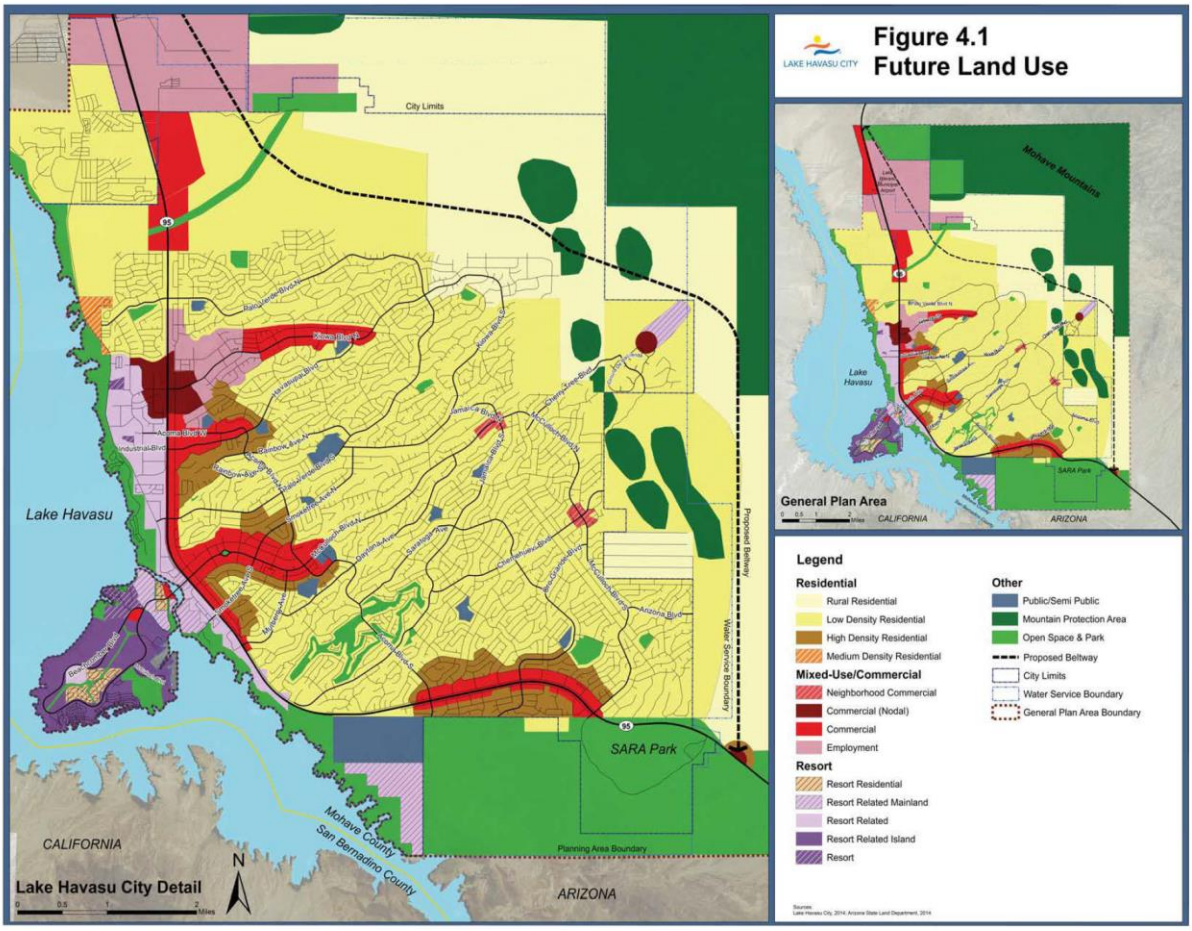
Major transportation and land ownership elements in and around Lake Havasu City are provided in the following map. According to the Lake Havasu City General Plan 16, the City was conceived in 1963 as a master-planned community with an emphasis on recreation and retirement residential. This theme, deriving from the area's outstanding features of scenery, climate, and shoreline, was augmented by adding a strong employment base. The City's founder, Robert P. McCulloch, commissioned comprehensive planning and design studies. He also brought his own industry as well as others to the community. He successfully sought to put Lake Havasu on the map by transporting the London Bridge from the River Thames in England, to its current place of prominence spanning Bridgewater Channel. The community experienced strong growth during the 1960s and 1970s, which accelerated after official incorporation in 1978.

According to the Arizona Department of Commerce, Lake Havasu City attracts hundreds of thousands of visitors each year to its calm waters and beautiful beaches. The London Bridge and adjoining English village are a focal point of a multi-million-dollar resort complex that infuses millions of dollars a year into the City's economy. Along with the profitable tourism trade, a wide variety of manufacturing industries and the supporting retail trade also contribute significantly to the economy. Future growth plans include concentrations of commercial and employment sectors to north around the airport, resort related development along Lake Havasu, and rural residential areas to east. There are also large open space / park land used proposed at the north and south ends of the City.

Lake Havasu City has a population base of approximately 57,464 as reported in 2020. The civilian labor force in 2020 was approximately 24,520 with an unemployment rate of approximately 6.2%.



Map 2-12: Lake Havasu City Location and Land Ownership



Map 2-13: Lake Havasu City Land Use Plan

2.6 Ft. Mojave Indian Tribe

Mojave Indians are Pipa Aha Macav — "The People by The River." Mojave culture traces the earthly origins of its people to Spirit Mountain, the highest peak in the Newberry Mountains, located northwest of the present reservation inside the Lake Mead National Recreation Area.

The Tribe's spirit mentor, Mutavilya, created the Colorado River, its plants, and animals, and instructed the Pipa Aha Macav in the arts of civilization. They were prosperous farmers with well-established villages and trade networks that stretched as far away as the Pacific Ocean.

In the 16th Century, the time the Spanish arrived in the territory, the Mojaves were the largest concentration of people in the Southwest. With the ever-growing insurgence of non-Indian people to the region traditionally occupied by Pipa Aha Macav, a United States military outpost was established in 1859 on the east bank of the Colorado River to give safe passage to American immigrants traveling from east to west. Initially, this outpost was called Camp Colorado, but it was soon renamed Fort Mojave. After the military fort was closed in 1891, the buildings were transformed into a boarding school, which operated until 1930. Ruins of Fort Mojave still exist today as a reminder of the once-troubled historic relationship between Pipa Aha Macav and American civilization. The ruins are located on a bluff overlooking the Colorado River just south of the boundary of present-day Bullhead City.

Tribal Sovereignty

The Fort Mojave Indian Tribe is a federally recognized tribe that is organized and established as a sovereign nation pursuant to the provisions of the Indian Reorganization Act of February 2, 1911. The Tribe adheres to its Tribal constitution and sovereign government status.

The Fort Mojave Indian Tribe land is held in trust by the federal government through the Secretary of the Interior and, therefore, requires compliance with federal laws as it pertains to the environment and community land within the reservation boundaries.

The Fort Mojave Indian Tribe has a written constitution and a Tribal Council of five members with a Chair and Vice Chair. They serve a four-year term which are up for election in alternating terms. The tribal governments act as both governing body and a business enterprise. This dual ability allows for a simplified process for business development.[3] The Council sets policy; passes legislation; approves leases and contracts. Under this environment, Fort Mojave's income base has become very diversified in municipal services, telecommunications, energy, real estate development, agribusiness, and commercial ventures.

Geography

The Fort Mojave Indian Reservation borders Arizona (22,820 acres), Nevada (3,862 acres) and California (6,297 acres) along the Colorado River in the Mohave Valley. Fort Mojave Indian Tribe derives its name from the "Old Fort Mojave" that existed just west of the Reservation. The centroid of the FMIT is approximately 114.60 degrees west and latitude 34.93° north. The area has many small communities up and down along the Colorado River. Elevations across the FMIT range from approximately 470 feet to 600 feet. The Reservation's Administrative Headquarters is located adjacent to Needles, California. The Reservation is oriented north and south on both sides of the Colorado River. The tribal boundary spreads out into a checkerboard pattern for 20 miles southward from Bullhead City. Approximately 25,000 acres of the reservation is used for agricultural development with irrigation supplied by the Colorado River. The agriculture provides most of the reservation's economy.

Major transportation routes through the reservation include Interstate 40, Arizona Highway 95, Nevada Highway 95, Historic Route 66, and Needles Highway. The reservation also has access to rail and airport facilities nearby.

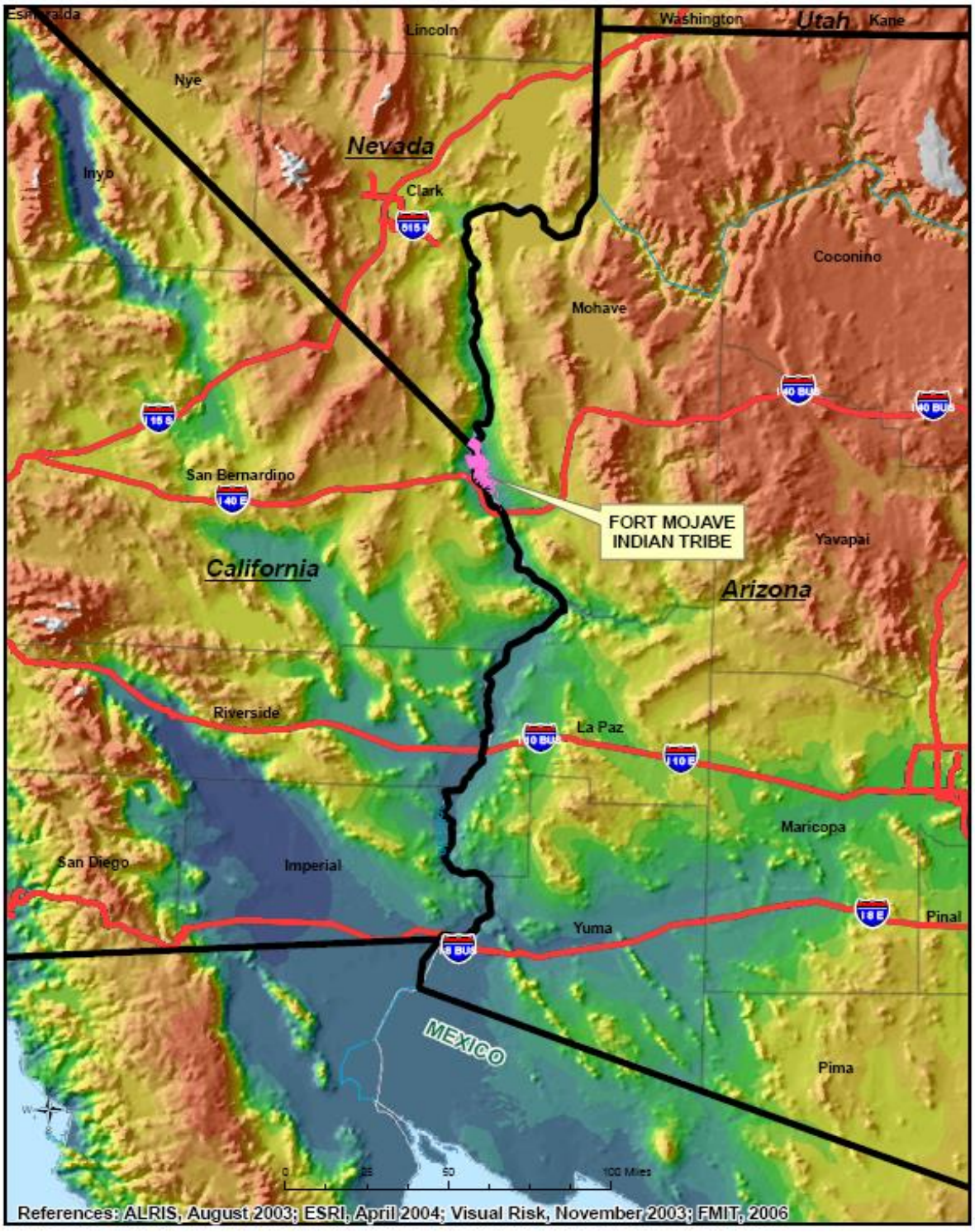
[3] The Fort Mojave Indian Tribe, "The People by the River", Hallock/Gross

The geographical location of the Reservation lies within the Mojave Desert region with proximity to the Sonoran Desert terrestrial ecoregion. This area is known as the Basin and Range Region which covers a large area of the Southwest. The map below depicts the location of the Reservation with respect to the ecoregions, which are described as follows:

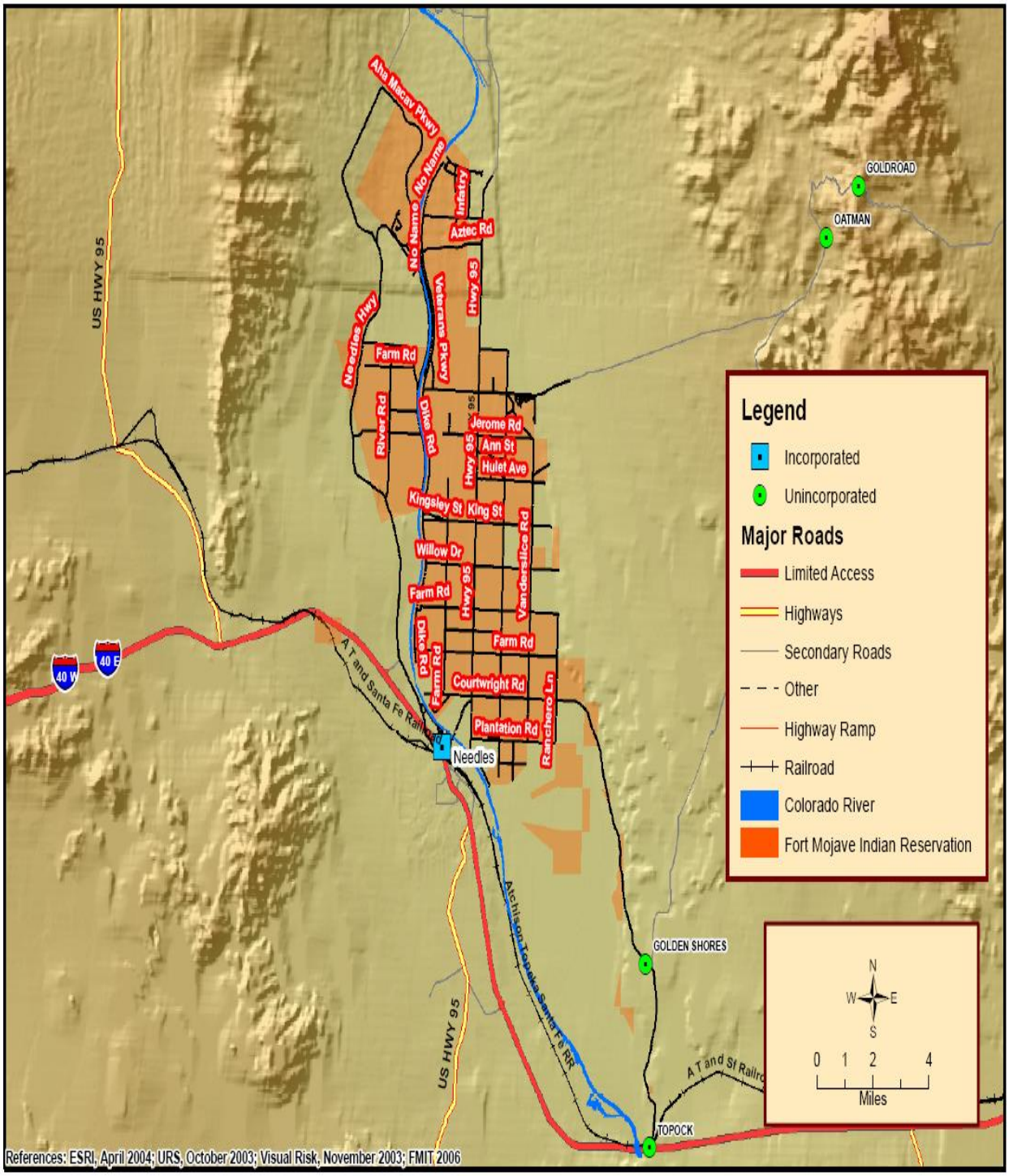
- **Sonoran Desert** – This ecoregion is an arid environment that covers much of southwestern Arizona. The elevation varies in this zone from approximately sea level to 3,000 feet. Vegetation in this zone is comprised mainly of Sonoran Desert Scrub and is one of the few locations in the world where saguaro cactus can be found. The climate is typically hot and dry during the summer and mild during the winter.
- **Mojave Desert** – this ecoregion covers a large area of California and a relatively small portion of northwest Arizona, including portions of Coconino and Mojave Counties. This includes the communities of Kingman and Bullhead City, as well as a portion of the lower Grand Canyon. The elevation varies from 1,500 feet to nearly 4,000 feet on some mountains. Typically, the climate is very hot and dry during the summer and comparatively warm during the winter.

The Tribe has guaranteed water supply via the Colorado River through water rights that were more clearly defined by Arizona v. California, the case which divided the waters of the Colorado River among competing water users. Since western water law recognizes the concept of “first in use, first in right,” the Mojave Indians, with a long history of occupancy along the Colorado River, maintains its earliest priority on water allocation. Therefore, the tribe can continue in community development regarding large scale housing, casino, commercial businesses, and major agriculture production on tribal lands.

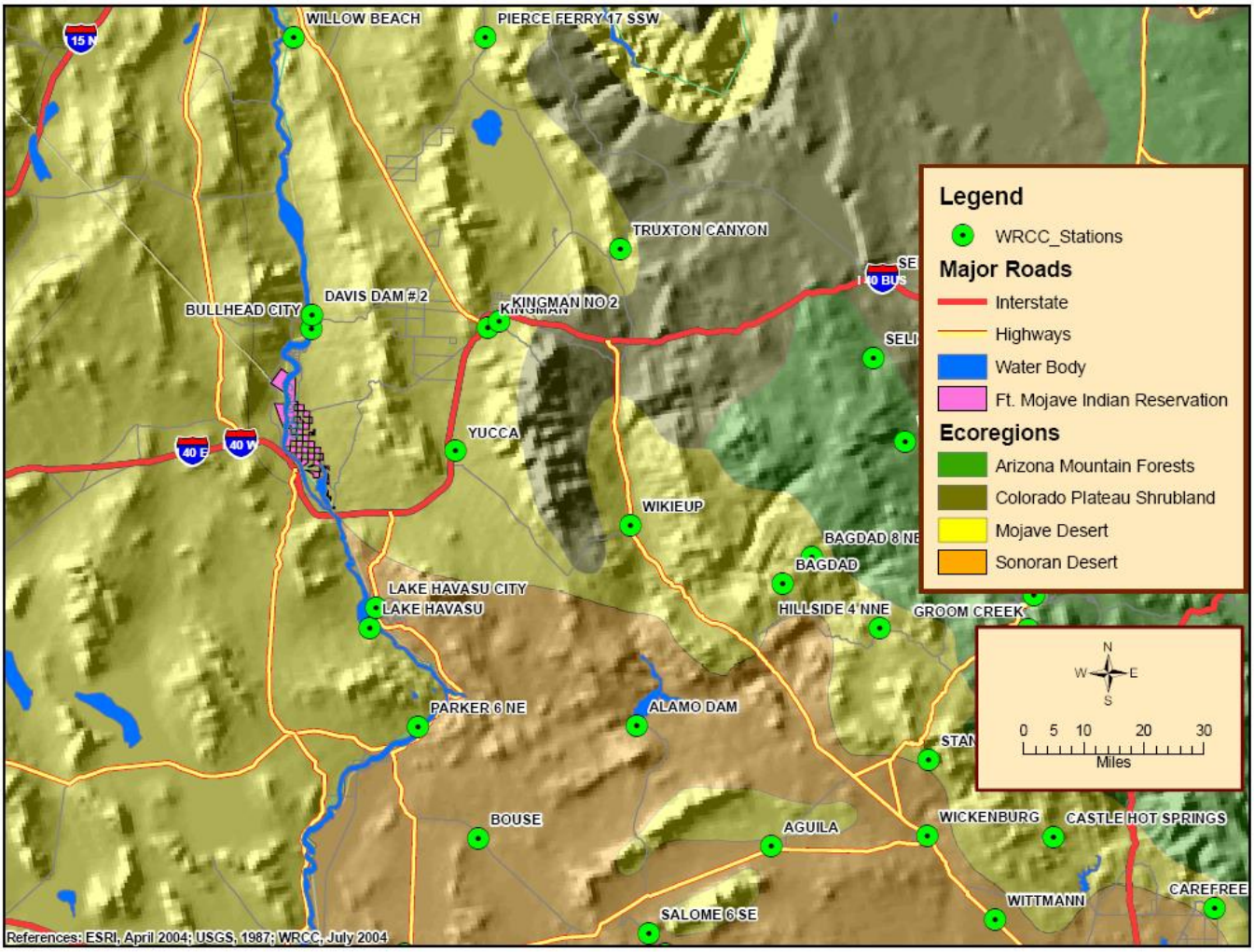
Fort Mojave Indian Tribe has a population base of approximately 1,120 as reported in 2020.



Map 2-14: Ft. Mojave Vicinity



Map 2-15: Ft. Mojave Transportation Routes



Map 2-16: Ft. Mojave Terrestrial Ecoregions

Development History

The Mojave Indians which were known as the Pipa Aha Macave, or the "The People by the River," located along the most important river in the southwestern United States. The military wagon trains and immigrants that would pass through on their way to the West Coast would use the shallow portion of the Colorado River to gain safe crossing to continue their rugged desert trek on the California Trail. The trail is still visible and traversable on the Nevada side of the Reservation. During this time, the Mojaves defended their homeland during armed encounters against immigrants, settlers, and the military. In response to these encounters, Fort Mojave was established in 1859 on the east side of the Colorado River.[4] The following are past developments that have impacted the future of Fort Mojave Indian Tribe:

- 1999, Calpine Corporation leased and broke ground to build a 500-megawatt gas fired electric generating plant located on the Arizona lands of the Reservation. Revenues from the lease of land and water will be used to invest in other projects to help in securing economic self-sufficiency.[5]
- 1996, the Tribe dedicated Veterans Memorial Bridge across the Colorado River connecting the Tribe's Arizona lands and Nevada lands to provide access to the new Avi Casino and surrounding resort.
- 1995, construction began of the first gambling casino on Nevada lands called the Avi Resort and Casino. They opened their doors on February 17, 1996.
- 1978, the Tribe started farming 2,500 acres on the Arizona lands of the Reservation. The crops included alfalfa, cotton, wheat and melons.
- 1978, the first permanent bridge from Needles, California to Mohave Valley, Arizona was built over the Colorado River. This project was a joint effort between three counties and the Fort Mojave Tribe.
- 1964, FMIT right to water from the Colorado River was decided on a landmark decision by Arizona v. California. In the same year, 1,300 acres of land in California, Nevada and Arizona was approved to be developed into a master planned community.
- 1947, Davis Dam was built by the U.S Government on the Colorado River just north of the Reservation.
- 1939, Hoover Dam on the Colorado River was completed.

The Fort Mojave Indian Tribal economy is based on Tribal governmental actions in conjunction with over 40 associated enterprises. These enterprises are generally owned and managed by the tribe. Some of the larger enterprises are the Avi Casino, the tribal farm, and tribal utilities that are organized with a board of directors and a professional management team. Additional enterprises include smoke shops, businesses at the airfield, and providing leases to enterprises on tribal lands. The Calpine power generating plant also contributes to the tribal economy.

Future Development

The Fort Mojave Indian Tribe has an adopted long-range plan for all lands in Nevada. This is the Aha Macav Master Plan. It is a mixed-use plan based on a string of casino resorts along the Colorado River, two golf courses, three marinas, and housing. There is also a planned community center with associated retail and commercial development. The master plan designates all river front land as publicly accessible open space. The master plan also contains development standards for roads, utilities, etc.

[4] The Fort Mojave Indian Tribe "The People By the River" brochure, Gross Hallock, Inc, 1993

[5] Celebrating Change: The Fort Mojave Indian Tribe, 2001

Fort Mojave does not have a traditional zoning ordinance. This was not appropriate where all land is owned in common by the tribe, which has complete control over land use decisions. Instead, a performance based Planned Unit Development and Subdivision Ordinance was adopted by Council. It is an integrated planning and engineering ordinance, with a long environmental checklist for proposed projects. It has worked well for over 15 years. Most projects proposed for development are large scale mixed use.

A Draft Land Use Plan for Arizona and California lands has been "hanging fire" for quite a few years. The Council has not formalized it, but it has been the unofficial reference. A set of land use policies also goes with the plan, such as keeping agricultural lands in production and not converting them to other uses.

The draft plan was driven by Fort Mojave's water allocations. The Aha Macav Master Plan was based on what the tribe wanted, and what its Nevada allocation could support. The plans for California and Arizona also were driven by available water (including reclaimed water as it comes on line from development). A draft water budget accompanies the draft land use plan.

In general, commercial development is planned for a 300-foot-deep strip along major highways such as SR 95. High density affordable housing is proposed for the non-irrigated sections of land along the far eastern boundary of the reservation, with the intent that casino workers would need housing as Aha Macav builds out.

Nonagricultural land along the river is proposed for large-scale mixed-use development. The Council, presently, is ambivalent about long term leases of river front land but has not formally reversed the policy of previous Councils on this matter.

Ecological restoration has also been discussed. Mesquite and other riparian species would be reintroduced in low lying areas, such as old meander scars and engineered storm water detention areas and flood control areas.

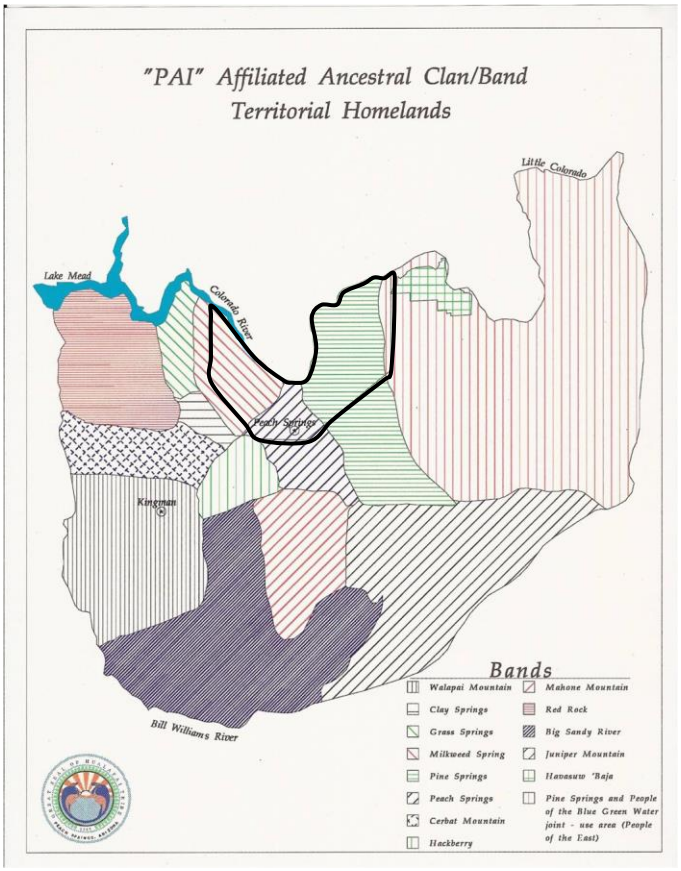
2.7 Hualapai Tribe

Hualapai Tribe Vision and Values

WE ARE HUALAPAI! • WE ARE A NATIVE PEOPLE, WHO FOR MILLENNIA HAVE LIVED ON THE LAND OF OUR ANCESTORS • WE ARE THE CANYON KEEPERS • WE ARE A COMMUNITY THAT WORKS TO CREATE A PROMISING FUTURE FOR OUR CHILDREN • WE ARE AMERICANS WHO LOVE AND FIGHT FOR OUR COUNTRY • WE ARE CHILDREN OF ANCESTORS WHO TAUGHT US TO HONOR THE CREATOR, RESPECT MOTHER EARTH, TO VALUE ALL LIVING THINGS • WE ARE ANCESTORS TO FUTURE GENERATIONS WITH A RESPONSIBILITY TO CARRY ON OUR LANGUAGE, CULTURE, AND TRADITIONS • WE ARE THE PEOPLE OF THE TALL PINES – WE ARE HUALAPAI!

History of the Hualapai - Pre-Colonization Through The 20th Century (Shepherd, J.P., *We Are An Indian Nation: A History of the Hualapai People*, 2010, The University of Arizona Press)

The Hualapai are a native people that reside in the southwestern region of the United States. Traditionally, they inhabited an area between five and seven million acres, with archeological evidence dating back to 600 AD near what is now Hoover Dam. Their homeland stretched from the Grand Canyon southward to the Bill Williams and Santa Maria rivers of Arizona, and from the Black Mountains eastward to the pine forests of the San Francisco Peaks located near what is today Flagstaff, Arizona. This geography of tall pines is where the Hualapai derived their name, which means “people of the tall pines”.



The Hualapai were primarily nomadic hunter-gatherers and were organized in 13 bands of extended families that occupied defined territory in pursuit of seasonally available wild game, plants, roots, and berries (Figure 1).

Tribal Sovereignty

The Hualapai Tribe is a federally recognized sovereign Indian Tribe. The jurisdiction of the Hualapai Tribe extends to all lands within the boundaries of the Reservation as established by Executive Orders of January 4, 1883 and June 2, 1911; and Public Law 93-560, December 30, 1974. Tribal jurisdiction also extends to any and all lands held by the Tribe, Trust Allotments located outside the Reservation boundaries (to the extent permitted by Federal law), and to any additional lands acquired by the Tribe or by the United States for the benefit of the Tribe. Additionally, in 1925, the U.S. Department of Interior restated recognition that the Hualapai Tribe is the rightful legal owner of the entire Hualapai Reservation by right of occupancy.

Under an Executive Order issued on December 22, 1898, the Hualapai Indian School Reserve was created in Truxton Canyon, comprising a section of land (approximately 640 acres). On May 14, 1900, a second Executive Order added an additional 160 acres (approximate) to the Hualapai Indian School Reserve. In 1902, the U.S. Bureau of Indian Affairs (BIA) established a sub agency at Valentine, known as the Truxton Canon Agency.

The Tribe is governed by a legislative, executive, and judicial branch and has a Tribal Constitution (*Constitution of the Hualapai Indian Tribe of the Hualapai Indian Reservation, Arizona*, certified by the Tribal Council on

March 13, 1991). The legislative branch is comprised of a nine-member Tribal Council, which includes a chairperson and vice-chairperson. Council members are elected to office by Tribal members and serve staggered 4-year terms. Chairperson, Vice-chairperson, Secretary and Treasure from the Executive that administer tribal business. The judicial branch of government consists of a Tribal Court and a Court of Appeals. Judges are appointed by the Tribal Council for two-year terms. The Courts have jurisdiction over all cases and controversies within the jurisdiction of the Tribe by virtue of the Tribe's inherent sovereignty or which may be vested in Tribal courts by Federal law.

Tribal and Government Business Functions

The Tribal Council oversees twelve administrative departments. In addition to this, there are other governmental and non-governmental agencies that serve the Tribe. Among these are the Grand Canyon Resort Corporation, which operates the Lodge and Walapai Market and Hualapai River Runners in Peach Springs and Grand Canyon West (Skywalk). There are several boards and commissions including the Tribal Employments Rights Office (TERO) and the Tribal Environmental Review Commission (TERC).

Federal Agencies

The Federal Government has the following offices located in Peach Springs and Valentine:

U.S. Bureau of Indian Affairs – Office Valentine; Wildland Fire Management in Peach Springs was contracted (PL 93-638) to the Hualapai Tribe in April 2020.

Indian Health Service – Peach Springs

U.S. Postal Service – Peach Springs

Tribal Lands

The Lands of the Hualapai tribe are located within the main Reservation as well as outside of the Reservation as Trust lands, Allotments, or donated/purchased lands. Trust lands are held by the federal government through the Secretary of the Interior and, therefore, require compliance with federal laws and those laws enacted by the Hualapai Tribal Council and Constitution. Likewise, Reservation, Allotment, and donated/purchased lands are also subject to compliance with federal laws as well as those enacted by the Hualapai Tribal Council and Constitution.

The Tribe currently holds the following lands. Acreages are derived from the University of Arizona Cooperative Extension*, Publication AZ1467*, dated October 2008:

Main Reservation-the Main Reservation area is trust land comprised of approx. 993,083 acres.

Valentine - Approximately 806 acres of trust land along SR66 are located within Valentine, approx. 18 miles west of Peach Springs. Additionally, 20-acres of land at the Valentine Cemetery was brought into trust in 2016.

Valentine Cemetery- Approx. 28 acres of land transferred in the Trust

Truxton Triangle- in 2016, the Tribe was able to transfer a 142-acre parcel of undeveloped fee land northeast of Truxton into trust.

Clay Springs - Clay Springs was purchased by the Tribe and comprises 10 checker-board parcels of Trust land comprising approx. 6,526 acres located adjacent to the western boundary of the main Reservation.

Hunt Ranch - Fee land of approx. 467 acres and is located west of the main Reservation and near the Clay Springs parcels. This parcel was brought into trust in 2016.

Big Sandy Allotments and Cholla Canyon Ranch - Located off US93 near Wikieup, respectively, the Big Sandy Allotments (570 acres) acres of Trust land and the 360 acres Cholla Canyon Ranch (fee lands) are primarily ranching areas utilized by the Tribe currently, Cholla Canyon Ranch serves as a special event area.

Water Rights - Although the reservation boundary includes 108 miles of the Colorado River the Hualapai Tribe does not have an established water right from the River due to the 1968 Congressional approval of the Central

Arizona Project. The Tribe is in negotiations with the State of Arizona and the Federal Government to establish these water rights.

Transportation Facilities

Major transportation routes through the Reservation or connecting to the Reservation are shown on Figure 8 and include roadway, railway, and aeronautical facilities (*Long-Range Transportation Plan for the Hualapai Indian Tribe*, December 2014).

Roadways

Consist of approximately 50 miles of paved roadway and over 850 miles of unpaved roadways exist within the Reservation. These roadways are maintained by the Public Services Department using BIA funding for most. This network of roadways residing on and connecting to the Reservation include the following primary routes:

Historic Route 66 (ADOT SR66)

Buck and Doe Road (BIA Route 1)

Diamond Creek Road (BIA Route 6)

Supai Road (BIA Route 18)

Antares Road – This dirt road is maintained by the County of Mohave and connects SR66 to Clay Springs Road.

Pierce Ferry Road – This road is paved and maintained by Mohave County and serves as a major tourist route via US93 from Las Vegas, Nevada.

Diamond Bar Road – This road is the primary route to GCW and The Skywalk attraction. The Tribe completed construction of the road in 2014. Recent upgrades were completed in August 2015. The Tribe is in the process of transferring the non-Reservation portion of Diamond Bar Road to Mohave County.

Railway

The ATSF merged with the Burlington Northern in 1994 and became the Burlington Northern Santa Fe Railway (*www.american-rails.com*). The BNSF runs trains every fifteen to twenty minutes resulting in between 60 to 70 trains per day or more with train speeds through Peach Springs varying from stopped, slow rolling, or 45 to 70 miles per hour (*www.trainweb.org*).

With BIA Route 6 and Valentine Way, there are no right or left turn lanes for ingress or egress and no acceleration lanes for motorist safety.

Airports

There are two airfields on the main Reservation. The Limestone Airfield is a small unmanned airfield with no amenities. The Grand Canyon West Airport is the 5th busiest airport in Arizona.

Limestone Airfield

The Limestone Airfield is a private use airfield with a single 4,800 runway that is located off of and west of BIA 18 that does not receive a lot of use and currently needs occasional repair to the asphaltic surface.

Grand Canyon West Airport

The Grand Canyon West Airport is a public use airport (FAA LID:1GA) with a 5,000 paved runway. The primary purpose of the facility is to bring tourists to The Skywalk Attraction as well as providing aerial tours of the Grand Canyon. Incoming plane and helicopter flights are primarily from Las Vegas, Nevada. With 137,771 commercial passenger enplanements in CY 2017, it is the fifth busiest airport in Arizona.

Existing Socioeconomic and Demographic Conditions

As identified by the U.S. Census Bureau, below is a summary of the population growth trends from 2000 to 2010 for the Reservation, Peach Springs Census Designated Place (CDP), Valentine CDP, Truxton CDP, GCW

CDP, Mohave and Coconino Counties, and the State of Arizona. According to the U.S. Census Bureau, the Reservation had a slight decrease (1.3% decrease) in population since 2000, while Peach Springs CDP's total number of housing units and population dramatically increased. Nearly 82% of the Reservation population resides in Peach Springs, with nearly 42% living in the area north of Hualapai Way between Diamond Creek Road and SR66. This significant increase in the CDP's population can be primarily attributed to the geographic expansion of the Peach Springs CDP to include the housing developments of Buck and Doe and Milkweed Springs and the increased job opportunities provided by GCRC and Tribal government.

Table 2-6: Population and Growth Trends

Geographic Area	2000	2010	2015-2019 American Community Survey	Population Growth (2000-2010)	Population Growth (2010-2019)
Hualapai Reservation	1,353	1,335	1,555	-1.3%	16.18%
Peach Springs CDP	600	1,090	1,301	81.7%	19.36%
Valentine CDP	-	38	71	-	86.84%
Truxton CDP	-	134	40 to 85*	-	-70% to -37%
Grand Canyon West CDP	-	2	0 to 12*	-	-100% to 500%

Source: 2019 American Community Survey, 2010 U.S. Census and 2000 U.S. Census *significant margin of error

As of September 2015, there are 2,328 enrolled members of the Hualapai Tribe (*Clara Mahone, Hualapai Tribe Enrollment Department, pers. comm. 09/28/15*). Of this number, approximately 1,455 live in Peach Springs. By January 2021, there were 2,408 enrolled members with 1,330 living in Peach Springs and 15 in Valentine (Cody Susanyatame, Hualapai Tribe Enrollment Department, 01/29/2021). An enrolled member of the Tribe must have a blood quantum of ¼ to qualify for enrollment.

Housing

Residential areas primarily consist of rural (1 dwelling unit per acre) to medium (3 – 8 dwelling units per acre) density single family homes in Peach Springs, along Buck and Doe Road, in Valentine, and the GCW. The GCW units are temporary until adequate housing and associated infrastructure (such as water and electric) can be constructed for employees and Tribal members.

Home sites on the Reservation are through a lease agreement with the Tribe. A homeowner does not own their home site, although at some point in time may own their home.

Table 2-7: Hualapai Reservation NAHASDA Housing Statistics

Housing Units By Type	# of Housing Units	# of Occupants
NAHASDA Homebuyers	5	24
Conveyed	171	578
NAHASDA Rental	4	13
Rental	135	487
Private Ownership	134*	453*
Unoccupied	73*	NA
Total*	**522**	**1,555***

Source: 2013 *Hualapai* Housing Department. * 2015-2019 American Community Survey, and Hualapai Planning Department estimates (non-Housing Program population proportionally allocated based on the ratio of Conveyed to Private Ownership units, i.e. 56/44).

*Recent reports indicate that 1,330 enrolled Tribal members live on the Reservation. The difference between this number and the NAHASDA number is 332 and it is unknown at this time as to which category of housing they fit into.

86% of housing units on the reservation are occupied with an average household size of 3.39 (2015-2019 American Community Survey). However, this number may be low for most households as crowding is a significant issue wherein extended family members and/or friends also live in the household. Table 2 above reflects an average household size of 3.46 based on NAHASDA and American Community Survey data combined.

Employment

Prior to the COVID-19 pandemic, between 500 and 700 tribal members were employed at any one time in the various economic undertakings of the Hualapai Tribe (*Rudy Clark Sr., Hualapai Human Resources Director, 09/17/15*). This includes the Tribal government functions as well as the commercial and recreational businesses of the GCRC. The 2013 *Hualapai Housing Needs Assessment, HHD #120301*, identified a total of 831 full-time, 33 part-time, and 8 seasonal employees; salaries are generally higher than in the surrounding communities with 57% of employees making between $1,500 and $2,500 per month and 33% making between $2,501 and $5,000 per month. The 2014 *Long-Range Transportation Plan for the Hualapai Indian Tribe* indicates that approximately 960 people were employed: 350 within Tribal government and other Federal positions and 550 with GCRC. That would indicate an increase in employment of approximately 14% in one year. With the recent COVID-19 pandemic, GCRC had reduced its staffing to 227 by January 2021 of which 104 were Hualapai tribal members (Jason Davis, GCRC Director of Operations, 1/28/2021). As the pandemic subsides and the tourist season approaches in late spring, staffing levels are expected to pick-up but will likely not reach pre-pandemic levels. Tribal government employment increased by over 100 in the past five year and has remained relatively stable during the pandemic with 458 persons working for the tribe in January of 2021 (Sherri Norman-Bravo, Hualapai Payroll Department, 1/29/2021); however, the composition of the jobs has changed with some positions being eliminated or reduced to part-time during the pandemic while the Incident Command Team (ICT) has hired staff for security and community service positions. Tribal members hold 215 of these positions or about 47% of the tribe's government staff (Sonja Crozier, Hualapai Human Resources Acting Director, 1/29/2021).

SECTION 3: PLANNING PROCESS

3.1 Section Changes

- Detailed information on planning meetings and activities was omitted. This is now discussed in narrative form and supporting documentation is in the Appendix.
- The Fort Mojave Indian Tribe is rejoining this county multi-jurisdictional plan. They participated in the original plan and developed a stand-alone tribal plan for their first update which expired in 2013.
- Hualapai Tribe is joining this county multi-jurisdictional plan, their stand-alone tribal plan has been is expired since approximately 2007.

3.2 Planning Team and Activities

Primary Planning Points of Contact:

Mohave County
Byron Steward
Director
Emergency Management Division

Ft. Mojave Indian Tribe
Ashely Hemmers
Tribal Administrator

Hualapai Tribe
Kevin Davidson
Planning Director

Bullhead City
Andrew Sevillano
EM Coordinator
Police Department

Colorado City
Kevin Barlow
Chief
Fire Department

Kingman
Jack Yeager
Deputy Fire Chief
Fire Department

Lake Havasu City
Peter Pilafas
Chief
Fire Department

The Planning Team was responsible for performing the coordination, research, and planning element activities required to update the 2010 Plan. Steps and procedures for updating the Plan were presented and discussed at each Planning Team meeting and the update work was performed between meetings. The Planning Team had the responsibility of liaison to their respective local partners and it is expected that Planning Team Representatives will naturally reach out within their community and possibly to outside sources for information and material for this Plan.

At the beginning of the update planning process, Mohave County identified members for the Planning Team by initiating contact with various County departments and the incorporated communities. Other entities invited to participate are listed in table format in the pages that follow. The Planning Team members are listed below with returning members indicated by **bold** print.

Table 3-1: Planning Team Members		
Name Agency/Dept	**Department / Position**	**Planning Team Role**
Mike Browning Mohave County	Emergency Management Coordinator	Provided county information and support.
Byron Steward Mohave County	Risk and Emergency Management Director	Provided leadership and direction for planning process.
Paul Baughman Mohave County	Flood Control District District Engineer	Provided information related to flooding and mapping information.
Andrew Sevillano Bullhead City	Police Department – Deputy EM Coordinator	Jurisdictional Point of Contact Lead local efforts and coordination of information and data collection.
Jack Yeager Kingman	Fire Dept Assistance Fire Chief	Jurisdictional Point of Contact Lead local efforts and coordination of information and data collection.
Peter Pilafas Lake Havasu City	Fire Dept Fire Chief	Jurisdictional Point of Contact Lead local efforts and coordination of information and data collection.
Ashley Hemmers Ft Mojave Indian Tribe	Tribal Administrator	Tribal Point of Contact Lead local efforts and coordination of information and data collection.
Philip Wisely Hualapai Tribe	Public Services Director	Tribal Point of Contact Lead local efforts and coordination of information and data collection.
Kevin Davidson Hualapai Tribe	Planning Director	Tribal Point of Contact Lead local efforts and coordination of information and data collection.

The Planning Team started to work virtually in January 2021. Some initial review work was done in 2020, but the COVID-19 pandemic caused most work to be delayed or put on hold. All jurisdictions faced challenges in physically attending any in person planning activities but have conducted efforts at the local level including others within their respective jurisdictions. They are part of an experienced and knowledgeable team that has worked on emergency planning (and responded to real emergencies) for years. With this knowledge and despite their challenges, they stayed informed of the process and received meeting information and assignments via phone and email. Mohave County Risk and Emergency Management incorporated updates and information from the jurisdictions into an initial draft, and meetings between the County and individual jurisdictions were scheduled to review the draft, determine needed changes, and assign responsibility for completing revisions. Meeting agendas, sign-in sheets and notes for Planning Team meetings are provided in this Plan's Appendix.

3.3 Public and Stakeholder Outreach

For the purpose of this Plan, the 'Public' is defined by the jurisdictions and Indian Tribes as the area residents and stakeholders.

To educate the public and stakeholders on the risks facing the communities and engage them in the planning process, a whole *community approach* was used. This type of approach to public and stakeholder outreach can produce benefits such as a better understanding of risks and needs, increased resources to act and of course, more resilient communities.

An attempt to reach as many individuals, government agencies and departments and community businesses, organizations, and associations as possible was made using a variety of methods. The first step was to reach out to stakeholder agencies and organizations, including those that participated in the previous Plan. To accomplish this, invitations to participate in the plan update were sent to the following:

- Mohave County
  - Development Services
  - Emergency Mgmt
  - Flood Control
- Bullhead City
  - Emergency Mgmt
  - Police
- Colorado City
  - Fire
- Kingman
  - Fire
  - Police
- Lake Havasu City
  - Fire
  - Police
  - Public Works
- Fort Mojave Indian Tribe
  - Emergency Management
- Hualapai Indian Nation
- AZ Division of Emergency Management
- Mohave Valley Fire Dept
- AZ GEO Survey

As a part of the plan update process each planning team member representing a local or tribal community utilized local resources and coordinated efforts with others. This activity could range from technical assistance to having a local planning team established. The others involved in the process are captured below so that the information may be helpful in future planning efforts.

Table 3-2: Local Planning Resources

Name Title	Agency/Dept/Division	Jurisdiction	Role/Contribution
Edigar Kajirwa Assistant to the City Manager	City of Bullhead	Bullhead	Provided guidance on all materials submitted.
Johnny Loera Planning/Code Enforcement Manager	Public Works	Bullhead	Provided guidance on development trend.
Robert Drexler Financial administrator	Finance	Bullhead	Provided guidance and input on all information submitted
Vance Barlow Town Manager	City Administration	Colorado City	Related projects to Town Master Plan and Capital Improvements Plan.
John T. Barlow Public Works Director	Public Works Dept.	Colorado City	Prioritized projects and needs.
John T. Barlow Flood Plain Manager	Public Works Dept.	Colorado City	Provided information on relation of projects to County Flood Control funding.
Brian Zitting Town Engineer	Contract Engineer	Colorado City	Provide information on project status.
Weston Barlow Utilities Manager	Utilities Department	Colorado City	Provide information relating to costs and progress of culinary well.
Greg Henry Engineer	City Engineering Dept.	Kingman	Provided information on current and past projects as well as general information about the City.
Rob Owen Director	City Public Works	Kingman	Provided information on current and past projects as well as general information about the City.

Mark Clark Manager	Public Works Department-Operations	Lake Havasu City	Provided guidance on local flood related issues and information related to flood control measures (mapping) within our jurisdiction.
Greg Froslie Public Works Director/ City Engineer	Public Works Department for Lake Havasu City	Lake Havasu City	Provided information related to storm/flood control, water conservation, and building codes.
Dan Sloan, Assistant City Engineer	Engineering for Lake Havasu City	Lake Havasu City	Provided information related to flood control measures within the City.
Ashley Hemmers Tribal Administrator	Tribal Administration	Ft. Mojave Indian Tribe	Provided a liaison role to the Tribal Council throughout plan development.
Captain Lesley J. Preston	Indian Health Services	Hualapai Tribe	Clinic emergency plans / emergency generators.
Harry J. Turtschanow Jr. Facilities Engineer	Indian Health Services	Hualapai Tribe	Clinic Emergency Plans / emergency generators.
Alex Cabillo Water Resources Program Manager	Hualapai Natural Resources Department	Hualapai Tribe	Aquifer and water conditions and anticipated future limitations on water availability.
Paul Baughman, PE District Engineer	Mohave County Flood Control	Mohave County	Information on alert gages and topographic mapping.
Julie Alpert Transportation Planner	Hualapai Tribe	Hualapai Tribe	Severe weather conditions (Deicing) / emergency generators.
Karl Banks, PE Environmental Engineer	EPA	Hualapai Tribe	Provided information on funding for public water system expansion and funding options.
Lt. Marcus Felter, PE Water and Wastewater Engineer	Indian Health Services	Hualapai Tribe	Provided information on funding for public water system expansion (new water tanks).
Jeri Ben-Horin, AZ Geological Survey	Arizona Council on Earthquake Safety (ACES)	State	Provided background of earthquake risk in Mohave County

Additionally, activities to inform and encourage and solicit comments from the public on the plan were performed during the development stage and prior to finalizing the document and submitting for approval. This outreach was delivered via various venues which are discussed below:

- Mohave County - Website was used to post a public notice of the planning activities and the local jurisdictions ad tribes were encouraged to link to the county site from their site.
- Hualapai Tribe – Posted notice and previous tribal plan on website along with a link to the county plan, issued a press release, posted public notices and notice placed in tribal newsletter. Copies of the previous plans were made available at four locations for tribal members to review.
- Bullhead City – Posted notice and link to county website on their website and released press release which was disbursed through social media outlets.
- Colorado City – Issued a public notice.
- Kingman – Posted notices and link to county on their website and their Police Department's webpage and issued a press release.
- Lake Havasu City – Posted notice and link to county website on their website as well as their Fire Department's webpage.

A post-draft public notice and copy of the draft plan was posted to the Mohave County website, as well as a press release announcing the availability of the draft for public review and comment. Updated website notices

directing readers to the Mohave County website were also posted to the Plan participants' websites. Copies of the public notices, web pages, and press releases are provided in this Plan's Appendices. No questions, concerns, or responses were received from the public outreach efforts.

During the previous plan cycle the participating jurisdictions/tribes took the following action to keep the public and stakeholders aware of and involved in their respective risks and mitigation efforts:

- The Plan and seasonal emergency preparedness information was posted on the County's website as well as the department's Facebook page.
- Used various forms of social media to inform the public of seasonal weather hazards and forecasts.
- Presentations about local hazards were made to small groups, clubs, and other organizations as well as handouts provided at community events.
- Provided Community Emergency Response Team (CERT) Training.
- Periodically notified the Board of Supervisors about the progress and intentions of Emergency Management particularly about wildfire mitigation measures.
- Participated in Tri-State Public Information Officer Group to jointly provide common emergency preparedness and mitigation information across multiple jurisdictions.

Hualapai Tribe specifically

- Mitigation project and Community information have been distributed in multiple ways, including Tribal member text messages (textmygov), public meetings (including tribal council meetings), online postings, community workshops and zoom meetings.

Ft. Mojave Indian Tribe specifically

- The Fort Mojave Tribe posts updates, emergency information, watches, and warnings on its private Tribal wide Facebook page. The Fort Mojave Department of Emergency Response also started a Facebook page to post emergency information, planning efforts, mitigation project status updates, community education on personal preparedness, evacuation routes and general emergency management and public health information.
- Information gets sent to the Tribal Public on a regular basis through a weekly news information packet that is distributed by Tribal Administration.

Lake Havasu City specifically

- An Emergency Preparedness Guide (EPG) has been posted on the City website for easy access.
    - The EPG has information related to emergency planning for a variety of disasters including severe temperatures, flooding, high winds, storms, earthquakes, etc.
- Updates to the EPG have been made over the years and it is reviewed annually.
- Periodic updates related to disaster and mitigation planning have been and continue to be, provided to City Manager and Department Heads. The City Council receives updates on an as needed basis.
- News releases have been submitted during extreme weather conditions to inform and prepare citizens.
- Social media was utilized to inform citizens on services being provided during extreme weather and power outages.
- The local Community Emergency Response Team (CERT) continuously trains and assists with extreme conditions within the City as well as other jurisdictions within Mohave County.

- Outreach to service clubs within the community was made related to emergency management and planning the City has to offer and what citizens should do to be prepared.

3.4 Program Integration

During the planning process, various plans, studies, reports, and technical information were reviewed for incorporation or reference purposes in this Plan. The table below lists the primary documents and technical resources reviewed and how they were useful to the planning process.

Table 3-3: Resource Documents and References

Referenced Document or Technical Source	Jurisdiction /Area Agency	Description of Reference and Its Use
Mohave County Hazard Mitigation Plan (2016)	Mohave County	County information and existing and future land use planning. Used for reference material and past mitigation strategies.
Mohave County General Plan (2020)	Mohave County	County information and existing and future land use planning. Used for community description and development trend analysis.
Mohave Co Emergency Response and Recovery Plan (2020)	Mohave County	Hazard profile data, Used in risk assessment.
Mohave Co Community Wildfire Protection Plan (2019)	Mohave County	Wildfire hazard profile data for hazard mapping, risk assessment, and mitigation project identification.
HazMat Commodity Flow Study Report I-40 Corridor, Arterial Highways, and Railway (2004)	Mohave County	Amounts and types of Hazmat being transported along I-40 corridor. Used in risk assessment.
Flood Risk Management Plan	Mohave County	Hazard profile data for hazard mapping, risk assessment, and mitigation project identification.
Beaver Dam Flood Response Plan (2017)	Mohave County	Hazard profile data for hazard mapping and mitigation project identification.
Golden Valley Area Drainage Master Plan (2021)	Mohave County	Hazard profile data for hazard mapping and mitigation project identification.
City of Kingman Emergency Operation Plan (2010), City of Kingman General Plan (2014)	Kingman	Hazard profile data. Used in risk assessment. Various data elements incorporated into plan.
Bullhead City General Plan	Bullhead City	Bullhead City Information and existing and future land use planning. Used for community description and mitigation projects list.
Bullhead City Emergency Operations Plan	Bullhead City	Hazard Profile Data. Used in risk assessment
Bullhead City Capital Improvements Plan	Bullhead City	Capital Improvement projects reference. Used in identifying risk mitigation projects.
Building Codes (2006)	Bullhead City	Adopted building codes (IBC) for Bullhead City. Used in capability assessment.
Stormwater Management Plan	Bullhead City	Documents BHC strategy to address stormwater related impacts. Used in Capability Assessment and in identifying risk mitigation projects.
Bullhead City Ordinances	Bullhead City	Adopted ordinances by the City Council. Used in Capability Assessment.
Mohave Co Wildfire Protection Plan, Hualapai Mountain Wildfire Protection Plan.	Mohave County	Wildfire hazard profile data for hazard mapping and risk assessment

Table 3-3: Resource Documents and References		
Referenced Document or Technical Source	**Jurisdiction /Area Agency**	**Description of Reference and Its Use**
HazMat Commodity Flow Study Report I-40 Corridor, Arterial Hwys and Railway (2014), Mohave Co Hazardous Materials Response & Recovery Plan	Various	Amounts and types of HazMat being transported along the I-40 corridor/BNSF rail line. Used in the risk assessment.
Earthquakes & Utah	Colorado City	Booklet referencing historical data regarding earthquakes in Utah, particularly the southern Utah region that has direct effect on the Colorado City area. (http://geology.utah.gov/online/pdf/pi-48.pdf)
Utah Earthquake Ground-Shaking Maps	Colorado City	Booklet referencing geological data about fault zones that would also affect the Colorado City and northern Arizona area. (http://ussc.utah.gov/publications/grd_shake_maps2003.pdf)
Utah Quaternary Fault Map	Colorado City	Web site map at University of Utah "Seismograph Stations" (http://www.quake.utah.edu/REGIONAL/utahfaults.htm)
FEMA FIRM Map	Colorado City	FEMA Flood Plain Maps
Kingman Fire Department	Kingman	Historic HazMat, transportation accident, and wildfire incident data. Used in the risk assessment.
Lake Havasu City Emergency Operation Plan (2015)	Lake Havasu City	All Hazard operational plan and guide. Used in planning and mitigating emergencies within Lake Havasu City
Lake Havasu City Resource Manual	Lake Havasu City	Manual with various resources within Lake Havasu City, the local area, within the county, state and federal. Used during planning and mitigation phases of a large scale incident or emergency.
Lake Havasu Unified School District Emergency Operational Plan (2019-2020)	Lake Havasu City	School District emergency plans for all schools within their jurisdiction of Lake Havasu City. Used in planning and mitigation of emergencies in the city as well as establishing shelter operations if needed.
Capital Improvement Plan	Lake Havasu City	The CIP identifies key projects that aid in flood control, emergency operations and key facilities in Lake Havasu City
FMIT COOP/COG Plan (Draft)	FMIT Dept of Emergency Response (DER) Homeland Security	Continuity of Government Plan used to ensure continued government operations in the event of a disaster or emergency.
FMIT All Hazard Emergency Response Plan	DER Emergency Management	Emergency Response Plan for whole community, all hazards response
FMIT THIRA	DER Homeland Security	Assessment of greatest hazard and risk and capability assessment for each of the 31 core capabilities
FMIT Shelter Plan	DER Public Health Preparedness	Plan for disaster shelter operations for the whole community. (updated in 2013/2014 to include functional and access needs population into general shelter plan)
FMIT Pandemic Influenza Plan	DER Public Health Preparedness	Plan for whole community response for Pandemic outbreak
FMIT Strategic National Stockpile Plan	DER Public Health Preparedness	Procedural Plan for obtaining assets from the Strategic National Stockpile for Public Health Emergencies (this plan is currently being revised to better align with the Mohave County SNS plan.)

Table 3-3: Resource Documents and References		
Referenced Document or Technical Source	**Jurisdiction /Area Agency**	**Description of Reference and Its Use**
GIS Maps	GIS Department	Various GIS maps for reference
Public Health Preparedness Capabilities Assessment	DER Public Health Preparedness	Used to assess Public Health Capabilities for Essential Support Function 8
FMIT Master Drainage Plan *Include*- Flood Management Control Plan	Planning Department	The Master Drainage Plan which was updated to include a Flood Management (mitigation) Control Plan
FMIT Tribal Environmental Plan	DER EPA	5 year Environmental Protection Strategic Plan (Draft)
Hualapai 5-yr Strategic Plan	Reservation Wide Planning Office	Master Plan for Reservation. Primary Focus on the Peach Springs area.
Grand Canyon West Master Plan	Planning Office/ Grand Canyon Resort Corporation Board	
2011 Road Safety Assessment	Public Services Transportation	ADOT study in cooperation with Hualapai Tribe, ITCA and Havasupai Tribe
Valentine Land Use Plan	Planning Office	
2015 Transportation Safety Plan	Public Services Transportation	Plan which identifies safety projects, develops estimated costs and responsible organizations
2014 Long Range Transportation Plan	Public Services Transportation	Long range plan broken into short, medium and long range projects to improve roadway safety and reliability.
BIA 5-year Burn Plan	BIA Forestry	Location of all planned burns over the next 5-yrs.
2015 Tribal Budget	Hualapai Tribe	Budget funding constraints/opportunities
IHS Emergency Operations Plan	IHS	96 hr resource list for hospitals dealing with emergencies either internal or external to the community
2014 IHS Hazardous Vulnerability Analysis for Peach Springs	IHS	Table evaluating hazards within the community of Peach Springs.
Influx of Infectious Patients Incident Response Guide	IHS	Checklist detailing actions to take in case of influx of infectious patients
The Community Status Book Report	FEMA	For information and details on communities participating in the NFIP which was used in the Risk Assessment.
Community Rating System and Their Classes report	FEMA	Used this information /details for flood hazard profile.
Local Mitigation Planning Handbook	FEMA	Used to ensure plan meets FEMA's requirements and for helpful suggestions on how to improve plan.
State of AZ Hazard Mitigation Plan, 2013	State of AZ	Used as a reference and for information relative to the statewide hazards and on the planning process. The plan was also formatted in the same manner as the state plan.
Mohave County Earthquake Hazard Evaluation Study	State of AZ / NAU	Used as a reference and information related to local earthquake risk in Mohave County.
Mead Slop Fault Study	State of AZ	Used as a reference and information related to local earthquake risk in Mohave County.
Hwy 95 Realignment Corridor Survey Report	State of AZ	Used as a reference and information related to local earthquake hazards in Mohave County.

SECTION 4: RISK ASSESSMENT

4.1 Section Changes

- This section introduces the newly added hazards of Biological, Hazardous Materials Incidents, Earthquakes and Power/Utility Outage.
- Levee Failure was removed as there are no documented failures of certified levees or non-levee embankments within the County. The participating jurisdictions' exposure and loss estimations are zero or an insignificant amount. Any levee issues may be addressed in the flood profile as that is the expected impact.
- The numerous loss estimation tables in the previous Plan have been replaced by one revised and all-inclusive table for each hazard, the table is named 'Estimated Exposure and Potential Losses Due to [*hazard name*]'.
- In the Vulnerability Assessment, Commercial and Industrial counts have been removed as it was determined to be too much information that is not beneficial enough to the Plan to warrant using resources to maintain and update this information in the future.

There were no significant rectifiable data deficiencies in the previous Plan. However, the updating and restructuring of the loss estimation tables is likely to have provided more accurate updated information.

In performing their risk assessment, the Planning Team determined "what" can occur, "how often" it is likely to occur, and "how bad" the effects could be. That information is categorized into the following measures:

Hazard Identification/Profiling

Assessing Vulnerability to Hazards

This risk assessment was performed using a county-wide, multi-jurisdictional perspective. The vulnerability analysis was performed in a way such that the results reflect vulnerability at an individual jurisdictional level, as well as a countywide level.

The planning area is defined for use in this Plan as the area, developed or not within the boundaries of the county, city, town, or tribe being discussed. These areas are described in Section 2 of this Plan.

4.2 Hazard Identification

The list of hazards identified in the 2010 Plan was reviewed by the Planning Team to refine the list to reflect the hazards that pose the greatest risk to the jurisdictions represented by this Plan. The Planning Team also compared the list to the hazard list in the 2013 State Hazard Mitigation Plan to ensure compatibility.

The review included a screening process to evaluate each of the listed hazards based on the following considerations:

- Experiential knowledge on behalf of the Planning Team with regard to the relative risk associated with the hazard
- Documented historic context for damages and losses associated with past events
- The ability/desire of Planning Team to develop effective mitigation for the hazard
- Compatibility with the state hazard mitigation plan hazards
- Duplication of effects attributed to each hazard

As part of the screening, historic hazard information was reviewed and updated. Information regarding declared disaster events is summarized below.

Table 4-1: Declared Hazard Events that Included Mohave County

Hazard	No. of Declarations	Recorded Losses		
		Fatalities	Injuries	Estimated Damage Costs ($)
Drought	9	0	0	$303,000,000
Flooding / Flash Flooding	15	31	116	$845,111,000
Snowstorm	3	4	0	$41,844.220
Thunderstorm / High Wind	1	0	1	$1,022,000
Tropical Storm	4	15	975	$750,000,000
Wildfire	22	0	28	$500,000
Pandemic	1	873 on-going	30,602 on-going	$1,000,000 on-going

State/Federally, December 1967-October 2015.
Notes: Damage Costs include property and crop/livestock losses are reported as is with no attempt to adjust to current dollar values. Furthermore, wildfire damage costs do not include the cost of suppression which can be quite substantial.
Sources: DEMA, FEMA, USDA

The culmination of the review and screening process by the Planning Team resulted in a revised list of hazards that will be carried forward with this updated mitigation plan. No hazards have been omitted however there are three newly added hazards that are perceived as a significant threat to some or all of the participants. Those new hazards are underlined in the list below.

The Planning Team has selected the following list of hazards for profiling and updating based on the above explanations and screening process.

- **Biological**
- **Dam Failure**
- **Drought**
- **Extreme Heat**
- **Flooding**
- **HazMat Incidents**
- **Power/Utility Outage**
- **Severe Wind**
- **Wildfire**
- **Earthquake**

4.3 Vulnerability Analysis Methodology

For this Plan, the vulnerability analysis was reviewed and if necessary, updated to reflect the new hazard categories, the availability of new data, or differing loss estimation methodology.

Calculated Priority Risk Index (CPRI) Evaluation

Each hazard identified in this Plan is assessed to determine the perceived overall risk using the Calculated Priority Risk Index (CPRI). The CPRI value is obtained by assigning varying degrees of risk to four categories for each hazard, and then calculating an index value based on a weighting scheme.

The table below lists the CPRI risk categories and provides guidance regarding the assignment of values and weighting factors for each category. As an example, assume flooding is being assessed and the following assignments best describe the hazard for their community:

- Probability = Likely
- Magnitude/Severity = Critical
- Warning Time = 12 to 24 hours
- Duration = Less than 6 hours

The CPRI for the flooding hazard would be: 2.65 (Max 4)

CPRI calculation = [(3*0.45) + (3*0.30) + (2*0.15) + (1*0.10)]

Table 4-2: Calculated Priority Risk Index (CPRI) Categories and Risk Levels

CPRI Category	Degree of Risk			Assigned Weighting Factor
	Level ID	Description	Index Value	
Probability	Unlikely	▪ Extremely rare with no documented history of occurrences or events. ▪ Annual probability of less than 0.001.	1	45%
	Possibly	▪ Rare occurrences with at least 1 documented or anecdotal historic event. ▪ Annual probability that is between 0.01 and 0.001.	2	
	Likely	▪ Occasional occurrences with at least two or more documented historic events. ▪ Annual probability that is between 0.1 and 0.01.	3	
	Highly Likely	▪ Frequent events with a well-documented history of occurrence. ▪ Annual probability that is greater than 0.1.	4	
Magnitude/ Severity	Negligible	▪ Negligible property damages (less than 5% of critical and non-critical facilities/infrastructure). ▪ Injuries or illnesses are treatable with first aid and there are no deaths. ▪ Negligible quality of life lost. ▪ Shut down of critical facilities for less than 24 hours.	1	30%
	Limited	▪ Slight property damages (greater than 5% and less than 25% of critical and non-critical facilities/infrastructure). ▪ Injuries or illnesses do not result in permanent disability and there are no deaths. ▪ Moderate quality of life lost. ▪ Shut down of critical facilities for more than 1 day and less than 1 week.	2	
	Critical	▪ Moderate property damages (greater than 25% and less than 50% of critical and non-critical facilities and infrastructure). ▪ Injuries or illnesses result in permanent disability and at least 1 death. ▪ Shut down of critical facilities for more than 1 week and less than 1 month.	3	
	Catastrophic	▪ Severe property damages (greater than 50% of critical and non-critical facilities/infrastructure). ▪ Injuries or illnesses result in permanent disability and multiple deaths. ▪ Shut down of critical facilities for more than 1 month.	4	
Warning Time	Less than 6 hours	Self-explanatory.	4	15%
	6 to 12 hours	Self-explanatory.	3	
	12 to 24 hours	Self-explanatory.	2	
	24 hours +	Self-explanatory.	1	
Duration	Less than 6 hours	Self-explanatory.	1	10%
	Less than 24 hours	Self-explanatory.	2	
	Less than 1 week	Self-explanatory.	3	
	More than 1 week	Self-explanatory.	4	

Table 4-3: CPRI Hazard Ranking by Jurisdiction										
	Biological	Dam Failure	Drought	Extreme Heat	Flooding	Hazmat	Power Outage	Severe Wind	Wildfire	Earthquake
Mohave Co	2.95	3.10	2.95	2.80	3.60	2.60	2.70	2.85	3.60	2.95
Ft Mojave Indian Tribe	2.20	3.10	2.95	3.25	3.40	2.85	2.50	2.85	3.60	2.95
Hualapai Indian Tribe	3.70	1.00	2.95	2.40	4.00	2.70	2.75	2.85	3.30	2.55
Bullhead City	2.40	3.10	2.95	3.25	3.40	2.30	2.55	3.30	2.30	2.85
Colorado City	2.00	2.50	3.25	2.40	3.40	3.05	2.75	3.30	2.30	3.60
Kingman	1.80	1.80	3.25	2.40	2.80	3.60	2.60	3.30	3.10	1.65
Lake Havasu	2.50	2.80	2.95	3.25	3.40	3.05	3.15	2.85	1.45	1.95

Jurisdictional Hazards

The jurisdictional variability of risk associated with each hazard assessed is demonstrated by the various CPRI and loss estimation results in each hazard profile. Accordingly, each jurisdiction has varying levels of need regarding the hazards to be mitigated and may not consider all of the hazards as posing a great risk to their individual communities. The table below indicates the hazards selected for mitigation by each jurisdiction/tribe and will be the basis for each jurisdictional mitigation strategy.

Table 4-4: Hazards to be Mitigated by Jurisdictions										
Jurisdiction	Biological	Dam Failure	Drought	Extreme Heat	Flooding	HazMat	Power/Utility Failure	Severe Wind	Wildfire	Earthquake
Unincorporated Mohave Co	X	X	X	X	X	X	X	X	X	X
Bullhead City		X	X	X	X			X		X
Colorado City			X		X	X	X	X		
Kingman			X	X	X	X	X	X	X	
Lake Havasu City		X	X	X	X	X	X	X		X
Ft. Mojave Indian Tribe	X	X	X	X	X	X	X	X	X	X
Hualapai Tribe	X		X		X	X	X		X	X

Asset Inventory

The asset inventory from the 2010 was reviewed and where appropriate, updated to reflect current estimated counts.

Critical facilities and infrastructure are systems, structures and infrastructure within a community whose incapacity or destruction would have a debilitating impact on the defense or economic security of that community and/or significantly hinder a community's ability to recover following a disaster. For the purpose of this Plan, the following eight categories that define critical facilities and infrastructure are used:

1. **Telecommunications Infrastructure:** Telephone, data services, and Internet communications, which have become essential to continuity of business, industry, government, and military operations.
2. **Electrical Power Systems:** Generation stations and transmission and distribution networks that create and supply electricity to end-users.

3. **Gas and Oil Facilities:** Production and holding facilities for natural gas, crude and refined petroleum, and petroleum-derived fuels, as well as the refining and processing facilities for these fuels.
4. **Banking and Finance Institutions:** Banks, financial service companies, payment systems, investment companies, and securities/commodities exchanges.
5. **Transportation Networks:** Highways, railroads, ports and inland waterways, pipelines, and airports and airways that facilitate the efficient movement of goods and people.
6. **Water Supply Systems:** Sources of water; reservoirs and holding facilities; aqueducts and other transport systems; filtration, cleaning, and treatment systems; pipelines; cooling systems; and other delivery mechanisms that provide for domestic and industrial applications, including systems for dealing with water runoff, wastewater, and firefighting.
7. **Government Services:** Capabilities at the federal, state, and local levels of government required to meet the needs for essential services to the public.
8. **Emergency Services:** Medical, police, fire, and rescue systems.

Other assets such as educational, cultural, business, flood control or recreational are classified as non-critical, as they would not necessarily have a debilitating impact on the defense or economic security of the community or significantly hinder recovery following a disaster.

A combination of the initial Asset Inventory and HAZUS-MH data were used to represent the total critical facility exposure for Mohave County jurisdictions. The table below summarizes the facility counts by category for each of the participating jurisdictions in this Pan.

Table 4-5: Estimated Assets by Jurisdiction

	Critical Facilities and Infrastructure								Non-Critical Facilities				
Jurisdiction	Communications Infrastructure	Electrical Power Systems	Gas and Oil Facilities	Banking and Finance Institutions	Transportation Networks	Water Supply Systems	Government Services	Emergency Services	Educational	Cultural	Businesses	Flood Control	Recreational
County-Wide Totals	13	2	1	0	9	51	61	56	80	3	0	0	24
Ft. Mojave Indian Tribe – Mohave Co	3	4	1	1		7	6	3	2	5	4		
Ft. Mojave Indian Tribe – Clark Co	0		1		1	4		1					
Ft. Mojave Indian Tribe – San Bernardino Co	0					1	2	1		1			
Hualapai Tribe	2	4	2	0	3	3	9	6	3	1	2	0	1
Bullhead City	1	0	1	0	1	14	14	9	13	0	0	0	6
Colorado City	2	1	0	0	1	5	3	4	5	0	0	0	0
Kingman	0	1	0	0	0	11	33	17	16	2	0	0	17
Lake Havasu City	2	6	1	2	4	19	11	8	19	0	0	0	1
Uninc Mohave County	11	0	0	0	6	18	2	18	30	1	0	0	0

Loss Estimations

Losses are estimated by using either quantitative or qualitative methods. Quantitative methods consist of intersecting hazard map layers with the asset map layer and the use of the HAZUS-MH program. The qualitative assessment relied less on technology, but more on historical and anecdotal data, community input and professional judgment regarding expected hazard impacts.

Economic loss and human exposure estimates for the hazards identified in this Plan begin with an assessment of the potential exposure of critical assets and human populations to those hazards. Exposure estimates of critical assets identified by each jurisdiction are accomplished by intersecting the asset inventory with the hazard profiles. Human or population exposures are estimated by intersecting the same hazards with population statistics based on HAZUS-MH.

For this Plan, the numerous exposure and loss estimation tables included in each of the hazard profiles were revised, consolidated, and replaced by one table per hazard. The exception to that change is in the hazards where quantitative loss estimations cannot be developed (biological, drought, extreme heat, etc). The updated table estimations are based on high hazard intensity rather than on varying degrees of hazard intensity used in the previous Plan. The building stock of commercial and industrial units have also been removed from the table as the Planning Team decided to focus more on critical facilities and population.

It is noted that the HAZUS data population statistics may not exactly equate to the current population statistics due to actual changes in population counts presented in HAZUS. It is also noted that the residential building stock estimates may severely under-predict the actual buildings present due to the substantial growth in the last decade. Combining the exposure results from the asset inventory and the HAZUS database provides a comprehensive depiction of the overall exposure of building stock and the two datasets are considered complimentary.

Economic losses to structures and facilities are estimated by multiplying the exposed facility replacement cost estimates by a loss to exposure ratio for the hazard. The loss-to-exposure ratios are subjective, and the estimates are solely intended to provide an understanding of relative risk and potential losses.

Some of the hazards profiled in this Plan update will not include quantitative exposure and loss estimates. The vulnerability of people and assets associated with some hazards are nearly impossible to evaluate given the uncertainty of where these hazards will occur as well as the relatively limited focus and extent of damage. Instead, a qualitative review is discussed to provide insight to the nature of losses associated with the hazard. For subsequent updates of this Plan, the data needed to evaluate these unpredictable hazards may become more refined so comprehensive vulnerability statements and thorough loss estimates can be made.

Cultural and Sacred Sites

The Fort Mojave Indian Tribe has twenty-three locations that are considered cultural or sacred sites to the tribal membership. Six of these sites are located on the reservation in the state of Arizona. Six of these sites are located off the reservation in the State of Arizona but are an area of great significance to the tribal membership. Eight sites are located off the reservation in the state of California but are areas of great significance to the tribal membership. One site is located on the reservation in the state of Nevada. One site is located off the reservation in the state of Nevada and is of great significance to the tribal membership. One site is located both on and off reservation lands and is in Arizona, California, and Nevada. To ensure the protection and preservation of the protected cultural and/or sacred sites no other identifying information will be listed in this section.

The Hualapai Tribal lands contain many sacred and important cultural and historical sites. Due to the sensitive nature of such sites, the Tribe's Cultural Department shall be consulted with regarding the locations and sensitivities of such sites. They may be reached at 928-769-2223.

4.4 Hazard Risk Profiles

The following are the profiles for each of the identified hazards. For each hazard, the following elements are addressed to present the overall risk:

- **Description**
- **History**
- **Changes in Development in the Hazard Area**
- **Probability and Magnitude**
- **Vulnerability**

4.4.1 Biological/Disease Events

Introduction

Biological diseases can affect any living organism, including people, animals, and plants. Biological diseases can both directly (through exposure) and indirectly (through secondary impacts) affect people, animals, and plants. Some Biological diseases can directly affect both people and animals for an extended period and in most cases cause death. The most hazardous Biological event threat is the mass exposure of a biological substance that affects numerous people, animals, and plants. Of great concern for human and animal health are infectious diseases caused by the entry and growth of microorganisms in another living organism. Some, but not all, infectious diseases are contagious, meaning they are communicable through direct or even indirect contact with an organism infected with the disease, something it has touched, or another medium (e.g., water, air).

According to the Centers for Disease Control and Prevention (CDC), during the first half of the twentieth century, optimism grew as steady progress was made against infectious diseases in humans resulting from improved water quality, sanitation, antibiotics, and inoculations (CDC, October 1998). The incidences and severity of infectious diseases such as tuberculosis, typhoid fever, smallpox, polio, whooping cough, and diphtheria were all significantly reduced during this period. This optimism proved premature, however, for a variety of reasons, including the following: antibiotics began to lose their effectiveness against infectious disease (e.g., Staphylococcus aureus); new strains of influenza emerged in China and spread rapidly around the globe; sexually transmitted diseases surged; new diseases were identified in the U.S. and elsewhere (e.g., Legionnaire's disease, Lyme disease, toxic shock syndrome, and Ebola hemorrhagic fever); acquired immunodeficiency syndrome (AIDS) appeared; and tuberculosis (including drug-resistant strains) reemerged (CDC, October 1998).

The CDC maintains a list of over 50 nationally notifiable diseases. A notifiable disease is one that, when diagnosed, health providers are required, usually by law, to report to State or local public health officials. Notifiable diseases are those of public interest by reason of their contagiousness, severity, or frequency. The long list includes such diseases as the following: AIDS; anthrax; botulism; cholera; diphtheria; encephalitis; gonorrhea; Hantavirus pulmonary syndrome; hepatitis (A, B, C); HIV (pediatric); Legionellosis; Lyme disease; malaria; measles; mumps; plague; polio (paralytic); rabies (animal and human); Rocky Mountain spotted fever; rubella (also congenital); Salmonellosis; SARS; Streptococcal disease (Group A); Streptococcal toxic-shock syndrome; Streptococcus pneumoniae (drug resistant); syphilis (also congenital); tetanus; Toxic-shock syndrome; Trichinosis, tuberculosis, Typhoid fever; and Yellow fever (Centers for Disease Control and Prevention, May 2, 2003). In addition to diseases found only in humans, there is also significant concern about diseases that affect both humans and animals, known as zoonotic diseases. There are approximately 40 zoonotic diseases, including the following: rabies; tuberculosis and brucellosis; trichinosis; ringworm; giardiasis; and Lyme disease (Will, April 2002). West Nile Virus can also be very active in the equine species spread through mosquitoes.

Diseases affecting animals and plants, particularly livestock and agricultural products, are also of major concern, as they can affect the supply and quality of human food supplies, potential economic consequences, and impact foreign trade. According to the National Animal Health Emergency Management System

(NAHEMS), an animal health emergency is defined as the appearance of disease with the potential for sudden negative impacts through direct effects on productivity, real or perceived risks to public health, or real or perceived risks to foreign countries importing from the U.S. (Lautner, April 18, 2002).

Despite being banned by the Biological Weapons Convention of 1972, biological weapons remain a frightening, potential threat in a world where not everyone abides by said convention. The following are some of history's more infamous biological weapons, many of which are likely to pose just as much of a threat today.

Biological weapons are germs weaponized into superfine powders able to be breathed in and cause death or illness.

Smallpox

Smallpox is one of the more renowned biological weapons of yore, having been used by the British during the French and Indian War by giving Native American tribes in Canada smallpox-infested blankets. Given their lack of exposure to the disease, which was native to Europe, the recipients of these blankets found themselves quickly subdued by the disease, which boasts a 30% mortality rate. Despite being effectively eliminated thanks to vaccination in the 1970s, smallpox still poses a possible threat if it is somehow replicated today, given that vaccines are primarily given to medical and military personnel currently.

The Plague

Caused by a bacteria, the Black Plague that wiped out scores upon scores of lives in 14th century Europe remains a viable, albeit easily treatable, threat. As recently as the 1940s, the plague has been used as a biological weapon, as Japanese forces disseminated infected fleas from the air during the Sino-Japanese War. Modern dispersal methods are likely to be even more innocuous, but either way, there is no vaccine for the plague, despite treatments potentially bringing the mortality rate of a plague outbreak below the 5% mark.

Anthrax

Brought into the public eye in 2001 following a series of deaths tied to letters laced with infectious spores, anthrax is another biological weapon that has been around for some time. As recently as 1979, even before 2001's mail-based dispersals, the Soviet Union lost 66 lives due to an accidental, airborne release of anthrax. While preventable with vaccines, anthrax is much like smallpox in that vaccine stores tend to be reserved in the military and medical fields, and anthrax's high mortality rate (100% if inhaled and untreated) makes it that much more frightening.

Botulinum

Botulinum toxin, while used in plastic surgery under the name "botox," is a potentially deadly poison if weaponized and even if encountered in more mundane settings. Commonly found growing on fruit, vegetables and occasionally seafood, the ingestion of foods tainted with botulism-causing toxin has the potential to lead to death within 72 hours. Never open canned foods whose cans appear to be bulging at the ends as this is a sign botulinum toxin is possibly building up inside.

Even with bans in place, biological warfare remains a valid concern in the modern world, even if the chances of its implementation are slim away from the battlefield. Fortunately, most known stores of potential biological agents are actively tracked by world governments, going a long way toward narrowing down their potential use as weapons.

Additional Hazards

Many other hazards, such as floods, earthquakes, or droughts, may create conditions that significantly increase the frequency and severity of diseases. These hazards can affect basic services (e.g., water supply and quality, wastewater disposal, electricity), the supply and quality of food, and the public and agricultural health system capacities. As a result, concentrations of diseases may result and grow rapidly, potentially leading to large losses of life and economic value. In addition, since the anthrax attacks following the terrorist attacks on

September 11, 2001, the threat of terrorism using disease to infest humans, animals, or plants, is of growing concern. This is particularly true of those capable of disrupting the human or animal food chain.

History

- Throughout Mohave County there have been numerous biological incidents that have been investigated or responded to by the Mohave County Department of Public Health (MCDPH). The 2020 COVID-19 pandemic resulted in a Mohave County declaration of emergency in addition to the state and federal declarations. In the beginning of 2015 Mohave County was alerted by ADHS of a possible Ebola case. The possible case was a female medical worker who returned from the African Region where Ebola cases were at an epidemic level. Patient contact was made, and surveillance activities were performed. The case did not present itself as an active exposure. A second possible case also presented itself in Mohave County, and as in the first case, patient contact was made, and surveillance activities were performed. This case also did not become an active exposure case.
- September 30, 2014 the first US case of Ebola surfaced in Dallas, Texas when a male patient arrived at a Dallas hospital. The patient died and two more cases surfaced from the nurses that assisted in patient treatment. The two nurse cases survived.
- January 20, 2012, an outbreak of Pertussis surfaced in the Centennial Park area of the Arizona Strip. Surveillance activities and investigation of reported cases ensued until the last exposure case on December 31, 2014. There were 740 confirmed cases during the outbreak with no deaths.
- May 2009, the first case of the H1N1 flu pandemic occurred in Arizona. The MCDPH worked with ADHS on the tracking, reporting, surveillance, and investigation of possible pandemic flu cases. This incident became a Presidential Declaration until the outbreak was declared over.
- December 18, 2007, the MCDPH was requested to respond to a possible Anthrax Incident in Golden Valley by Mohave Co Emergency Management. The result of the response was that Eric with the Arizona State Lab advised the MCDPH that the substance was not a biological hazard.
- In the Spring of 2021, Mohave County was hit by the COVID-19 pandemic. As in the rest of the country, hospitals, nursing homes, and the rest of the public health system were overwhelmed. The Mohave County Public Health Department hired contract employees to assist in contact tracing and case tracking as well as providing public outreach and support to hospitals, first responders, and others. PPE acquisition and allocation along with quarantine/isolation and testing protocols were critical functions that were handled through interagency coordination and communication. As of late August 2021, there had been 25,341 positive COVID-19 cases and 733 deaths in the County.

Changes in Development in the Hazard Area

Mohave County's population has increased from an estimated 203,361 in 2015 to 212,181 as counted in the 2020 Census. The 8,820 increase, while adding to absolute numbers of individuals potentially exposed to a disease outbreak, translates to only a minor increase in overall risk as far as County capabilities for responding to such a large-scale medical event are concerned.

Probability and Magnitude

The probability and magnitude of disease, particularly an epidemic, is difficult to evaluate due to the wide variation in disease characteristics, such as rate of spread, morbidity and mortality, detection and response time, and the availability of vaccines and other forms of prevention. A review of the historical records indicates that disease related disasters do occur in humans with some regularity and severity. The COVID-19 pandemic is only the most recent example, and in terms of morbidity, mortality, and rate of spread is far from a worst-case scenario. There is concern about other emerging infectious diseases as well as the possibility of a bioterrorism attack.

Vulnerability

Table 4-6: CPRI Results for Biological/Disease Events					
Participating Jurisdiction	**Probability**	**Magnitude/ Severity**	**Warning Time**	**Duration**	**CPRI Score**
Bullhead City	Likely	Limited	12-24 hours	>1 week	2.40
Colorado City	Likely	Negligible	12-24 hours	>1 week	2.00
Kingman	Likely	Limited	12-24 hours	>1 week	1.80
Lake Havasu City	Likely	Limited	12-24 hours	> 1 week	2.50
Unincorporated Mohave Co	Likely	Limited	12-24 hours	> 1week	2.95
Ft Mojave Indian Tribe	Likely	Limited	12-24 hours	> 1 week	2.20
Hualapai Tribe	Highly Likely	Catastrophic	12-24 hours	> 1 week	3.7
				County-wide average CPRI =	**2.51**

Vulnerability – Loss Estimations

The wide variation in disease characteristics makes evaluation of the vulnerability difficult to analyze. Preventable diseases and injuries are studied, and vulnerability assessments have been made. However, a highly contagious and severe disease, such as smallpox or a new emerging disease that is more virulent than COVID-19, could more swiftly kill large numbers of people and incapacitate critical facilities (e.g. hospitals). The COVID-19 pandemic provided a thorough test of the vulnerability of the County's healthcare infrastructure. Critical shortfalls included insufficient staffing for all segments of the infrastructure, inadequate PPE supply both on hand and from vendors, too few ventilators and too little PPE recycling equipment, and insufficient lab testing capability, among others, While measures are in hand to acquire and maintain increased supplies of PPE and critical equipment, a more virulent disease will likely overwhelm even a more robust healthcare system, although enhancement of federal stockpiles or nationwide manufacturing capability for essential items would help to reduce immediate and long term impacts if sufficient allocations can be made to local governments.

4.4.2 Dam Failure

Description

The primary risk associated with dam failure in Mohave County is the inundation of downstream facilities and population by the resulting flood wave. Dams within or impacting Mohave County can generally be divided into two groups: (1) storage reservoirs designed to permanently impound water, provide flood protection, and/or generate power, and (2) single purpose flood retarding structures (FRS) designed to attenuate or reduce flooding by impounding stormwater for relatively short durations of time during flood events. Dam failures may be caused by a variety of reasons including seismic events, extreme wave action, leakage and piping, overtopping, material fatigue and spillway erosion. The U.S. geological Survey and the Arizona Geological Survey have revised earthquake fault zone information on both the Needles and Mead Slope Faults Zones which are both located near dams long the Colorado River. Additional seismic threats are identified in the Las Vegas Valley and Southern California regions. The Bureau of Reclamation (BOR) has rated Davis Dam which is an earthen dam as a High-Risk Threat from an earthquake event and requires additional protective actions in its Emergency Actions Plans.

History

Mohave County has no history of dam failure.

Changes in Development in the Hazard Area

A more accurate mapping evaluation of the floodway impact areas from a dam failure was completed, based on Bureau of Reclamation projections for probable water flows, which allowed a better targeted and more accurate assessment of population and structures at risk. While there was relatively small growth in

residential or commercial structures in the impact zones during the last few years, this growth combined with the reassessment resulted the residences at risk count rising 4,192 to a total of 105,758. This also caused an increase in population at high risk from 34,391 to 56,271 and structures at high risk increase from 18,305 to 28,550.

Probability and Magnitude

The probability and magnitude of dam failure discharges vary greatly with each dam and are directly influenced by the type and age of the dam, its operational purpose, storage capacity and height, downstream conditions, and many other factors. There are two sources of data that publish hazard ratings for dams impacting Mohave County. The first is the Arizona Department of Water Resources (ADWR) and the second is the National Inventory of Dams (NID). Hazard ratings from each source are based on an assessment of the consequence of failure and/or dam safety considerations, and they are not tied to probability of occurrence.

ADWR has regulatory jurisdiction over the non-federal dams impacting the County and is responsible for regulating the safety of these dams, conducting field investigations, and participating in flood mitigation programs with the goal of minimizing the risk for loss of life and property to the citizens of Arizona. ADWR jurisdictional dams are inspected regularly according to downstream hazard potential classification, which follows the NID classification system. High hazard dams are inspected annually, significant hazard dams every three years, and low hazard dams every five years. In these inspections, ADWR identifies safety deficiencies requiring correction and assigns each dam a safety rating. Examples of safety deficiencies include lack of an adequate emergency action plan, inability to safely pass the required Inflow Design Flood, embankment erosion, dam stability, etc. Further descriptions of each safety classification are summarized below.

Table 4-7: ADWR Safety Categories

ADWR Safety Rating	Definition
No Deficiency	Not Applicable
Safety Deficiency	One or more conditions at the dam that impair or adversely affects the safe operation of the dam.
Unsafe Categories	
Category 1: Unsafe Dams with Elevated Risk of Failure	These dams have confirmed safety deficiencies for which there is concern they could fail during a 100-year or smaller flood event. There is an urgent need to repair or remove these dams.
Category 2: Unsafe Dams Requiring Rehabilitation or Removal	These dams have confirmed safety deficiencies and require either repair or removal. These dams are prioritized for repair or removal behind the Category 1 dams.
Category 3: Unsafe Dams with Uncertain Stability during Extreme Events (Requiring Study)	Concrete or masonry dams that have been reclassified to high hazard potential because of downstream development (i.e. hazard creep"). The necessary documentation demonstrating that the dams meet or exceed standard stability criteria for high hazard dams during extreme overtopping and seismic events is lacking. The dams are classified as unsafe pending the results of required studies. Upon completion of these studies, the dams are either removed from the list of unsafe dams or moved to Category 2 and prioritized for repair or removal.
Category 4: Unsafe Dams Pending Evaluation of Flood-Passing Capacity (Requiring Study)	In 1979, the U.S. Army Corps of Engineers established Federal Guidelines for assessing the safe flood passing capacity of high hazard potential dams (CFR Vol. 44 No. 188). These guidelines established one-half of the "probable maximum flood" (PMF) as the minimum storm which must be safely passed without overtopping and subsequent failure of the dam. Dams unable to safely pass a storm of this size were classified as being in an "unsafe, non-emergency" condition. Prior studies for these earthen dams (mostly performed in the 1980's) predicted they could not safely pass one-half of the PMF. They were predicted to overtop and fail for flood events ranging from 30 to 46 percent of the PMF. Recent studies both

Table 4-7: ADWR Safety Categories	
ADWR Safety Rating	**Definition**
	statewide and nationwide have indicated that the science of PMF hydrology as practiced in the 1990's commonly overestimates the PMF for a given watershed. These dams should be re-evaluated using updated methods to confirm their safety status. Upon completion of these evaluations, they are either removed from the list of unsafe dams or moved to Category 2 and prioritized for repair or removal.
Source: ADWR, 2009.	

The NID database contains information on approximately 77,000 dams in the 50 states and Puerto Rico, with approximately 30 characteristics reported for each dam, such as: name, owner, river, nearest community, length, height, average storage, max storage, hazard rating and Emergency Action Plan (EAP).

The NID and ADWR databases provide useful information on the potential hazard posed by dams. Each dam in the NID is assigned one of the following three hazard potential classes based on the potential for loss of life and damage to property should the dam fail (listed in increasing severity): low, significant, or high. The hazard potential classification is based on an evaluation of the probable present and future incremental adverse consequences that would result from the release of water or stored contents due to failure or improper operation of the dam or appurtenances, regardless of the condition of the dam.

The ADWR evaluation of the potential hazard posed by dams includes land-use zoning and development projected for the affected area over the 10-year period following the classification of the dam. It is important to note that the hazard potential classification is an assessment of the consequences of failure, but not an evaluation of the probability of failure or improper operation. The table below summarizes the hazard potential classifications and criteria for dams regulated by the State of Arizona.

Table 4-8: Downstream Hazard Potential Classes for State Regulated Dams		
Hazard Potential Classification	**Loss of Human Life**	**Economic, Environmental, Lifeline Losses**
Low	None expected	Low and generally limited to owner
Significant	None expected	Yes
High	Probable. One or more expected	Yes (but not necessary for this classification)
Note: The hazard potential classification is an assessment of the consequences of failure, but not an evaluation of the probability of failure. Source: ADWR and NID 2009		

The NID database includes dams that are either:

- High or Significant hazard potential class dams, or,
- Low hazard potential class dams that exceed 25 feet in height and 15 acre-feet storage, or,
- Low hazard potential class dams that exceed 50 acre-feet storage and 6 feet height.

There are 20 dams located in, or directly impacting Mohave County based on the two databases. Of the 20 dams, seven are under ADWR jurisdiction. The table below provides a summary of the hazard and safety classifications by count for both the ADWR and NID databases.

Table 4-9: NID and ADWR Dams by Hazard Classification								
Hazard Class	**ADWR ID No.**	**NID ID No.**	**Dam Name**	**ADWR Safety Types**	**EAP**	**Inundation Mapping**	**Nearest Downstream Development**	**Distance in Miles**

Table 4-9: NID and ADWR Dams by Hazard Classification								
Hazard Class	**ADWR ID No.**	**NID ID No.**	**Dam Name**	**ADWR Safety Types**	**EAP**	**Inundation Mapping**	**Nearest Downstream Development**	**Distance in Miles**
High	08.10	AZ00177	Short Creek Southside #1	Safety Deficiency	Yes	Yes	Colorado City	1
	N/A	AZ10309	Davis BOR	N/A	Yes	Yes	Bullhead City	1
	N/A	NV10122	Hoover	N/A	Yes	Yes	Bullhead City	56
	N/A	AZ10307	Glen Canyon	N/A	Yes	Yes	Bullhead City	356
Significant	08.09	AZ00078	Short Creek Southside #2	Safety Deficiency	No	Yes	Colorado City	1
	08.11	AZ00219	Stockton Hill	No Deficiency	Yes	No	Kingman	2
	08.13	AZ00250	Brine Disposal Pond Dam	No Deficiency	Yes	No	Topock	42
Sources: NID, ADWR Dam Safety Database (October 2009)								

The magnitude of impacts due to dam failure are usually depicted by mapping the estimated downstream inundation limits and assigning notification zones based on an assessment of a combination of flow depth and velocity. These limits are typically a critical part of the emergency action plan. Downstream dam failure inundation limits were available for Alamo Dam on the Bill Williams River, Hoover and Davis Dams on the Colorado River, and Short Creek Dam No. 1 in Colorado City. Inundation mapping for the Alamo Dam was produced by the U.S. Army Corps of Engineers (USACE) and mapping for Short Creek Dam No. 1 was produced by the NRCS (NRCS, 2000). The Bureau of Reclamation (USBR, 2001) has developed multiple scenarios for Hoover, Davis and Parker Dams including multiple/cascading dam failures and probable maximum flood spillway releases. The scenario of cascading failures by Hoover and Davis Dams causes the worst-case inundation limit and was used for the purposes of this Plan.

Vulnerability

Table 4-10: CPRI Results for Dam Failure					
Participating Jurisdiction	**Probability**	**Magnitude/ Severity**	**Warning Time**	**Duration**	**CPRI Score**
Bullhead City	Possibly	Catastrophic	< 6 hours	> 1 week	3.10
Colorado City	Possibly	Limited	< 6 hours	> 1 week	2.50
Kingman	Unlikely	Limited	6-12 hours	< 1 week	1.80
Lake Havasu City	Possibly	Critical	< 6 hours	> 1 week	2.80
Unincorporated Mohave Co	Possibly	Catastrophic	< 6 hours	> 1 week	3.10
Ft Mojave Indian Tribe	Possibly	Catastrophic	< 6 hours	> 1 week	3.10
Hualapai Tribe	Unlikely	Negligible	> 24 hours	< 6 hours	1.00
				County-wide average CPRI	**2.49**

Vulnerability – Loss Estimations

The estimation of potential losses due to inundation from a dam failure was accomplished by intersecting the human and facility assets with the inundation limits. As stated previously, only four of the 19 dams have a

delineated dam failure inundation limit downstream of the dam. Therefore, the results of this analysis are expected to underestimate the exposure of people and infrastructure to dam failure within Mohave County.

Since no common methodology is available for obtaining losses from the exposure values, estimates of the loss-to-exposure ratios were assumed based on the perceived potential for damage. Any hazard event, or series of hazard events of sufficient magnitude to cause a significant a dam failure scenario, would have potentially catastrophic consequences in the inundation area. Flood waves from these types of events travel very fast and possess tremendous destructive energy. Accordingly, an average event-based loss-to-exposure ratio for the inundation areas with a high hazard rating are estimated to be 0.25. Low rated areas are zero.

It should be noted that the Planning Team recognizes that the probability of a dam failure occurring on multiple (or all) structures at the same time is essentially zero. Accordingly, the loss estimates presented below are intended to serve as a collective evaluation of the potential exposure to dam failure inundation events.

Table 4-11: Estimated Exposure and Potential Losses Due to Dam Failure

	Bullhead City	Colorado City	Kingman	Lake Havasu City	Fort Mojave Indian Tribe	Hualapai Tribe	Kaibab Paiute Indian Tribe	Unincorporated Mohave Co	Total
Total Critical Facilities	**59**	**18**	**97**	**71**	**0**	**0**	**0**	**86**	**331**
Facilities Exposed to High Hazard	32	3	0	2	0	0	0	11	48
Percentage of Total Facilities	54.24%	16.67%	0.00%	4.76%	0.00%	0.00%	0.00%	12.79%	11.06%
Estimated Exposure Value (x $1,000)	$110,325	$2,217	$0	$20,000	$0	$0	$0	$65,400	$197,942
Total Population	**40,884**	**4,836**	**31,013**	**57,464**	**1,117**	**1,433**	**130**	**77,984**	**214,861**
Population Exposed to High Hazard	26,337	2,145	0	1,484	771	0	0	25,534	56,271
Percent Exposed	64.42%	44.36%	0.00%	2.6%	69.02%	0.00%	0.00%	32.78%	26.65%
Total Residential Building Count	**21,156**	**449**	**12,411**	**30,000**	**431**	**393**	**91**	**40,827**	**105,758**
Estimated Replacement Cost (x $1,000)	**$2,604,199**	**$76,438**	**$1,780,842**	**$9,000,000**	**$102,113**	**$99,934**	**$22,892**	**$4,106,383**	**$17,792,801**
Structures Exposed to High Hazard	13628	199	0	1,039	300	0	0	13,384	28,550
Percentage of Total Facilities	64.42%	44.36%	0.00%	3.46%	69.60%	0.00%	0.00%	32.78%	26.83%
Estimated Exposure Value (x $1,000)	$1,242,879	$33,908	$0	$311,700	$71,071	$0	$0	$1,346,072	$3,005,630

Vulnerability – Development Trend Analysis

The flood protection afforded by dams in Mohave County has encouraged development of downstream lands, and it is reasonable to expect additional development within these areas. Public awareness measures such as notices on final plats and public education on dam safety are ways that the local county, city and town officials can mitigate the potential impact of a dam failure. In the past Mohave County has been actively working with ADWR and NRCS to update and improve the dams to enhance the safety of those structures. They have also worked on installing gages and telemetry to provide tools for monitoring and prediction. Also, Emergency Action Plans (EAPs) that establish potential dam failure inundation limits, notification procedures, and thresholds are also prepared for response to potential dam related disaster events.

Sources

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U.S. Department of Agriculture, Natural Resource Conservation Service, 2000, *Colorado City Short Creek Dam No. 1 Breach Analysis*.

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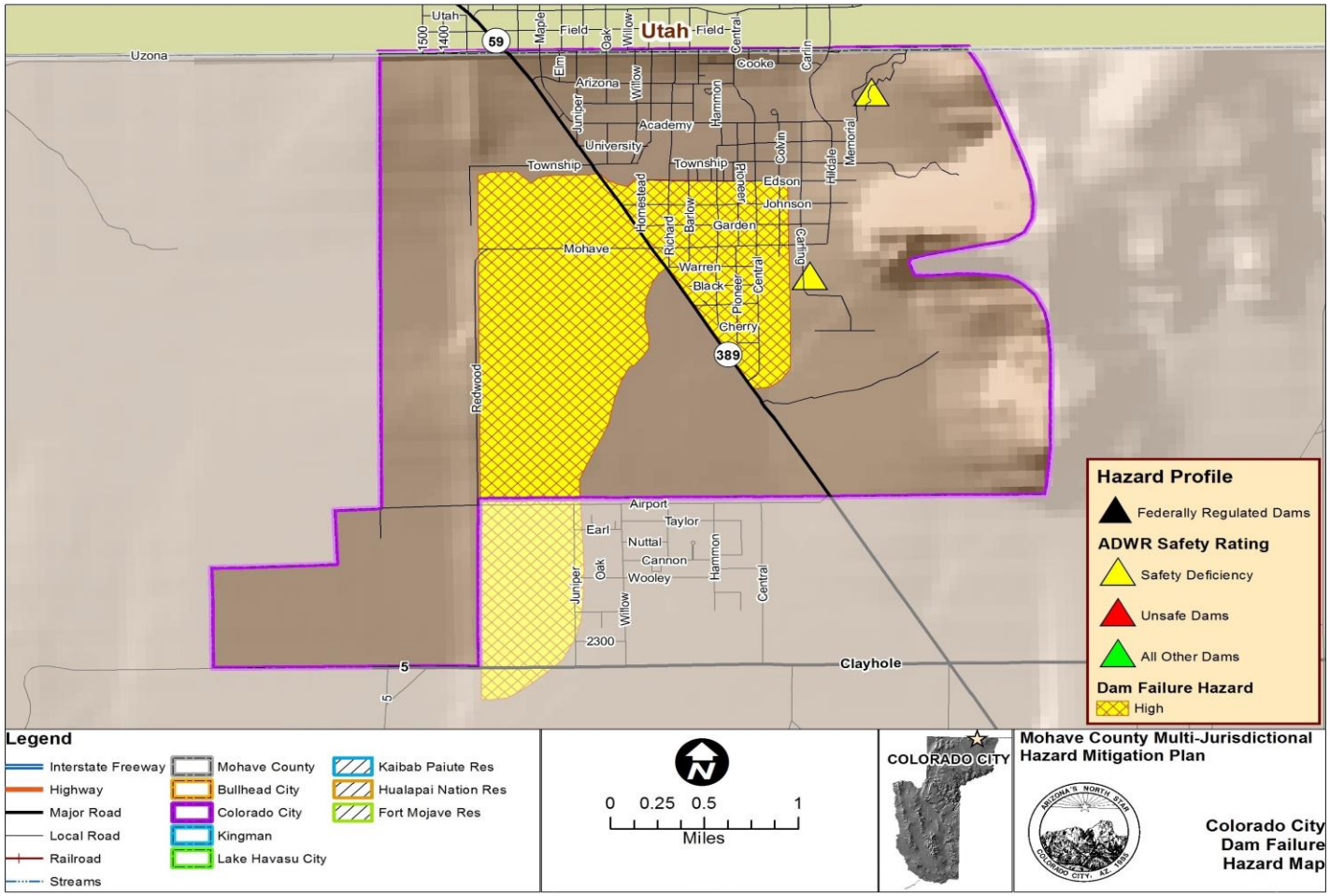
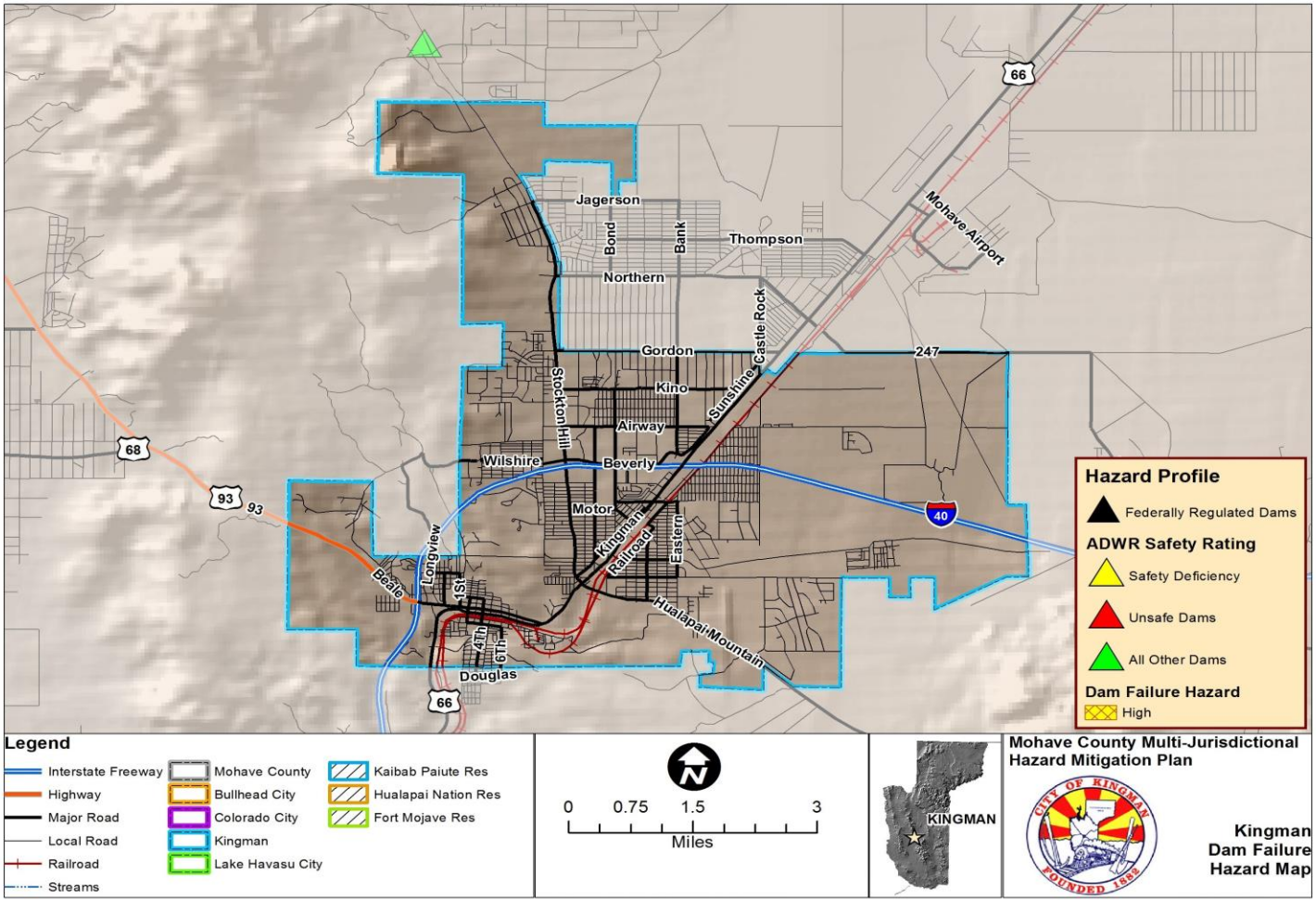
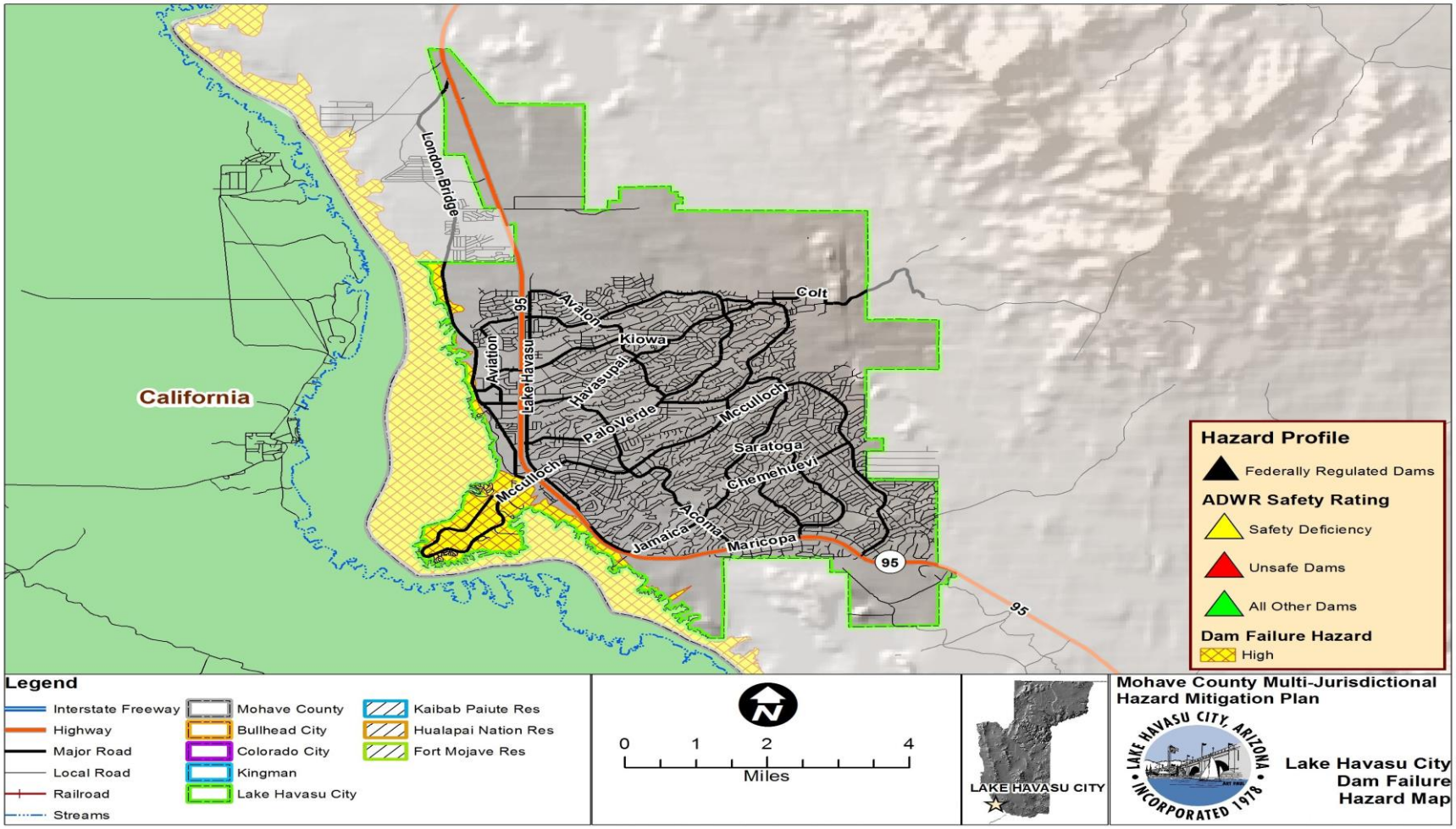


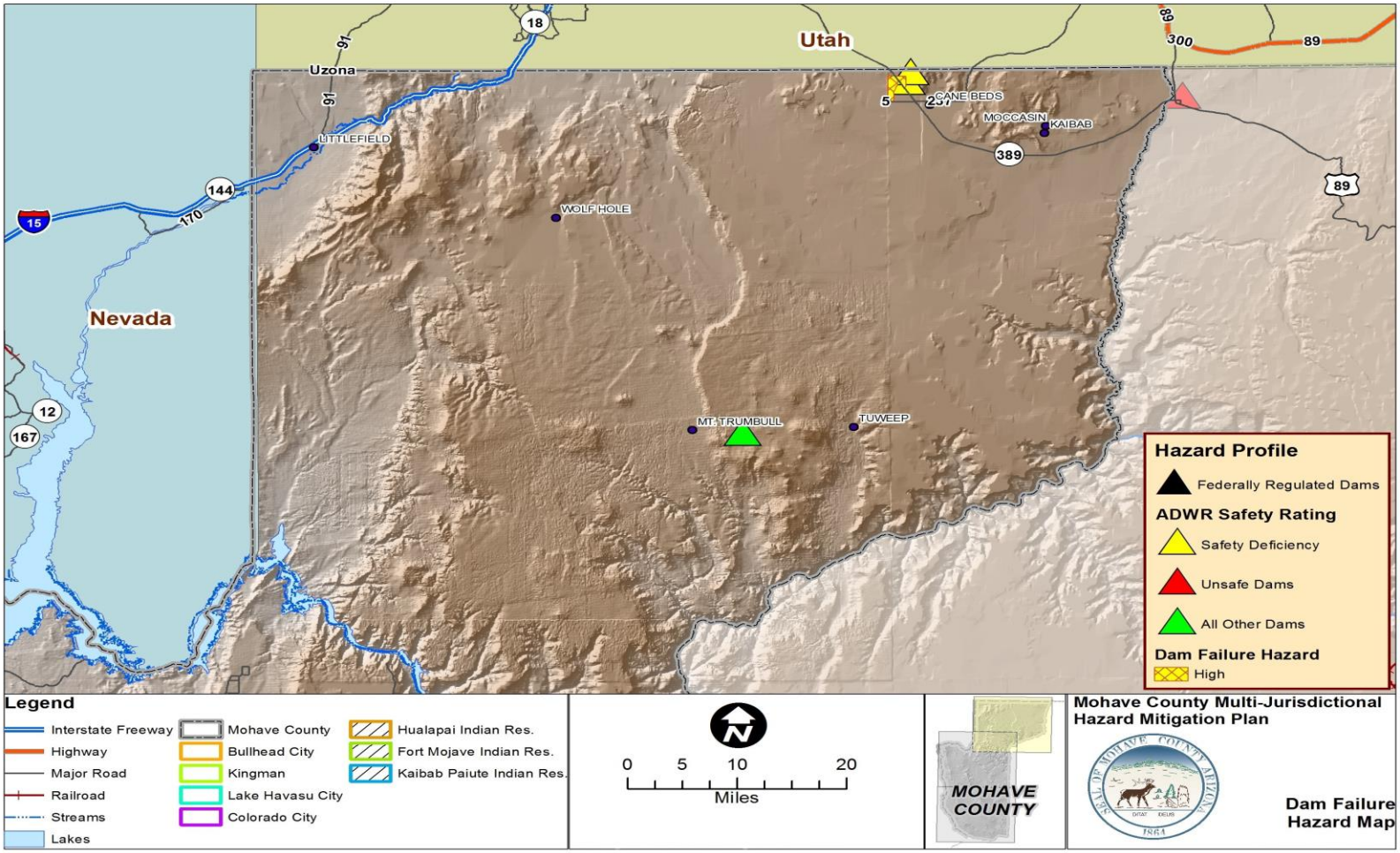
Map 4-1: Dam Failure Hazard, Colorado City



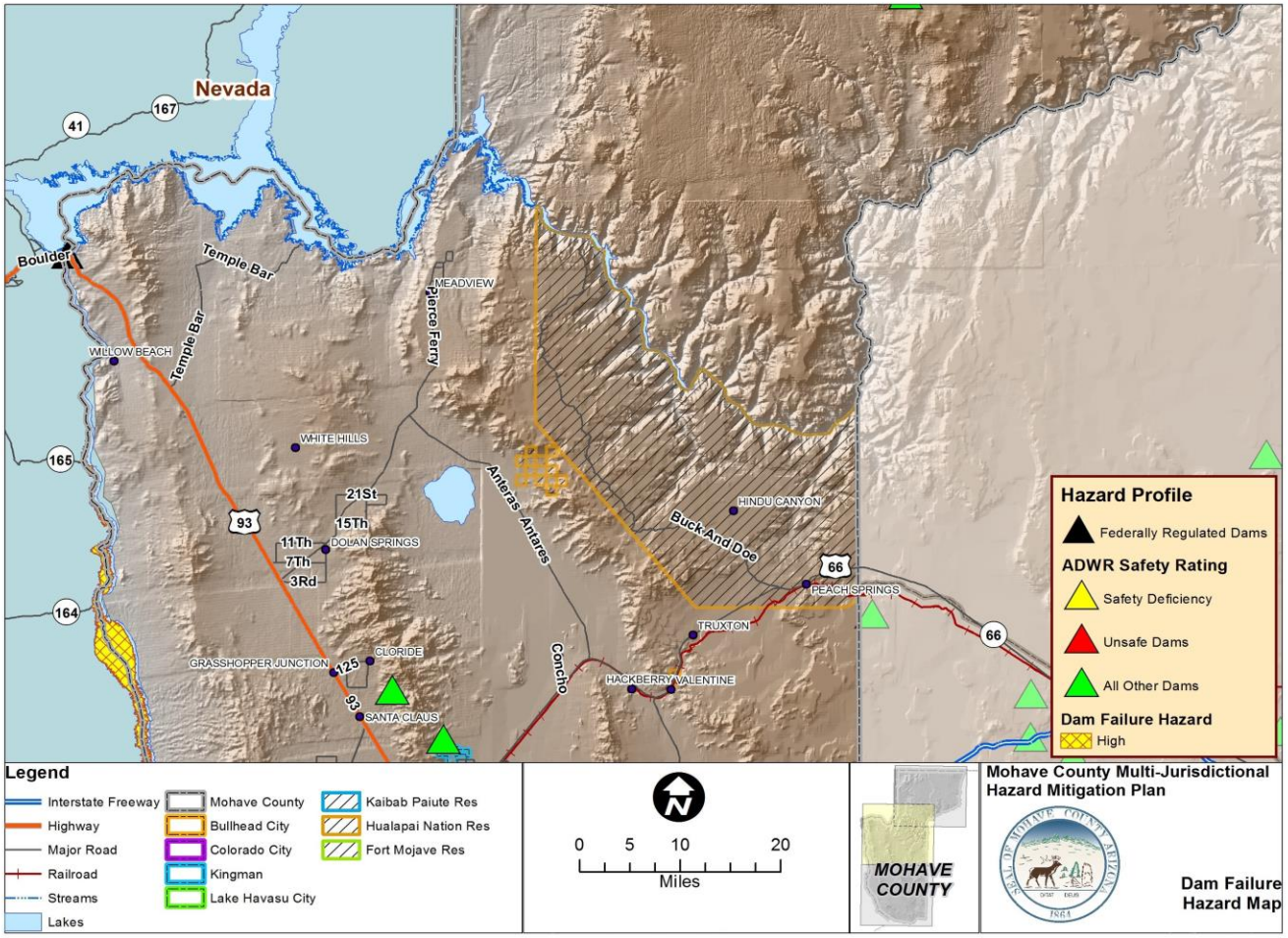
Map 4-2: Dam Failure Hazard, Kingman



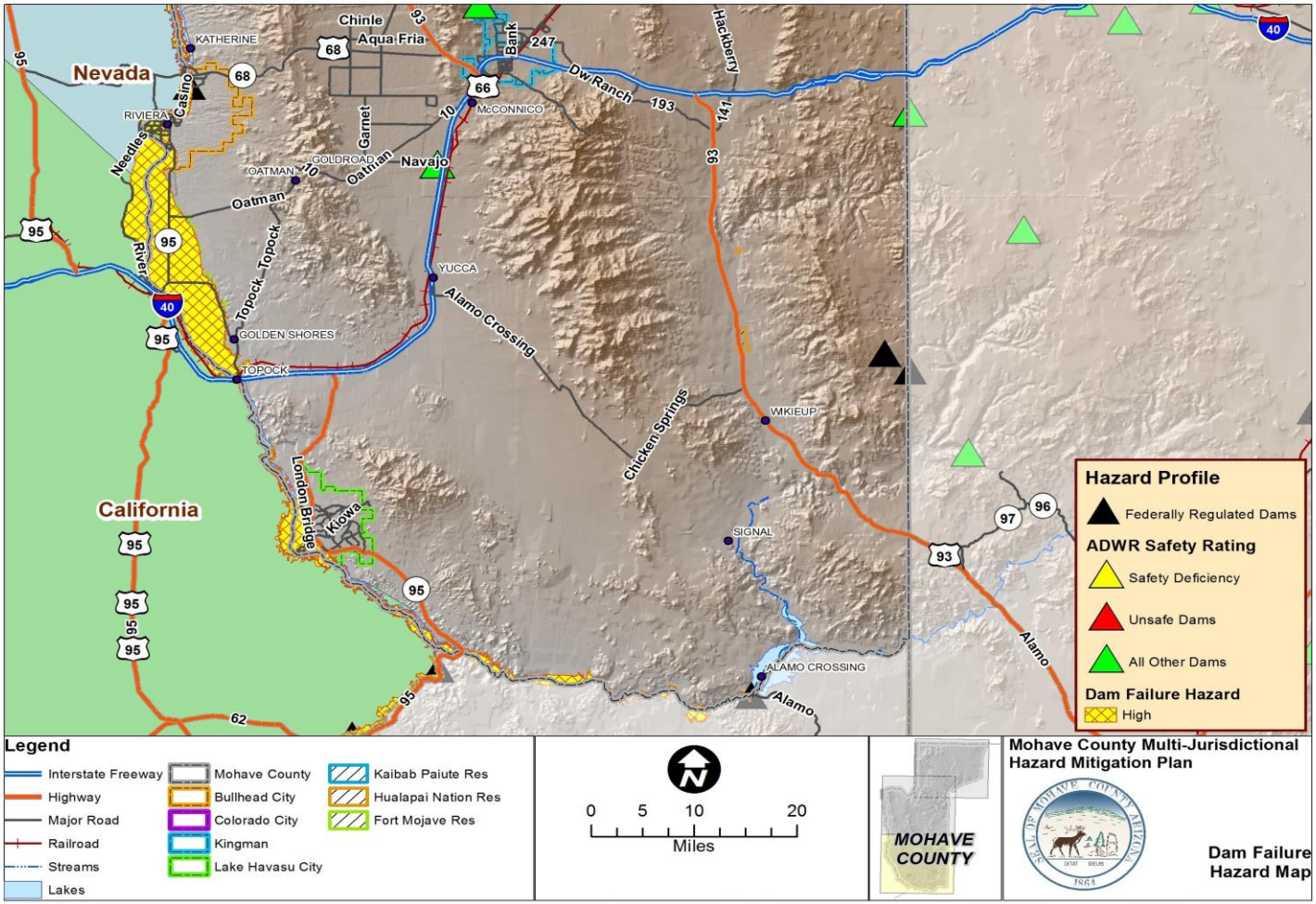
Map 4-3: Dam Failure Hazard, Lake Havasu City



Map 4-4: Dam Failure Hazard, Mohave County



Map 4-5: Dam Failure Hazard, Mohave County



Map 4-6: Dam Failure Hazard, Mohave County

4.4.3 Drought

Description

Drought is a normal part of virtually every climate on the planet, including areas of high and low rainfall. It is different from normal aridity, which is a permanent characteristic of the climate in areas of low rainfall. Drought is the result of a natural decline in the expected precipitation over an extended period, typically one or more seasons in length. The severity of drought can be aggravated by other climatic factors, such as prolonged high winds and low relative humidity (FEMA, 1997).

Drought is a complex hazard which is reflected in the following four definitions commonly used to describe it:

- Meteorological – defined solely on the degree of dryness, expressed as a departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales.
- Hydrological – related to the effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels.
- Agricultural – defined principally in terms of naturally occurring soil moisture deficiencies relative to water demands of plant life, usually arid crops.
- Socioeconomic – associates the supply and demand of economic goods or services with elements of meteorological, hydrologic, and agricultural drought. Socioeconomic drought occurs when the demand for water exceeds the supply because of weather-related supply shortfall. It may also be called a water management drought.

A drought's severity depends on numerous factors, including duration, intensity, and geographic extent as well as regional water supply demands by humans and vegetation. Due to its nature, drought is difficult to define in exact terms and poses difficulties in terms of comprehensive risk assessments.

Drought differs from other natural hazards in three ways. First, the onset and end of a drought are difficult to determine due to the slow accumulation and lingering effects of an event after its apparent end. Second, the lack of an exact and universally accepted definition adds to the confusion of its existence and severity. Third, in contrast with other natural hazards, the impact of drought is less obvious and may be spread over a larger geographic area.

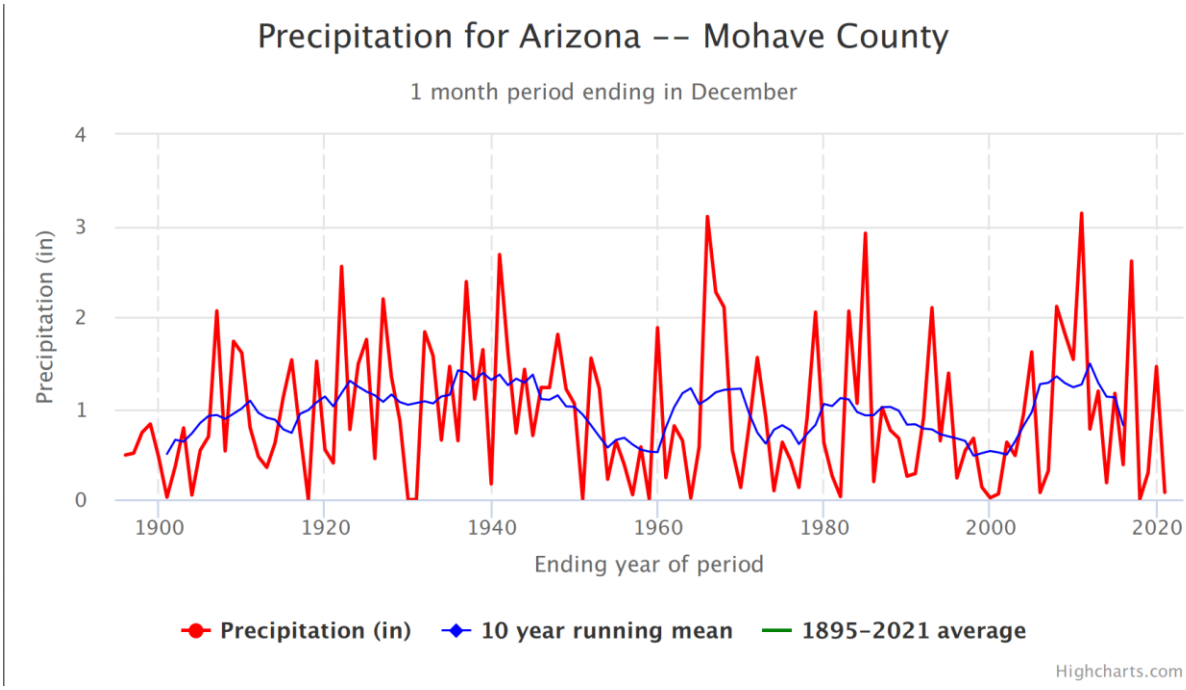
Droughts may cause a shortage of water for human and industrial consumption, hydroelectric power, recreation, and navigation. Water quality may also decline, and the number and severity of wildfires may increase. Severe droughts may result in the loss of agricultural crops and forest products, undernourished wildlife and livestock, lower land values, and higher unemployment.

History

Arizona has experienced at least 17 droughts declared as drought disasters/emergencies and at least 97 drought events (droughts affecting multiple years are recorded as a distinct event for each year affected). The following figure depicts the most recent precipitation data from NCDC regarding average statewide precipitation variances from normal. Between 1849 and 1905, the most prolonged period of drought conditions in 300 years occurred in Arizona (Jacobs, 2003). Another prolonged drought occurred during the period of 1941 to 1965. The period from 1979-1983 appears to have been anomalously wet, while the rest of the historical records shows that dry conditions are most likely the normal condition for Arizona. Between 1998 and 2007, there have been more months with below normal precipitation than months with above normal precipitation.

The figures below depict precipitation data from West Map (Western Climate Mapping Initiative) presented as annual county-wide precipitation variances from normal and a running mean, for a period of 1895 to 2015. West Map was developed through collaboration between the University of Arizona, the Western Regional

Climate Center/Desert Research Institute, and the PRISM Climate Group at Oregon State University. The data show that for the last 18 years, the county has on average been in a moderate drought cycle with intermittent years of precipitation exceeding normal.



Source: http://cefa.dri.edu/Westmap/westmappass.php

Changes in Development in the Hazard Area

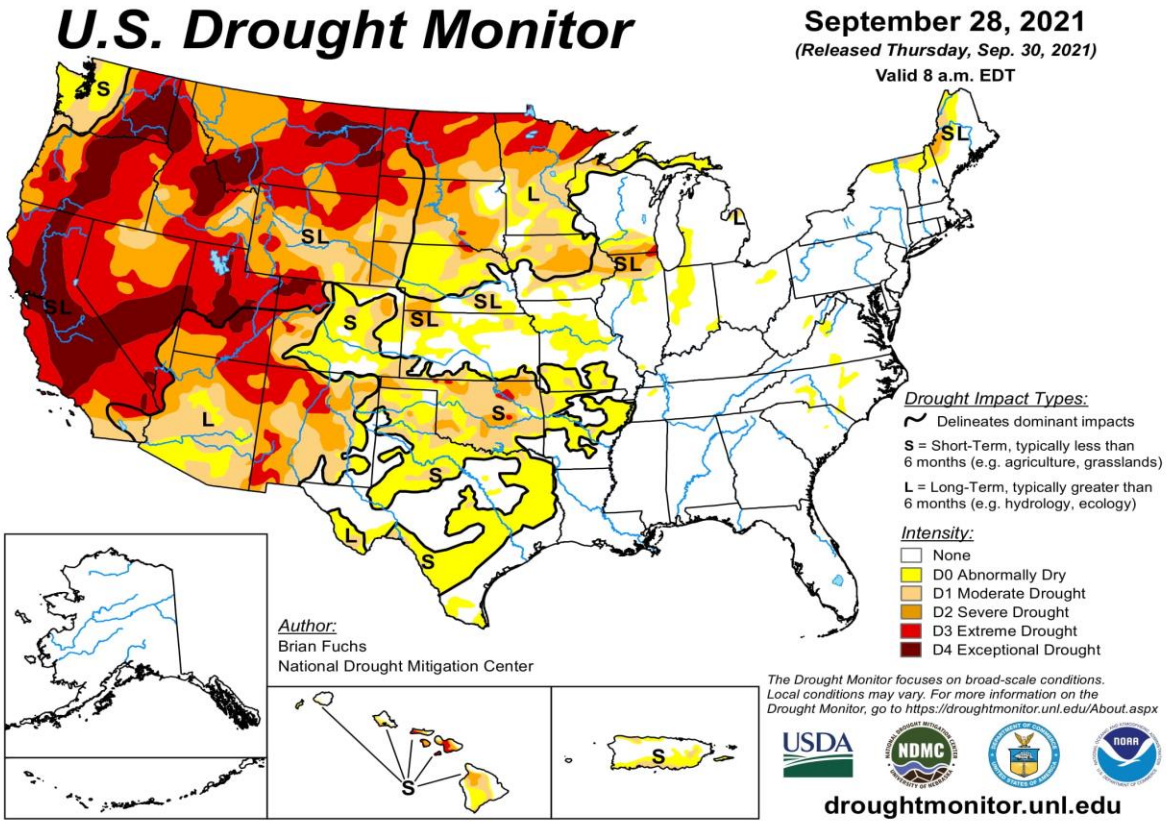
Mohave County's population has increased from an estimated 203,361 in 2015 to 212,181 as counted in the 2020 Census. Most of the increase, estimated at 6881 persons, occurred in the river communities of Bullhead City and Lake Havasu City. These cities' water supplies are more susceptible to decreases in Colorado River flows and at some point, in the near future may be impacted by mandated water conservation measures as a result of the greatly diminished water volume in Lake Mead. The Kingman area experienced a growth of 2464 persons in the incorporated city and several hundred more in the surrounding unincorporated areas. This area is more severely impacted due to its agricultural sector and it depends on aquifer recharge from monsoon rains, which have been abnormally low. Several catch basin and water injection well projects are underway to aid aquifer recharge.

Probability and Magnitude

There is no commonly accepted return period or non-exceedance probability for defining the risk from drought (such as the 100-year or 1% annual chance of flood). The magnitude of drought is usually measured in time and the severity of the hydrologic deficit. There are several resources available to evaluate drought status and even project expected conditions for the very near future.

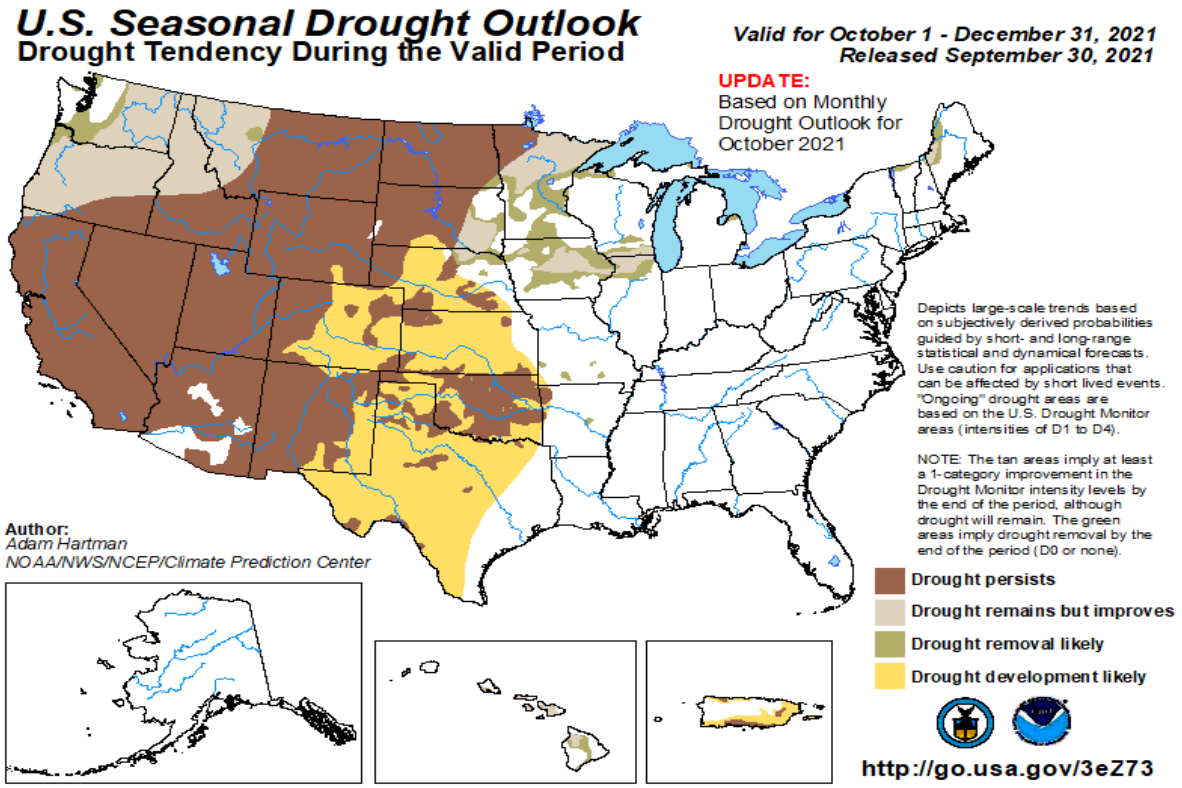
The National Integrated Drought Information System (NIDIS) Act of 2006 (Public Law 109-430) prescribes an interagency approach for drought monitoring, forecasting, and early warning (NIDIS, 2007). The NIDIS maintains the U.S. Drought Portal[6] which is a centralized, web-based access point to several drought related

resources including the U.S. Drought Monitor (USDM) and the U.S. Seasonal Drought Outlook (USSDO). The USDM is a weekly map depicting the current status of drought and is developed and maintained by the National Drought Mitigation Center. The USSDO, shown in the following figure, is a six-month projection of potential drought conditions developed by the National Weather Service's Climate Prediction Center. The primary indicators for these maps for the Western U.S. are the Palmer Hydrologic Drought Index and the 60-month Palmer Z-index. The Palmer Drought Severity Index (PSDI) is a commonly used index that measures the severity of drought for agriculture and water resource management. It is calculated from observed temperature and precipitation values and estimates soil moisture. However, the Palmer Index is not considered to be consistent enough to characterize the risk of drought on a nationwide basis (FEMA, 1997) and neither of the Palmer indices is well suited to the dry, mountainous western United States.



Source: www.drought.gov

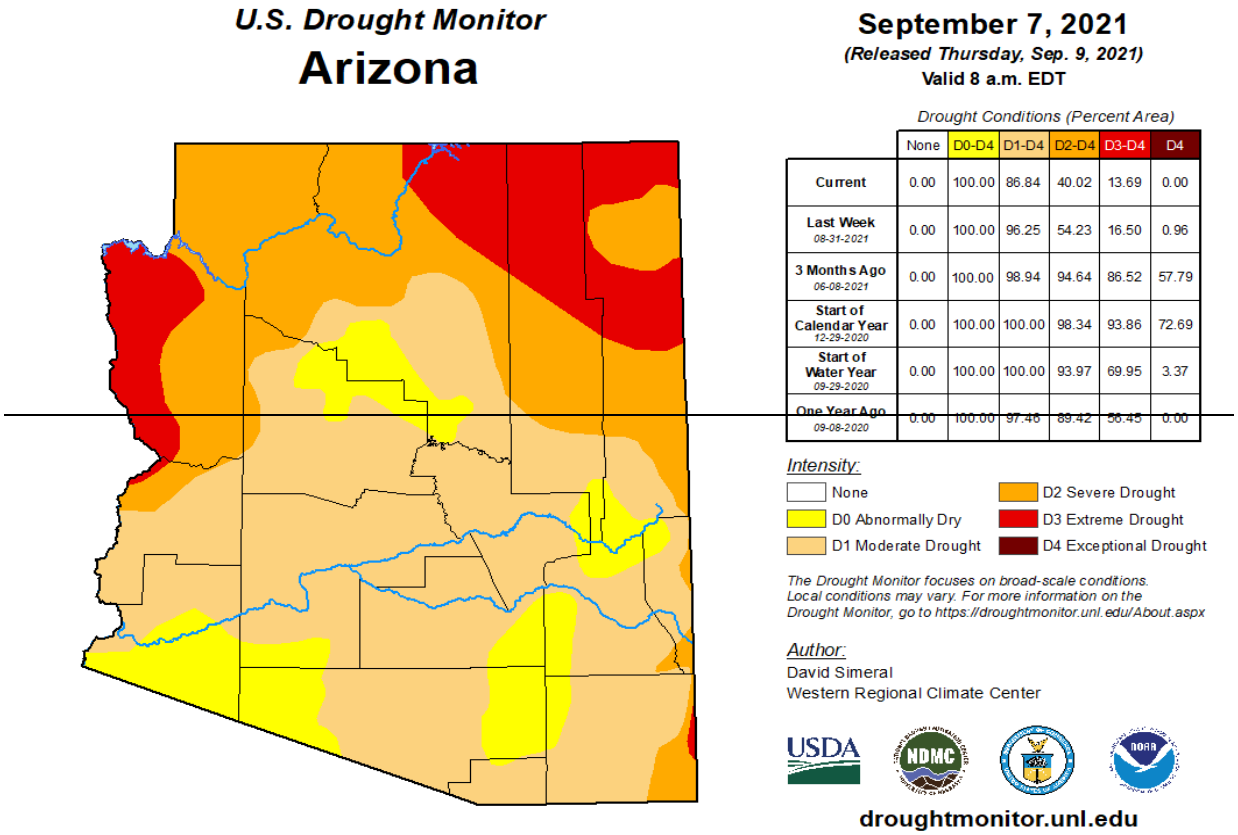
U.S. Drought Monitor Map for September 28, 2021



Source: http://www.cpc.ncep.noaa.gov

U.S. Seasonal Drought Outlook, October 2021 to December 2021

In 2003, Governor Janet Napolitano created the Arizona Drought Task Force (ADTF), led by ADWR, which developed a statewide drought plan. The plan includes criteria for determining both short and long-term drought status for each of the 15 major watersheds in the state using assessments that are based on precipitation and stream flow. The plan also provides the framework for an interagency group which reports to the governor on drought status. The counties use the monthly drought status reports to implement drought actions within their drought plans. The current drought maps are in general agreement that Mohave County is currently abnormally dry with that condition expected to continue and likely worsen for the long term.



Source: ADWR, 2021

Map 4-7: Arizona Long Term Drought Status for September 2021

Vulnerability

Table 4-12: CPRI Results for Drought					
Participating Jurisdiction	**Probability**	**Magnitude/ Severity**	**Warning Time**	**Duration**	**CPRI Score**
Bullhead City	Highly Likely	Limited	> 24 hours	> one week	2.95
Colorado City	Highly Likely	Critical	> 24 hours	> one week	3.25
Kingman	Highly Likely	Critical	> 24 hours	> one week	3.25
Lake Havasu City	Highly Likely	Limited	> 24 hours	> one week	2.95
Unincorporated Mohave County	Highly Likely	Limited	> 24 hours	> one week	2.95
Ft Mojave Indian Tribe	Highly Likely	Limited	> 24 hours	> one week	2.95
Hualapai Tribe	Highly Likely	Limited	> 24 hours	> one week	2.95
				County-wide average CPRI	**3.04**

No standardized methodology exists for estimating losses due to drought and drought does not generally have a direct impact on critical and non-critical facilities and building stock. A direct correlation to loss of human life due to drought is improbable for Mohave County. Instead, drought vulnerability is primarily measured by its potential impact to certain sectors of the County economy and natural resources include the following:

- Crop and livestock agriculture
- Municipal and industrial water supply
- Recreation/tourism
- Wildlife and wildlife habitat

Sustained drought conditions will also have secondary impacts to other hazards such as fissures, flooding, subsidence and wildfire. Extended drought will weaken and dry the grasses, shrubs, and trees of wildfire areas, making them more susceptible to ignition. Drought also tends to reduce the vegetative cover in watersheds, and hence decrease the interception of rainfall and increase the flooding hazard. Subsidence and fissure conditions are aggravated when lean surface water supplies force the pumping of more groundwater to supply the demand without the benefit of recharge from normal rainfall.

From 1995 to 2009, Mohave County farmers and ranchers received $2.2 million in disaster related assistance funding from the U.S Department of Agriculture (USDA) for crop and livestock damages (EWG, 2010). Over $1.8 million of those funds were received in 2000-2005, which corresponds to the most severe period of the current drought cycle for Mohave County. Other direct costs such as increased pumping costs due to lowering of groundwater levels and costs to expand water infrastructure to compensate for reduced yields or to develop alternative water sources, are a significant factor but very difficult to estimate due to a lack of documentation. There are also the intangible costs associated with lost tourism revenues and impacts to wildlife habitat and animals. Typically, these impacts are translated into the general economy in the form of higher food and agricultural goods prices and increased utility costs.

Most communities throughout Arizona utilize both surface water and ground water to serve their potable water needs. Bullhead City is exclusively dependent on the Colorado River. A drought declaration would have a significant impact on the amount of water available to Bullhead City.

Colorado City is located in a high desert region with an average rain fall of less than 15 inches per year. Efforts to capture run-off ground water in a series of reservoirs and ponds are in place but are very dependent on the rate of precipitation and prevailing weather patterns. Culinary water sources are largely from wells and springs, again dependent on ground water recharge and fluctuations in climate. For the past three summers, the municipal water department has been forced to issue Level 3 and 4 Water Restrictions (the highest levels) for days or weeks at a time. Agricultural crops and backyard gardens are affected. Residential and industrial growth is limited by water resources.

Kingman's water is provided by municipal sourced ground wells and pumped to holding tanks. Community concern regarding replenishment of ground water supply is heightened by recent increases in agricultural demand for water supply and sustained below normal levels of rainfall.

Lake Havasu City is under the same drought conditions as other communities in the south/western part of the United States and more specifically in Arizona. Since the City is in a desert climate, it is subject to drought conditions the majority of the time however, with the underground aquifers being the City's main water supply, and not the Colorado River which forms Lake Havasu, the City is constantly monitoring water usage and strives to conserve water wherever possible. The vulnerability to the community is determined by the water table in the aquifer that feeds the community.

The Fort Mojave Indian Reservation planning area sits in Arizona, California and Nevada and has experienced several years of extreme drought conditions. The planning area relies heavily on the water resources from the Colorado River and underground aquifers for potable water, agriculture, cultural activities and recreation. Reduced water resources are a major hazard to the entire Reservation. Potential hazards associated with drought are:

- Culture and traditional practices: Greater stress on traditional fish, plant and animal species.
- Water supply: Reduced availability and reliability of surface water, less groundwater recharge, increased treatment, and increased potential for over drafting of ground water. Potential increased conflict over water rights. Higher human water demands that reduce water needed to support ecosystems/species.
- Water Quality: Increase in water-borne illnesses, taste and odor issues, higher contaminate loading, increase in algae blooms, decreased in dissolved oxygen, and impacts to aquatic species.
- Health: Change in prevalence and spread of disease and mortality, reduced water supply, reliability, increased malnutrition, and increased health care costs.
- Critical Resource Impact: Decrease in power generating ability with decrease in water resources for power plant located on the Reservation.
- Financial Impacts: The tribe relies heavily on its agricultural farming industry. Decreased ability to irrigate crops would have catastrophic financial consequences.

Like much of the Southwest, the Hualapai Tribe has experienced drought for several years. The drought, whether due to climate change or normal weather cycles, is adversely impacting the Hualapai Tribe. The Hualapai Reservation has few viable groundwater sources. Even though the Colorado River runs along 108 miles of the reservation, the Tribe has no water rights settlement.

Many areas of the reservation are provided water through long pipelines (30 to 50 miles). The first to be impacted has been our ranchers. In one instance a recent water break stopped normal water delivery to a stock pond. We lost several head of cattle. The population center of Grand Canyon West, the economic engine of the Hualapai Tribe and surrounding communities, is limited on growth due to a lack of water. Its current water source is located 35 miles from the development and delivers just 45 gpm.

Vulnerability – Development Trends

Population growth in Mohave County will require additional surface and ground water to meet the demands of potable, landscape, and industrial uses. It is unlikely that significant growth will occur in the ranching sector given the current constraints on water and grazing rights and available range land, but some recent commercial farming projects have raised public concern about current water usage and future availability. Drought planning should be a critical component of any domestic water system expansions or land development planning.

The Mohave County Local Drought Impact Group (LDIG) was established by vote of the Board of Supervisors in April, 2008, as a result of a recommendation from the Governor's Drought Task Force that all Arizona counties form an LDIG in response to the current drought. The LDIG's tasks were to:

- Monitor the current level and impacts of the ongoing drought in Mohave County and provide information to local jurisdictions and ADWR
- Establish a public outreach program on drought impacts and preparedness
- Identify and recommend mitigation measures for implementation by jurisdictions, businesses, and individual families during various levels of drought.

The LDIG met numerous times between 2008 and 2012 to provide a planning venue and a public forum for addressing drought related issues in the county. An impact monitoring system was developed by the LDIG using monthly voluntary reports from residents in various locations, and drought mitigation measures were identified for recommended implementation if certain drought impact stages are reached. The LDIG now serves as an advisory group to the Mohave County Division of Emergency Management, which continues to manage the impact monitoring and reporting system.

Sources

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http://www.cpc.ncep.noaa.gov/products/expert_assessment/seasonal_drought.html

4.4.4 Extreme Heat

Description

Extreme Heat is the combination of very high temperatures and exceptionally humid conditions that exceed regionally based indices for perceived risk. The major human risks associated with extreme heat are as follows:

- *Heat Cramps:* May occur in people unaccustomed to exercising in the heat and generally ceases to be a problem after acclimatization.
- *Heat Syncope:* This refers to sudden loss of consciousness and is typically associated with people exercising who are not acclimated to warm temperatures. Causes little or no harm to the individual.
- *Heat Exhaustion:* While much less serious than heatstroke, heat exhaustion victims may complain of dizziness, weakness, or fatigue. Body temperatures may be normal or slightly to moderately elevated. The prognosis is usually good with fluid treatment.
- *Heatstroke:* Considered a medical emergency, heatstroke is often fatal. It occurs when the body's responses to heat stress are insufficient to prevent a substantial rise in the body's core temperature. While no standard diagnosis exists, a medical heatstroke condition is usually diagnosed when the body's temperature exceeds 105°F due to environmental temperatures. Rapid cooling is necessary to prevent death, with an average fatality rate of 15% even with treatment.

In addition to affecting people, extreme heat places significant stress on plants and animals leading to reduced agricultural yields and increased mortality rates.

History

Arizona's highest recorded temperature of 128°F was set in Lake Havasu City on June 29, 1994, which also ranks second in the U.S. behind California's Death Valley record of 134°F. For the period of 2008 to 2018, there were 70 deaths attributed to excessive natural heat in Mohave County, with 51 of those deaths occurring in 2016-2018 (azdhs.gov).

Changes in Development in the Hazard Area

Mohave County's population has increased from an estimated 203,361 in 2015 to 212,181 as counted in the 2020 Census. All the population is at risk from extreme heat events, with communities at lower elevations along the Colorado River (population estimated at 130,000) being at highest risk. There has been some increase in residences and commercial facilities within the county, but this has been within established developments and population areas. The threat has not increased because of these developments, other than due to incremental population growth within existing developments.

Probability/Magnitude

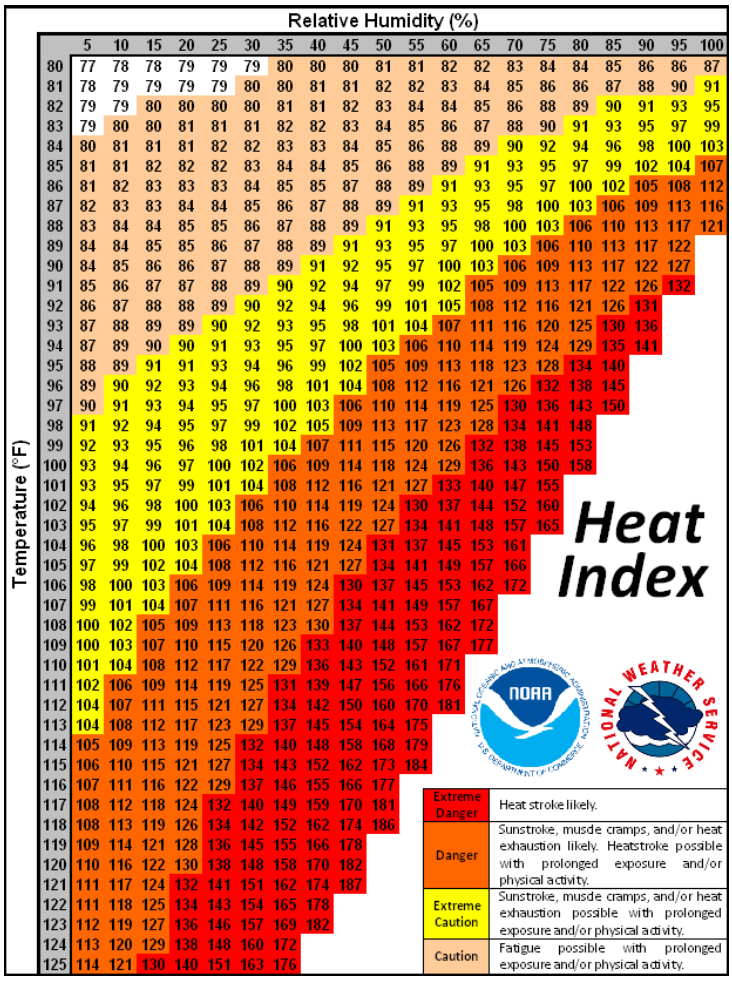
There are no recurrence or non-exceedance probabilities developed for extreme heat events in Mohave County. One indicator of the degree of danger associated with extreme heat is the Heat Index (HI) or the "Apparent Temperature". According the NWS, the HI is an accurate measure of how hot it really feels when the Relative Humidity (RH) is added to the actual air temperature. The heat index chart shows the HI based on current temperature and relative humidity, and levels of danger for HI values. *It is should be noted that the HI values presented below were devised for shady, light wind conditions. Exposure to full sunshine can increase HI values by up to 15°F. Also, strong winds, particularly with very hot, dry air, can be extremely hazardous due to rapid evaporation of body moisture and extreme dehydration potential.*

Each National Weather Service (NWS) Weather Forecast Office (WFO) can issue the following heat-related products as conditions warrant:

Excessive Heat Outlook: when the potential exists for an excessive heat event in the next 3 to 7 days. An outlook is used to indicate that a heat event may develop and is intended to provide information to those who need considerable lead time to prepare for the event, such as public utilities, emergency management and public health officials.

Excessive Heat Watch: when conditions are favorable for an excessive heat event in the next 12 to 48 hours. A watch is used when the risk of a heat wave has increased, but its occurrence and timing is still uncertain. It is intended to provide enough lead time so those who need to set their plans in motion can do so, such as established individual city excessive heat event mitigation plans.

Excessive Heat Warning/Advisory: when an excessive heat event is expected in the next 36 hours. These products are issued when an excessive heat event is occurring, is imminent, or has a very high probability of occurrence. The warning is used for conditions posing a threat to life or property. An advisory is for less serious conditions that cause significant discomfort or inconvenience and, if caution is not taken, could lead to a threat to life and/or property.



NWS Heat Index Chart

The geographical risk of extreme heat is relatively uniform across Mohave County, though some areas in the northern and higher elevation portions of the county don't get quite as hot and those of the valley areas adjacent to Colorado River.

Vulnerability

Table 4-13: CPRI Results for Extreme Heat					
Participating Jurisdiction	**Probability**	**Magnitude/ Severity**	**Warning Time**	**Duration**	**CPRI Score**
Bullhead City	Highly Likely	Critical	> 24 hours	> 1 week	3.25
Colorado City	Likely	Limited	> 24 hours	< 1 week	2.40
Kingman	Likely	Limited	> 24 hours	< 1 week	2.40
Lake Havasu City	Highly Likely	Critical	> 24 hours	> 1 week	3.25
Unincorporated Mohave County	Likely	Critical	> 24 hours	> 1 week	2.80
Ft Mojave Indian Tribe	Highly Likely	Critical	> 24 hours	> 1 week	3.25
Hualapai Tribe	likely	Limited	> 24 hours	< 1 week	2.40
				County-wide average CPRI	**2.82**

Kingman is in an arid high desert region and regularly subject to sustained high winds year-round and excessive heat advisories from May thru September, which impacts a significant segment of the population that would be considered vulnerable. Previous heat related events resulted in power failure which affected communications and public works services.

Lake Havasu City is known for being one of the hottest communities in the United States, with summertime temperatures averaging around 113°F. When temperatures start to rise above 110°F within the City, its electrical power supply becomes a concern. Efforts have been made to ensure there will be a constant source of electricity to keep a/c units in operation and people cool during the extreme heat. With the upgrades Unisource Electric as made in the past few years, the vulnerability of extreme heat being a problem has reduced considerably.

The Fort Mojave Indian Reservation is situated in the Mohave Desert with temperatures ranging over 100°F. from March through October. Temperatures over 100°F are common and temperatures ranging well over 120° are common during the months of June, July, and August. Hazards associated with extreme heat are loss of power and heat related illnesses. All sectors of government, community, infrastructure, and public safety facilities are vulnerable to high heat incidents.

Vulnerability – Loss Estimations

Losses due to extreme heat primarily occur in the form of death and illness. There are currently no statistical analyses for projecting heat related deaths in Mohave County, however, the Arizona Department of Health Services continues to track data and monitor trends and other factors to determine if a statistical significance exists. History would indicate that multiple deaths due to extreme heat are highly likely.

The homeless are particularly vulnerable to extreme heat during the summer months when the increased humidity keeps nighttime temperatures above 90°F. The cumulative effects over several days of continuous 24-hour exposure to this heat, without relief, put the homeless at serious risk of heat stress or worse. Others at significant risk are the low-income populations who do not have air conditioning, or in many cases do not even have evaporative coolers. The lack of air conditioning means this population, like the homeless, is also lacking nighttime relief from the heat, elevating their risk of heat stress or other complications.

Vulnerability – Development Trends

Paved surfaces typically absorb and retain the heat of the day and then slowly release that heat back into the atmosphere through the night. When large areas are paved, a phenomenon known as an "urban heat island" will develop, wherein temperatures in the center of the development area become much warmer than those on the outskirts of the development due to the storage of heat during the day. As the urban footprint grows, significant portions of the once natural desert and/or agricultural farm lands are transformed into concrete and asphalt paved streets, roofs, driveways, sidewalks, parking lots, and other hardscapes, with an intensification of the urban heat island effect and a steady increase in the nighttime low temperatures as a

result. The impacts of this expansion include increased cooling costs and greater demand on power resources. Use of low impact development techniques that minimize the paved areas and maximize the use of natural open space will reduce cooling costs.

Sources

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4.4.5 Flood / Flash Flood

Description

For the purpose of this Plan, the hazard of flooding addressed in this section will pertain to floods that result from precipitation/runoff related events. Other flooding due to dam failures is addressed separately. The three seasonal atmospheric events that tend to trigger floods in Mohave County are:

- *Tropical Storm Remnants*: Some of the worst flooding tends to occur when the remnants of a hurricane that has been downgraded to a tropical storm or tropical depression enter the State. These events occur infrequently and mostly in early autumn, and usually bring heavy and intense precipitation over large regions causing severe flooding.
- *Winter Rains*: Winter brings the threat of low intensity; but long duration rains covering large areas that cause extensive flooding and erosion, particularly when combined with snowmelt.
- *Summer Monsoons*: A third atmospheric condition that brings flooding to Arizona is the annual summer monsoon. In mid to late summer the monsoon winds bring humid subtropical air into the State. Solar heating triggers afternoon and evening thunderstorms that can produce extremely intense, short duration bursts of rainfall. The thunderstorm rains are mostly translated into runoff and in some instances, the accumulation of runoff occurs very quickly resulting in a rapidly moving flood wave referred to as a flash flood. Flash floods tend to be localized and cause significant flooding of local watercourses.

Damaging floods in the County can be categorized as either riverine or local area flows. Riverine flooding occurs along established watercourses when the bankfull capacity of a watercourse is exceeded by storm runoff or snowmelt and the overbank areas become inundated. Local area flooding is often the result of poorly designed or planned development wherein natural flowpaths are altered, blocked, or obliterated, and localized ponding and conveyance problems result. Erosion is also associated with damages due to flooding.

History

Flooding is clearly a major hazard in Mohave County. Mohave County has been part of over 19 presidential disaster declarations for flooding related events. The following incidents represent examples of major flooding that has impacted the County:

- October 2019, an intense thunderstorm over the Holy Moses Wash watershed south of Kingman generated large flows in the wash that exceeded the capacity of the existing culverts under Shinarump Road. Storm runoff in the wash spilled over the road washing a vehicle downstream, drowning one person.
- September 2015, a severe afternoon thunderstorm on the Arizona/Utah state line generated heavy flooding in washes crossing roadways that resulted in 13 fatalities in Utah and 1 in Mohave County. Over $500,000 in infrastructure damage was incurred in Colorado City.
- September 2014, severe thunderstorms generated heavy flooding in washes crossing roadways that required swift water rescue teams to extricate 13 individuals from the vehicles trapped in the floodwaters.
- December 2010, a long winter storm brought moisture to the Beaver Dam Wash watershed from tropical areas of the Pacific. More than 10 inches of rain fell in a week, generating flows in the Beaver Dam Wash near 15,000 cubic feet per second. Eight homes were destroyed by lateral erosion with the worst damage occurring in the Beaver Dam Resort community.
- January 2010, a series of four Pacific storms pounded the Mojave Desert and southern Great Basin between January 18th and 21st with heavy rain and snow, locally high winds, and isolated severe thunderstorms. A spotter in Kingman reported that a driveway was washed out and four to six inches of water flowed down some streets, with several road closures. The Big Sandy River near Wikieup

crested at 17.9 feet, which was the record crest. Rocks were washed onto Bullhead Parkway south of Adobe Road in Bullhead City and contributed to a vehicle rollover. Several roads were washed away throughout the county. Mohave County damages were estimated at $1.2 million and resulted in a federal disaster declaration (FEMA-1888-DR) (NCDC, 2010 and ADEM, 2010).

- September 2009, runoff and mud-covered Primavera Loop and Primavera Road near Mohave Valley. Two homes were destroyed, nine had moderate damage, and 16 had minor damage. Damages were estimated at $600,000 (NCDC, 2010).
- August 2007, several roads were closed and/or damaged by flooding, including U.S. Highway 93 20 miles north of Wikieup, Stockton Hills Rd. in the Kingman area, and Antares Rd. and Diamond Bar Rd. north of Kingman. Damages were estimated at $2 million (NCDC, 2010).
- July 2007, flood waters were up to the door of a home in Golden Valley, and many cars were stuck in washes. Two men died when their truck was swept down a wash after they attempted to drive across it. Damages were estimated at $20,000.
- July 2003, flash flooding in Peach Springs from a stationary thunderstorm. Mud and debris were deposited across Route 66. Trailers were moved off foundations and cars were floated in flood waters. All washes reported flooded with Santa Fe railroad tracks under water. SR 18 was also under water and closed. Damages were estimated at $500,000 (NCDC, 2010).
- September 1983, tropical storm remains, including those from Hurricane Octave, caused heavy rain over Arizona during a 10-hour period resulting in a federal disaster declaration (FEMA-691-DR). Southeast Arizona, Yavapai and Mohave Counties were particularly hard hit. Fourteen fatalities and 975 injuries were attributed to the flooding and at least 1,000 Arizonans were left temporarily homeless. Damages were estimated at $370 million in 2001 dollars (ADEM, 2010).
- June 1983, releases from federal reservoirs caused flooding along the entire Colorado River below Hoover Dam resulting in a federal disaster declaration (FEMA 686-DR) for La Paz, Mohave, and Yuma Counties.
- July 1981, massive flash flooding resulting from very heavy rains caused $250,000 in damage in Colorado City. Roads, streets, water, and sewer lines were destroyed, and basements filled with water and mud. Ravines three to six feet deep were cut into the streets. The large hail that preceded the heavy rain accumulated to a depth of one inch and severely damaged crops.
- September 1976, two storms hit the Bullhead City within weeks of each other. The first storm on the 11th dropped 2 to 5 inches of rain causing severe flash flooding. Eight washes carried walls of water from the hills east of the city causing severe damage to streets, highways, residences, businesses, water and gas mains, and culverts. Many cars were swamped in tons of debris. Silver Creek Wash crossing Highway 95 was cut into a 20-40-foot-deep canyon. The city was severed from all outside assistance. Estimates of damage to roads and streets were put more than $500,000 and damage to private property at $2,500,000. The second storm on the 24th dropped another 2-5 inches of rain producing walls of water that inundated the city, which was still trying to dig out from the millions of tons of silt, rocks, and debris from tropical storm Kathleen. Highway 95, the only access to the outside, was again quickly inundated in several places. Several cars, some with occupants, were swept down the washes. Eight persons were rescued, some by a private helicopter. Additional damage from this second wave was estimated at $2-3 million. (AFMA, 2003 and ADEM, 2010).
- July 1974, a severe thunderstorm with winds up to 80 mph and heavy rain caused extensive flooding in Lake Havasu City and completely washed out 4- and 5-feet deep sections in some streets. Many cars were abandoned during the storm and a number washed away. Three members of one family were carried to their deaths and one was injured when their station wagon was carried 3,000 feet down a wash by a wall of water 10 feet high. Damage to public and private property amounted to

$1.7million. At Bullhead City, over 2.0 inches of rain caused extensive flooding on the morning of the 20th. The event ultimately received a state disaster declaration (AFMA, 2003 and ADEM, 2010).

Changes in Development in the Hazard Area

There have been no major development changes in structures or population numbers in the areas of the County that are most susceptible to flash flooding.

Probability and Magnitude

For the purposes of this Plan, the probability and magnitude of flood hazards in Mohave County jurisdictions are based on the 1% probability floodplains delineated on FEMA Flood Insurance Rate Maps (FIRMs) or the 1% probability high and medium flood intensity hazard areas from the non-regulatory work products produced by Mohave County Flood Control District's (MCFCD) as a part of the watershed strategic plans as well as multiple projects funded through the FEMA Cooperating Technical Partners Program. FEMA digital FIRM (DFIRM) data for both the effective February 2015 and DFIRM data which was released by FEMA in early 2016 were used. DFIRM floodplain GIS based files were obtained from Mohave County and are the basis for the flood hazard depictions in this Plan. Areas mapped as HIGH hazard include all FEMA delineated Special Flood Hazard Area (SFHA)"A" zones (e.g. – A, A1-99, AE, AH, AO, etc.), which represent areas with a one percent (1%) probability of being flooded at a depth of one-foot or greater in any given year. The high and medium flood intensity hazard areas mapped by the MCFCD watershed strategic planning studies represent inundation areas where the product of the one percent (1%) probability flood depth and velocity is greater than 5.4 square feet per second and/or flood depths are greater than 1.6 feet. Most of the populated County areas have flood depth and velocity data available through the MCFCD website for the public and staff to assist with development.

Vulnerability

Table 4-14: CPRI Results for Flooding

Participating Jurisdiction	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI Score
Bullhead City	Highly Likely	Critical	< 6 hours	< 6 hours	3.40
Colorado City	Highly Likely	Critical	< 6 hours	< 6 hours	3.40
Kingman	Highly Likely	Negligible	< 6 hours	< 6 hours	2.80
Lake Havasu City	Highly Likely	Critical	< 6 hours	< 6 hours	3.40
Unincorporated Mohave County	Highly Likely	Critical	< 6 hours	< one week	3.60
Ft Mojave Indian Tribe	Highly Likely	Critical	< 6 hours	< 6 hours	3.40
Hualapai Tribe	Highly Likely	Catastrophic	< 6 hours	> 1 week	4.00
				County-wide average CPRI	**3.43**

Flooding typically occurs within the town of Peach Springs and within the open canyons that drain to the Colorado River. Flooding of Peach Springs usually occurs during the summer monsoon thunderstorm season when large volumes of water are deposited over a short period of time. Flood waters travel through Peach Springs in the Truxton Wash canal that runs along the railroad tracks. Large volumes of water have overrun the banks of the canal several times. In 2003, two large floods impacted the Hualapai Lodge and numerous residences in town. Floods also occur in Peach Springs Canyon and wash out Diamond Creek Road in several places.

There is also potential for flooding of the Colorado River in Grand Canyon on the northern border of the reservation. In 1983, there was an extended flood of 100,000 cubic feet per second that damaged Glen Canyon Dam and two ramadas along the river at Diamond Creek. Fortunately, there are few assets located along the river beyond the natural resources of the canyon. In addition, the Glen Canyon Dam Adaptive Management Program has the ability to direct controlled floods along the river as a resource management tool for improving camping beaches and habitats for native fish in Grand Canyon.

Based on previous occurrences and the location of the Reservation, it is reasonable to expect these events to continue.

Vulnerability – Loss Estimations

Loss estimates to all facilities located within the high flood hazard areas were made based on the loss estimation tables published by FEMA (FEMA, 2001). Most of the assets located within high hazard flood areas will be subject to three feet or less of flooding. Using the FEMA tables, it is assumed that all structural assets located within the high hazard areas will have a loss-to-exposure ratio of 0.20 (or 20%). Based on the historic record, multiple deaths and injuries are plausible and a substantial portion of the exposed population is subject to displacement depending on the event magnitude.

Table 4-15: Estimated Exposure and Potential Losses Due to Flooding

	Bullhead City	Colorado City	Kingman	Lake Havasu City	Fort Mojave Indian Tribe	Hualapai Tribe	Kaibab Paiute Indian Tribe	Unincorporated Mohave County	Total
Total Critical Facilities	**59**	**18**	**97**	**71**	**0**	**0**	**0**	**86**	**331**
Facilities Exposed to High Hazard	3	0	4	0	0	0	0	7	14
Percentage of Total Facilities	5.08%	0.00%	4.12%	0.00%	0.00%	0.00%	0.00%	8.14%	2.17%
Estimated Replacement Cost (x $1,000)	$24,250	$0	$3,088	$0	$0	$0	$0	$3,930	$31,268
Estimated Structure Loss (x $1,000)	$4,850	$0	$618	$0	$0	$0	$0	$786	$6,254
Total Population	**40,884**	**4,836**	**31,013**	**57,464**	**1,117**	**1,433**	**130**	**77,984**	**214,861**
Population Exposed to High Hazard	3,099	248	915	785	61	0	0	5,841	10,949
Percent Exposed	7.58%	5.12%	2.95%	1.37%	5.50%	0.03%	0.00%	7.49%	3.76%
Total Residential Building Count	**21,156**	**449**	**12,411**	**30,000**	**431**	**393**	**91**	**40,827**	**105,758**
Estimated Replacement Cost (x $1,000)	**$2,604,199**	**$76,438**	**$1,780,842**	**$9,000,000**	**$102,113**	**$99,934**	**$22,892**	**$4,166,383**	**$17,852,801**
Structures Exposed to High Hazard	1,603	23	367	466	23	1	0	3,058	5,541
Percentage of Total Facilities	7.58%	5.12%	2.95%	1.55%	5.26%	0.15%	0.00%	7.49%	3.76%
Estimated Replacement Cost (x $1,000)	$398,858	$4,702	$52,535	$139,800	$4,732	$120	$0	$307,568	$908,315
Estimated Structure Loss (x $1,000)	$79,772	$940	$10,507	$27,960	$946	$24	$0	$61,514	$181,663

It is duly noted that the loss and exposure numbers presented above represent a comprehensive evaluation of the County as a whole. It is unlikely that a storm event would occur that would flood all the delineated high and medium flood hazard areas at the same time. Accordingly, actual event-based losses and exposure are likely to be only a fraction of those summarized above. Furthermore, it should be noted that the 100-year floodplain would be entirely inundated during a 500-year flood.

Vulnerability – Repetitive Loss Properties

Repetitive Loss (RL) properties are those NFIP-insured properties that since 1978, have experience multiple flood losses. FEMA tracks RL properties and to identify Severe RL (SRL) properties. RL properties are important to the NFIP since structures that flood frequently put a strain on the National Flood Insurance Fund. Current records indicate there is only one unmitigated RL property in Mohave County, with a total of over $62,000 in associated building and contents value payments. The Flood Control District has extensively evaluated this property, and there is no viable cost-effective mitigation action that can be undertaken.

Table 4-16: RL Property Statistics for Mohave County

Jurisdiction	No. of Properties	Total Payments
Kingman	1	$62,414

National Flood Insurance Program Participation

Participation in the NFIP is a key element of any community's local floodplain management and flood mitigation strategy. Joining the NFIP requires the adoption of a floodplain management ordinance that requires jurisdictions to follow established minimum standards set forth by FEMA and the State of Arizona, when developing in the floodplain. As a participant in the NFIP, communities also benefit from having Flood Insurance Rate Maps (FIRM) that map identified flood hazard areas and can be used to assess flood hazard risk, regulate construction practices, and set flood insurance rates. FIRMs are also an important source of information to educate residents, government officials and the private sector about the likelihood of flooding in their community. Each of the participating jurisdictions provides in-house floodplain management and is a participant of the Mohave County Flood Control District. The jurisdictions strive to remain an active participant in the NFIP by continued compliance with the program's requirements. For community access, the Flood Control District has established a FEMA Data Viewer where all the Flood Insurance Rate Map (FIRM) data is located for all of Mohave County and has worked with the cities to publish some of their data on the viewer as well as the study data produced by the District over the years. The table below summarizes the NFIP status and statistics for each of the jurisdictions participating in this Plan.

Table 4-17: NFIP Status and Statistics for Mohave County

Jurisdiction	Community ID	NFIP Entry Date	Current Effective Index Date	Number of Policies	Premium Paid for Total Policies
Mohave County	040058	3/15/1982	12/30/2020	479	$255,107
Bullhead City	040125	3/15/1982	12/02/2015	385	$223,218
Colorado City	040059	8/4/1988	11/18/2009	1	$3,249
Kingman	040060	8/15/1977	12/30/2020	81	$53,513
Lake Havasu City	040116	9/1/1981	12/02/2015	21	$15,138
Ft Mojave Indian Tribe	40133	11/18/2009	12/02/2015	13	$13,324

Table 4-17: NFIP Status and Statistics for Mohave County					
Jurisdiction	**Community ID**	**NFIP Entry Date**	**Current Effective Index Date**	**Number of Policies**	**Premium Paid for Total Policies**
Hualapai Tribe	N/A	N/A	N/A	N/A	N/A
Source: Participation data: FEMA Community Status Book Report, 12/11/2020. Policy data: FEMA NFIP Policy Statistics, as of 12/11/2020.					

The following officials are responsible for continuing compliance and enforcement of floodplain ordinances.

Mohave County and City of Kingman	Mohave County Development Services Director
Bullhead City	Bullhead City Engineer
Lake Havasu City	Lake Havasu City Public Works Director
Colorado City	Colorado City Public Works Director
Fort Mojave Indian Tribe	Public Works Director
Hualapai Tribe	Public Works Director

Vulnerability – Development Trends

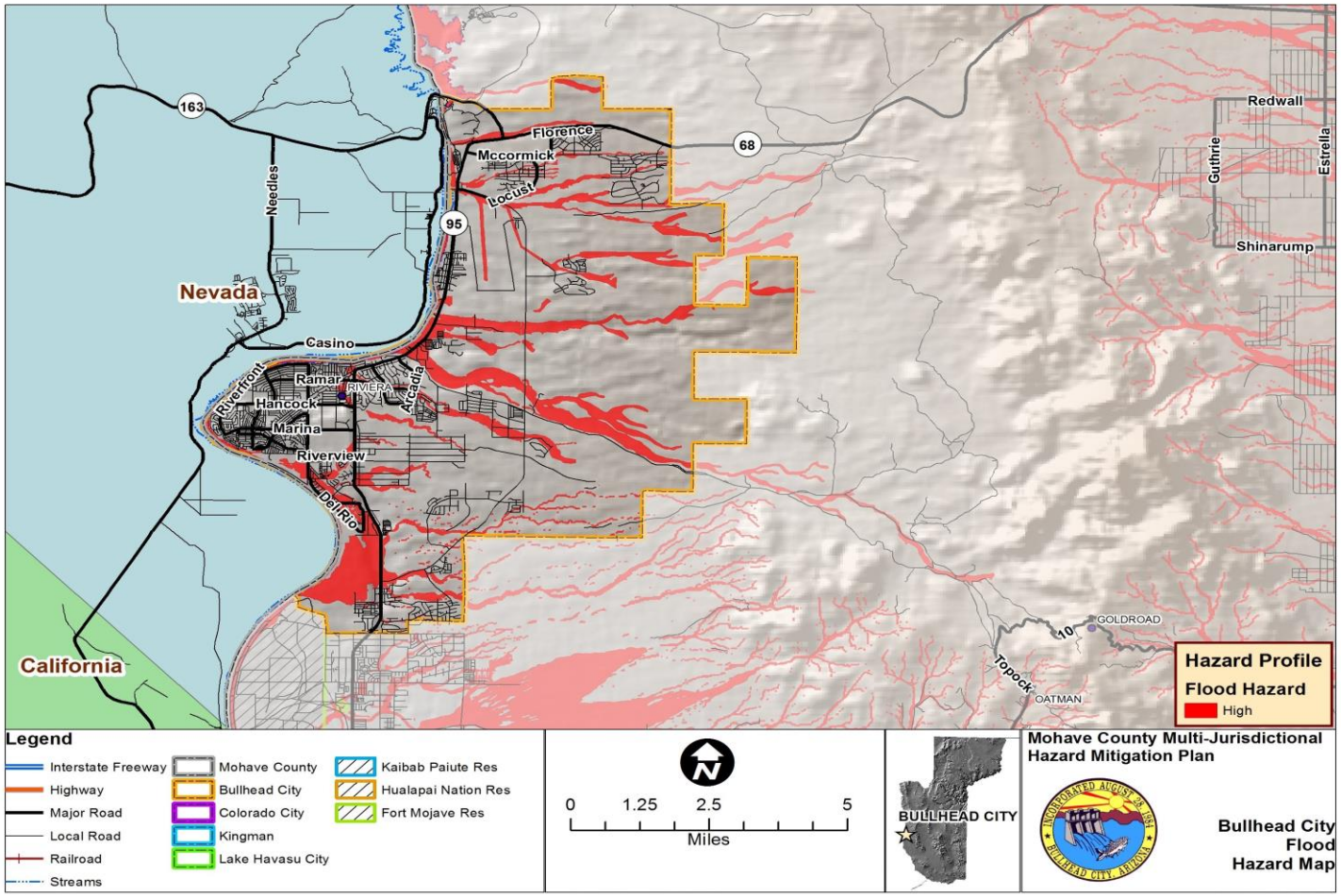
For most Mohave County jurisdictions, adequate planning and regulatory tools are in place to regulate future development. Challenges with new growth will include the need for master drainage planning and additional floodplain delineations to identify and map the flood hazards within the growth areas where no or outdated mapping currently exists.

Sources

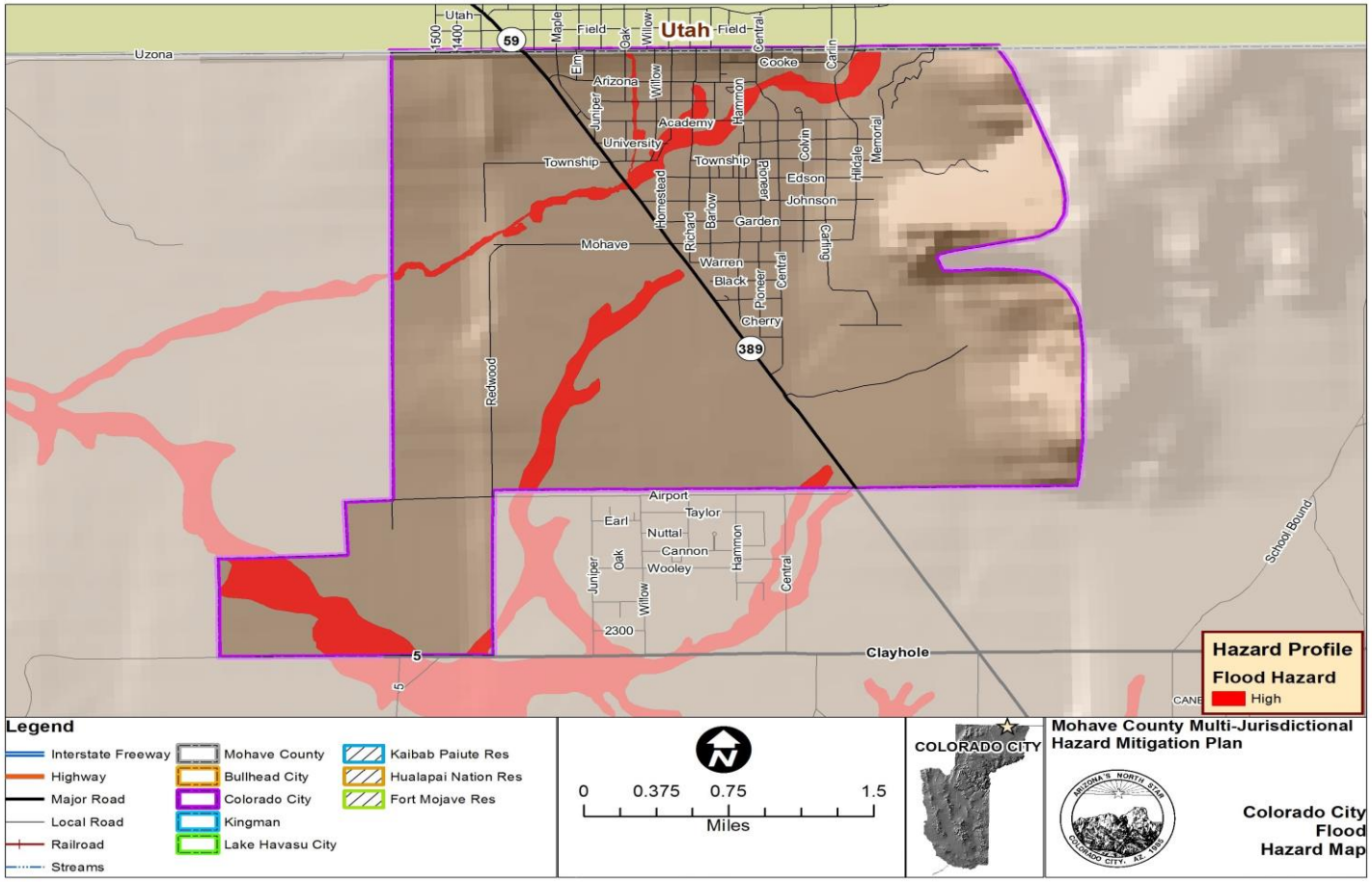
FEMA, 2001, Understanding Your Risks; Identifying Hazards and Estimating Losses, FEMA Document No. 386-2.

U.S. Dept of Commerce, National Climatic Data Center, Storm Events Database at: http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms

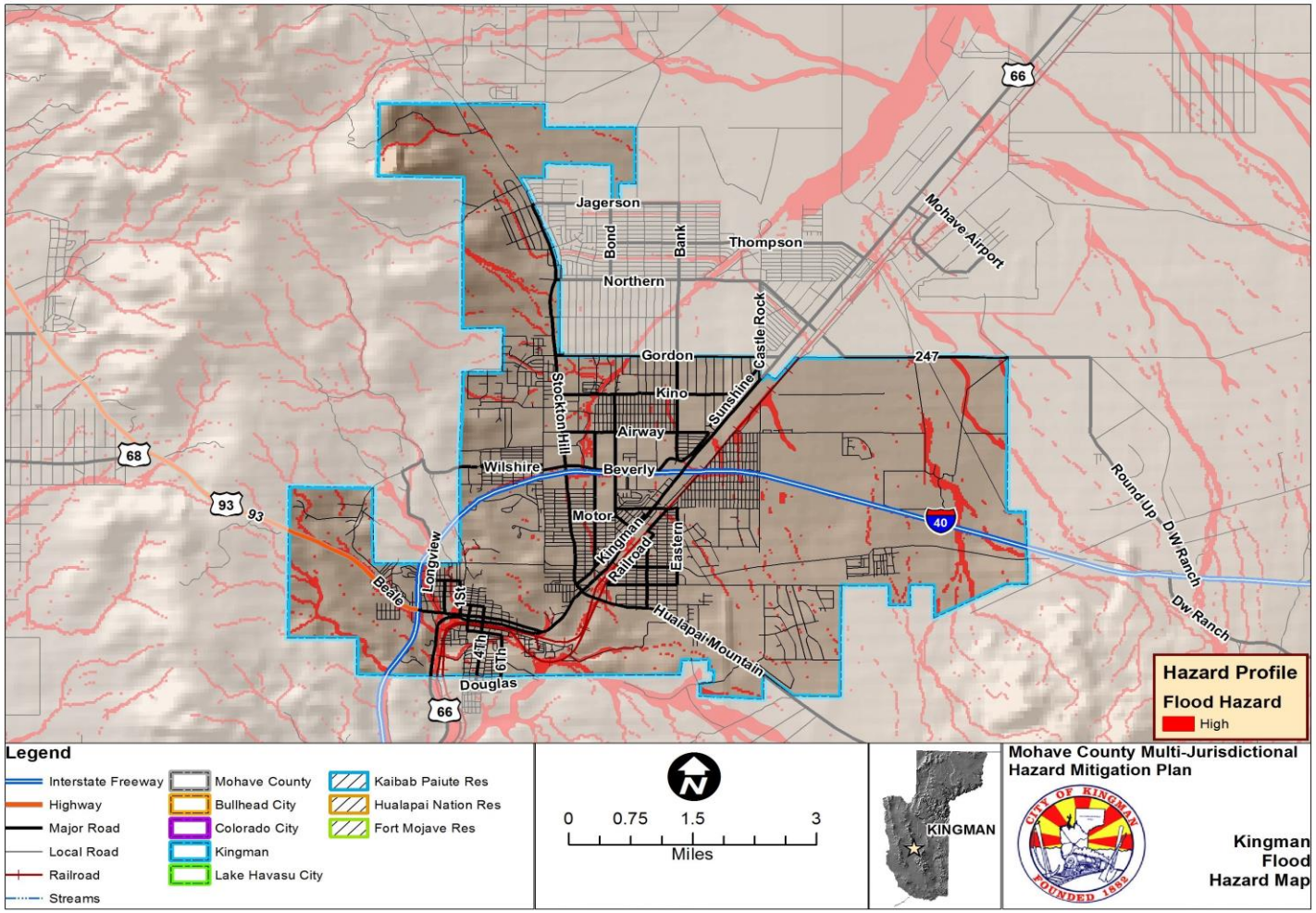
U.S. Army Corps of Engineers, Los Angeles District, 1994, Flood Damage Report, State of AZ, Floods of 1993.



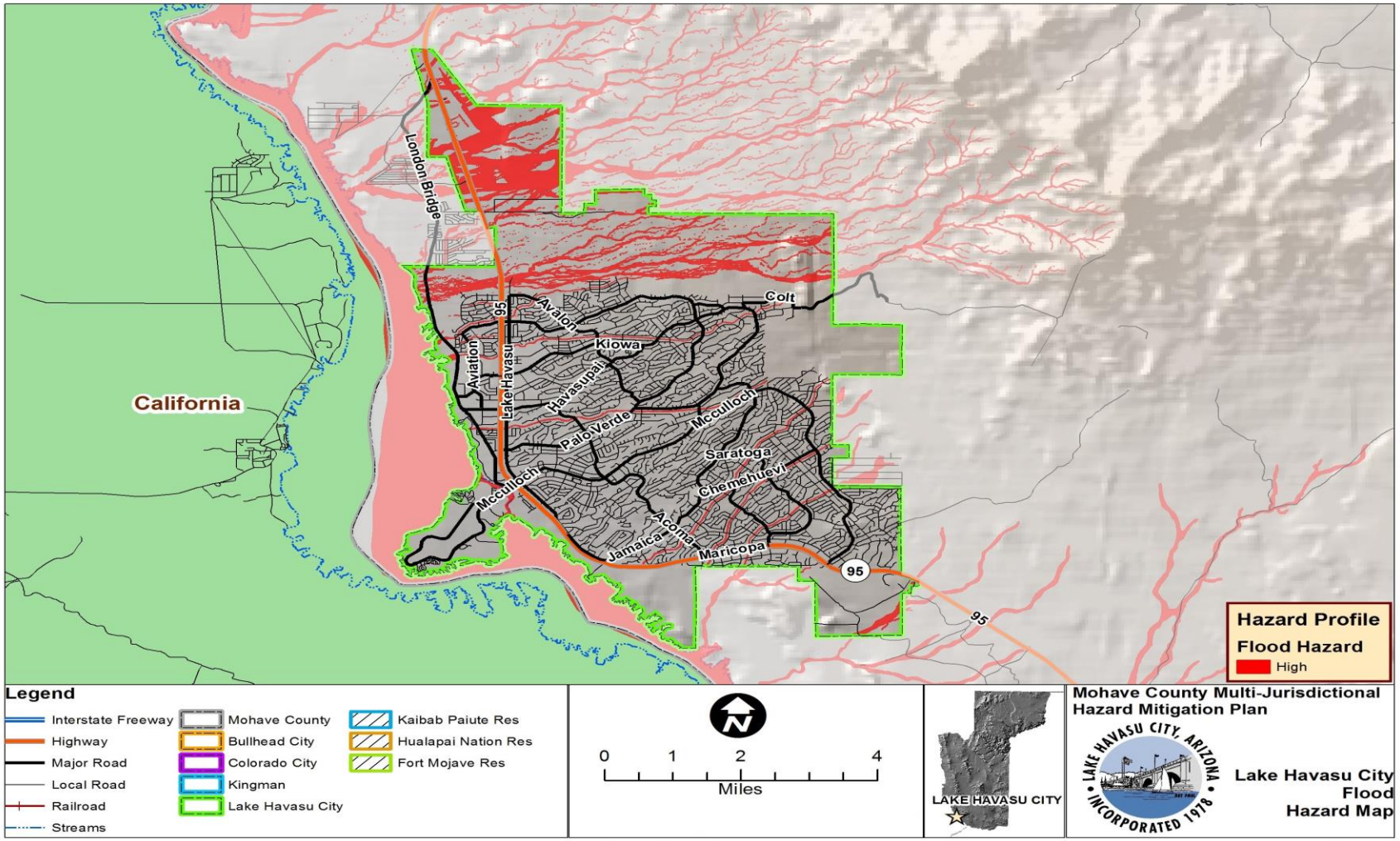
Map 4-8: Flood Hazard, Bullhead City



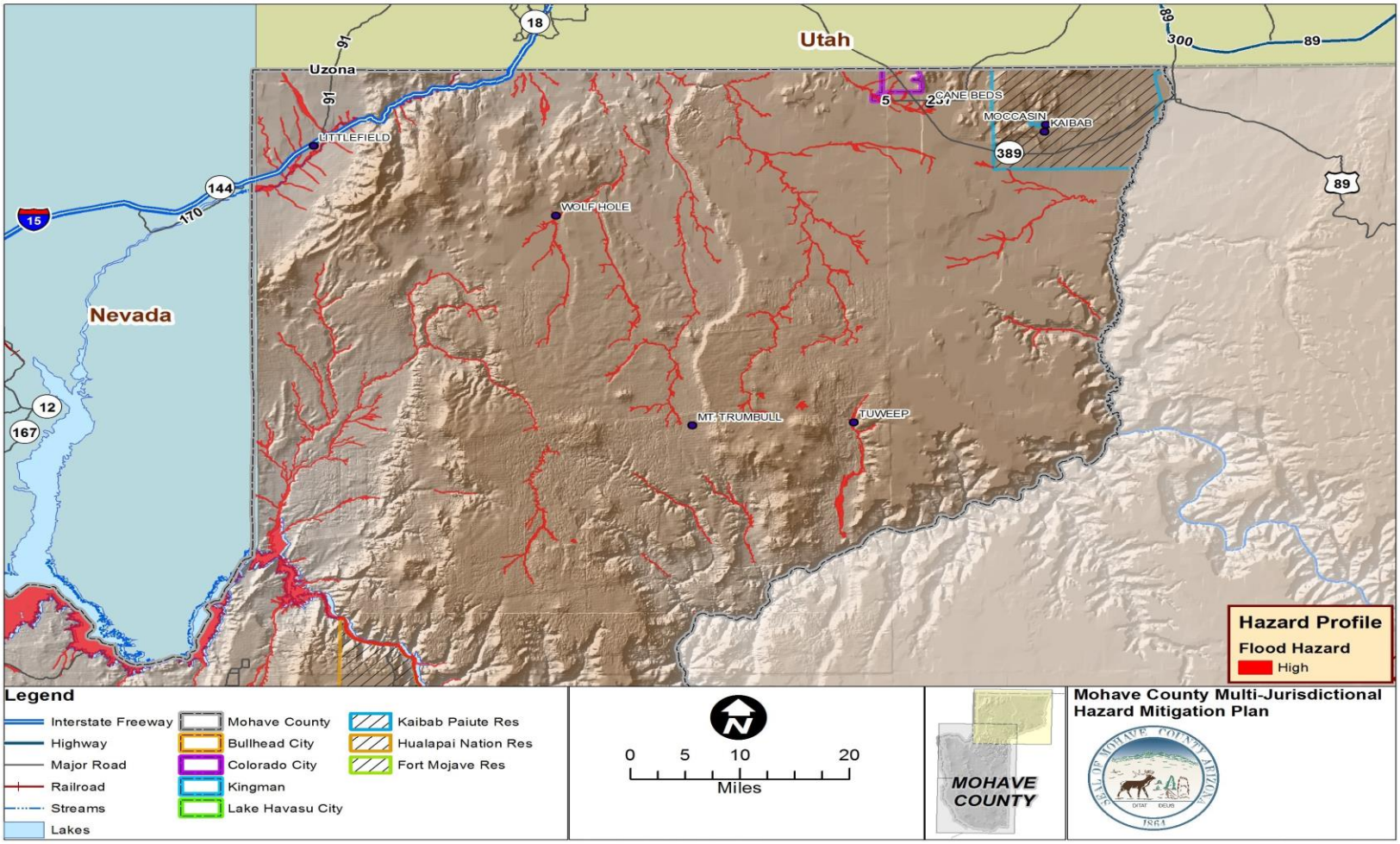
Map 4-9: Flood Hazard, Colorado City



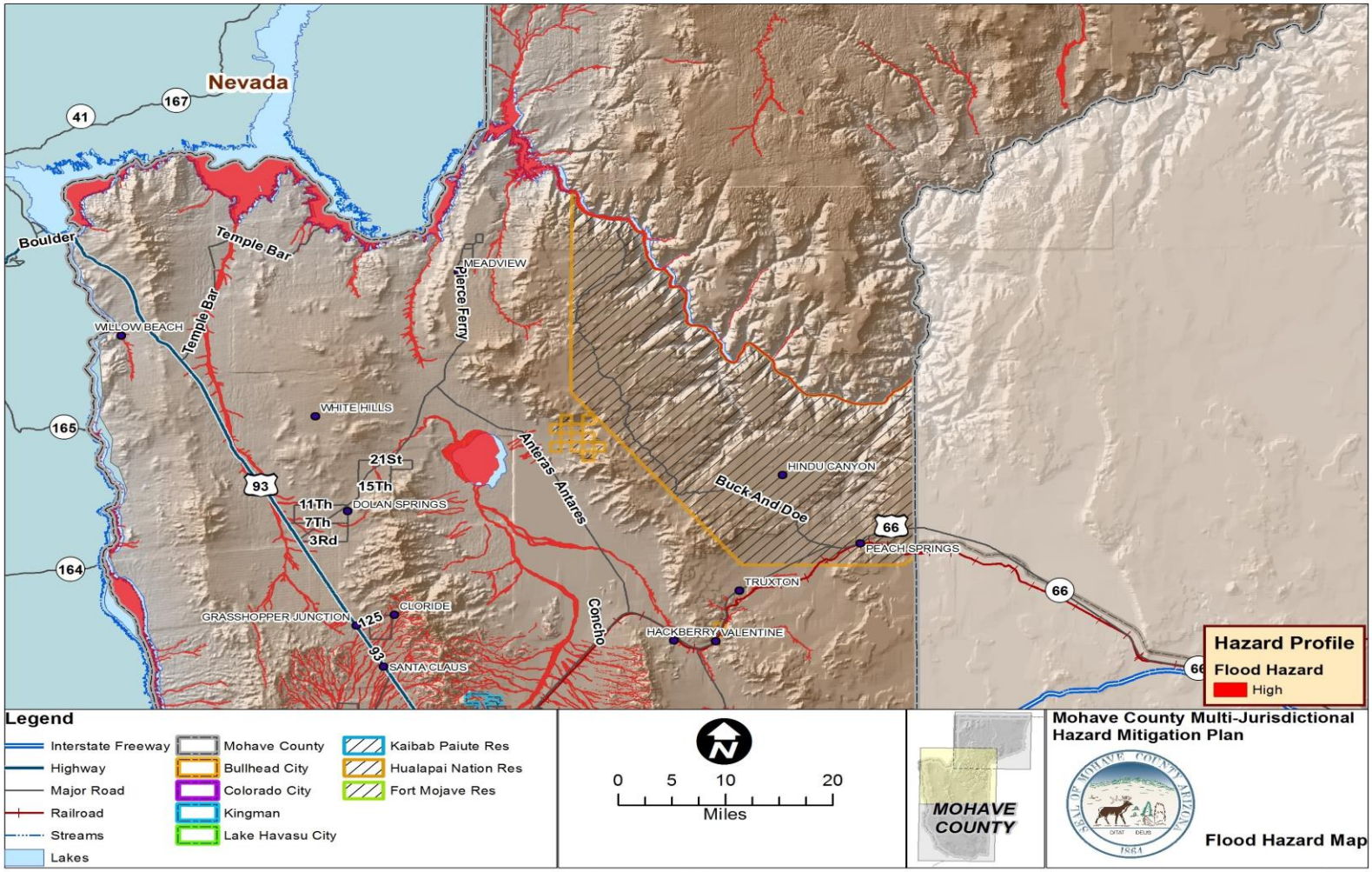
Map 4-10: Flood Hazard, Kingman



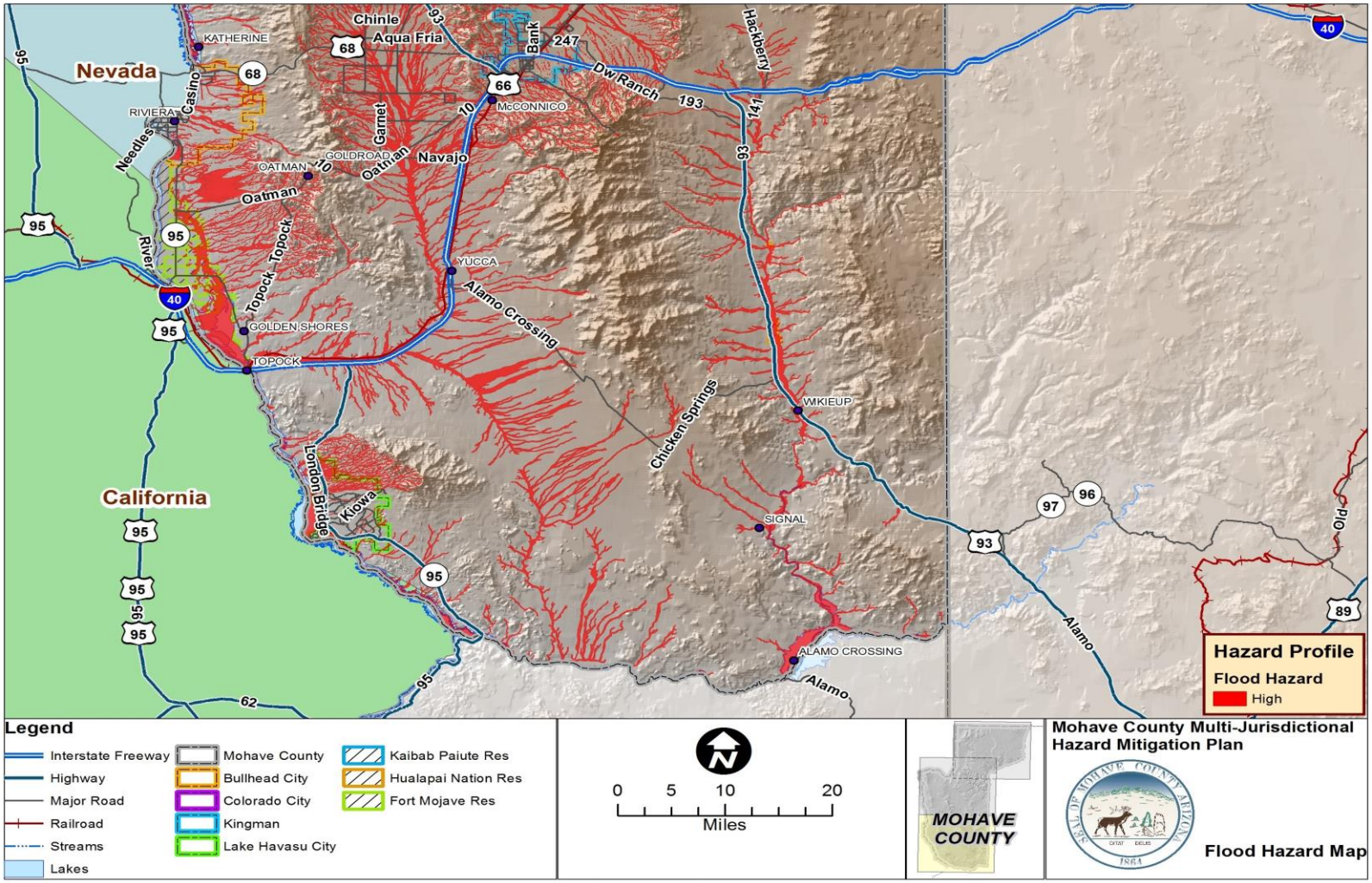
Map 4-11: Flood Hazard, Lake Havasu City



Map 4-12: Flood Hazard, Mohave County



Map 4-13: Flood Hazard, Mohave County



Map 4-14: Flood Hazard, Mohave County

4.4.6 Hazardous Materials Incidents

Introduction

As in most communities across the United States, hazardous materials incidents are relatively common occurrences in Mohave County. There are several fixed sites that routinely store and use hazardous materials, including Extremely Hazardous Substances (EHS) as defined by the U.S. Environmental Protection Agency. Mohave County is also at risk to mobile hazardous materials incidents due to the trucks and trains transporting hazardous materials along the many roadways and rail lines that traverse the county.

The main chemicals used by industries that pose a risk and are transported through the area by either truck or rail include chlorine, anhydrous ammonia, sulfuric acid, ethylene oxide, and petroleum products such as gasoline or diesel fuel. To date there has not been a significant number of deaths or injuries as a result of hazardous material incidents in Mohave County (with the exception of the 1973 BLEVE incident, described below), but it does remain a significant hazard of concern due to the volume and frequency of material transport via road and rail and the potential threat to human lives.

Large volumes of hazardous material are transported daily on I-40, US 93, I-15, and the BNSF railroad. The I-40 Corridor Commodity Flow Study of September 2004 identified 20 high risk areas (schools, hospitals, nursing homes) for Hazmat Incidents in Kingman and one each in Yucca, Hackberry, and Valentine. In addition, Lake Havasu City, Bullhead City, Mohave Valley, and Fort Mohave are at potential risk from hazardous materials transported on US 95; Golden Valley from materials moving on State Route 68 and US 93; the Beaver Dam/Littlefield community from materials moving on I-15; Colorado City from materials moving along State Route 389; and the Wikieup, Dolan Springs, and White Hills areas from materials moving along US 93. The overwhelming majority of the county population is in the above communities, with an estimated 25-30% of the population within high risk areas along corridors. In addition, numerous fixed facilities containing quantities of stored hazardous materials, including most of those in the county with Extremely Hazardous Substances, are located within or immediately adjacent to these corridors.

History

Most historical hazmat incidents have been caused by transportation accidents along Mohave Co roadways. Prior to the restrictions on transporting hazardous materials across Hoover Dam, fuel haulers on US 93 would reportedly experience up to 2-3 rollovers per year. However, in most cases the container trailers would remain intact and the tank would be offloaded onto another vehicle for continued transport. Although not nearly as frequent, some hazardous materials incidents have been caused by train accidents and derailments. Railroad events, when they occur, are usually classified as major and have in the past been the deadliest.

One of Mohave County's most devastating disasters resulted from a railroad hazardous material incident. In 1973, a propane railroad tanker was being offloaded in Kingman when a connection leak was ignited by spark, causing a boiling liquid expanding vapor explosion (BLEVE) that was 200 feet high and 1,000 feet in diameter. The explosion resulted in 12 fatalities and over 100 injuries. In 1980, the U.S. railroad industry retrofitted all tank cars with thermal protection and has since experienced no BLEVE incidents, although some can and do still happen with stationery propane tanks, tank trucks and pipelines.

According to the City of Kingman Fire Department, its Hazardous Materials Team responds to an annual average of 8 major hazardous materials spills per year (major spills are of 100 gallons or more of a liquid fuel or any amount of EHSs). In addition, there have been 50 to 60 minor spills per year which do not require activation of the Hazardous Materials Team (most of these incidents include gasoline and diesel fuel spills). The Lake Havasu City Fire Department responds to about several dozen liquid or chemical hazardous materials events and gas leaks per year most of which are minor and include some non¬hazardous false alarms. Fire Districts outside the cities respond to a few Hazmat calls annually, primarily involving traffic accidents and fuel spills. No major incidents requiring evacuations or causing injuries have occurred in the last 5 years.

Changes in Development in the Hazard Area

There has been no change in transportation corridors resulting in increased Hazmat transports despite the recent designation of the Highway 93 corridor as the I-11 corridor pending construction in the next few years. Also, no significant new housing developments or commercial facilities have been constructed along the main corridors except for several new truck stops or convenience stores along Highway 93.

Probability and Magnitude

The estimate of over 100,000 residents being potentially exposed to Hazmat incidents is a cumulative number for population numbers along all major highways and the BNSF railroad. Numbers exposed in any one incident would be much lower. Facilities with large inventories of Hazmat, such as one chemical plant and two power plants, are largely located outside of highly populated areas. A rail or I-40 accident involving a Hazmat spill within the Kingman city limits would pose the greatest risk and could result in shelter in place or evacuation orders for up to 40,000 persons, although it is likely that the numbers affected would be much lower than that. Depending on the type and volumes of the involved materials, casualties could potentially number in the hundreds, including scores of deaths. The probability of such an event is relatively low but nonetheless significant and particularly likely in the Kingman area.

Vulnerability

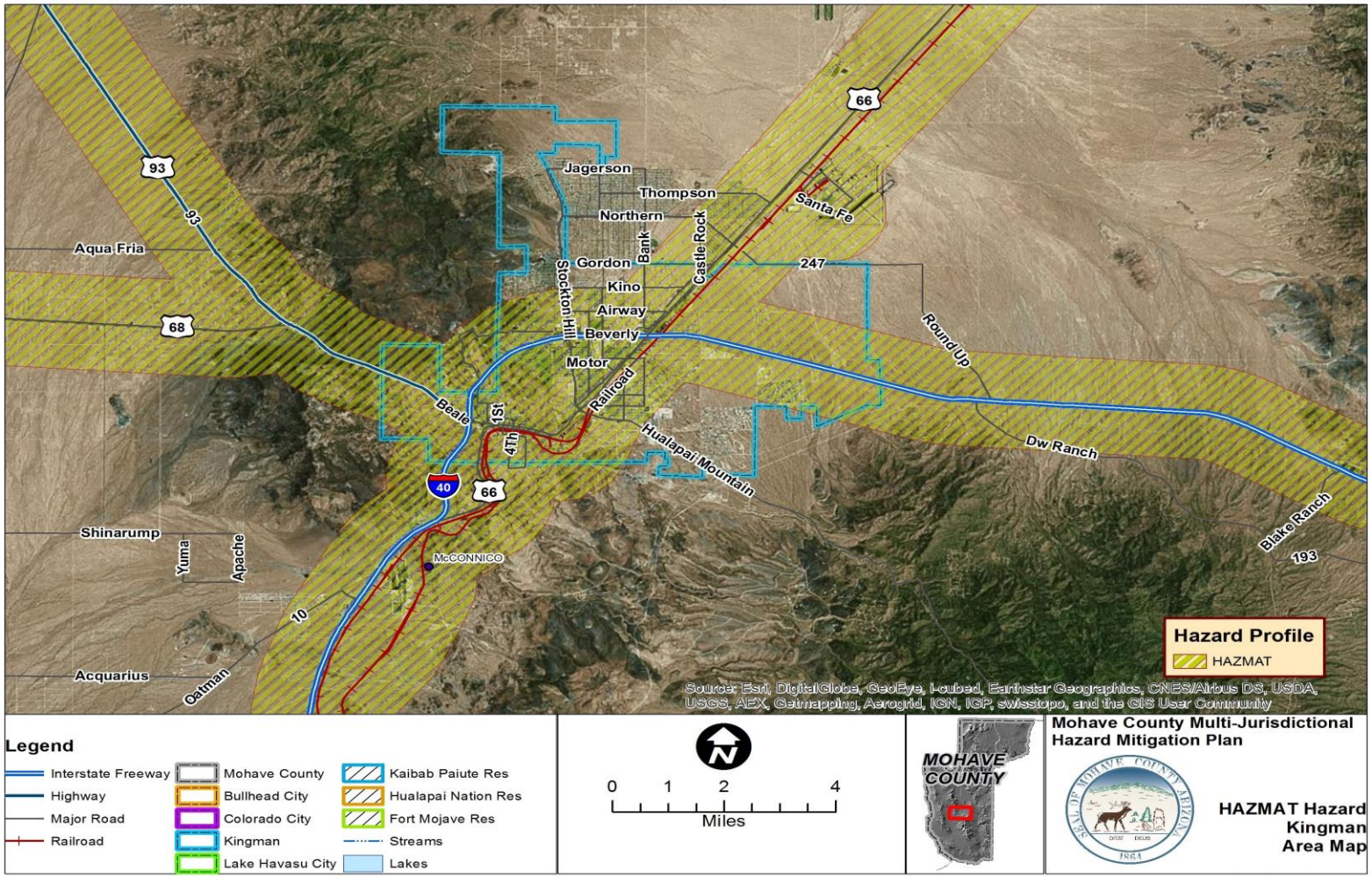
Table 4-18: CPRI Results for Hazardous Materials Incidents

Participating Jurisdiction	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI Score
Bullhead City	Possibly	Limited	< 6 hours	< 24 hours	2.30
Colorado City	Likely	Critical	< 6 hours	< 24 hours	3.05
Kingman	Highly Likely	Critical	< 6 hours	< 1 week	3.60
Lake Havasu City	Likely	Critical	< 6 hours	< 24 hours	3.05
Unincorp Mohave County	Possibly	Critical	< 6 hours	< 24 hours	2.60
Ft Mojave Indian Tribe	Likely	Limited	< 6 hours	< 1 week	2.85
Hualapai Tribe	Possibly	Critical	< 6 hours	< 1 week	2.70
				County-wide average CPRI	**2.89**

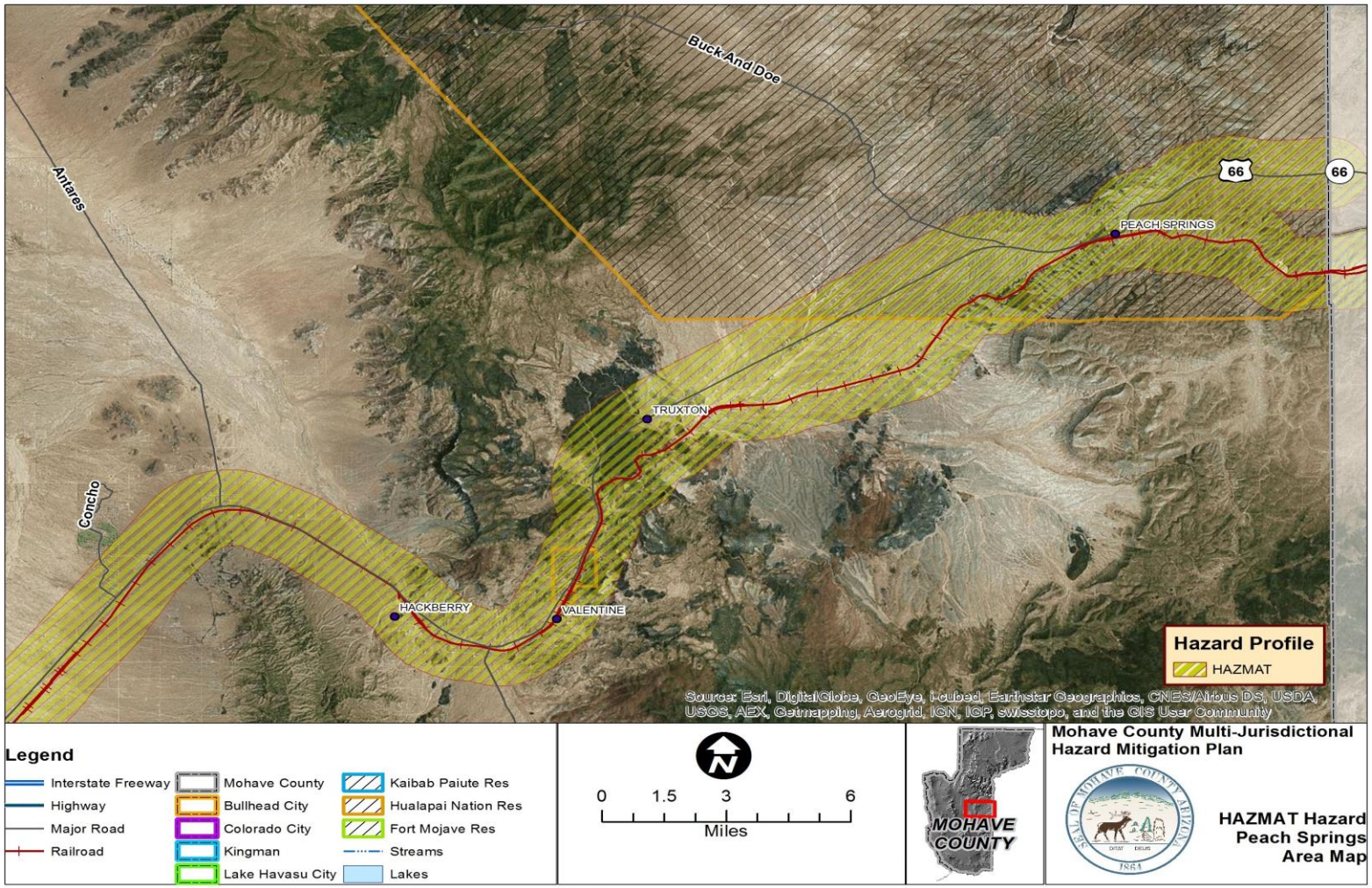
HAZMAT hazard areas for Mohave County were mapped by first identifying the major road and rail transportation routes through the county. The planning team chose to use I-15, I-40, US Highways 66, 68, and 93, and State Routes 66, 68, 95, and 389, and the Burlington Northern Santa Fe (BNSF) railway. A one mile buffer was established on either side of these corridors to approximate a realistic plume dispersion distance and the resultant area was designated as a HIGH hazard area.

Table 4-19: Estimated Exposure and Potential Losses Due to HazMat Incidents

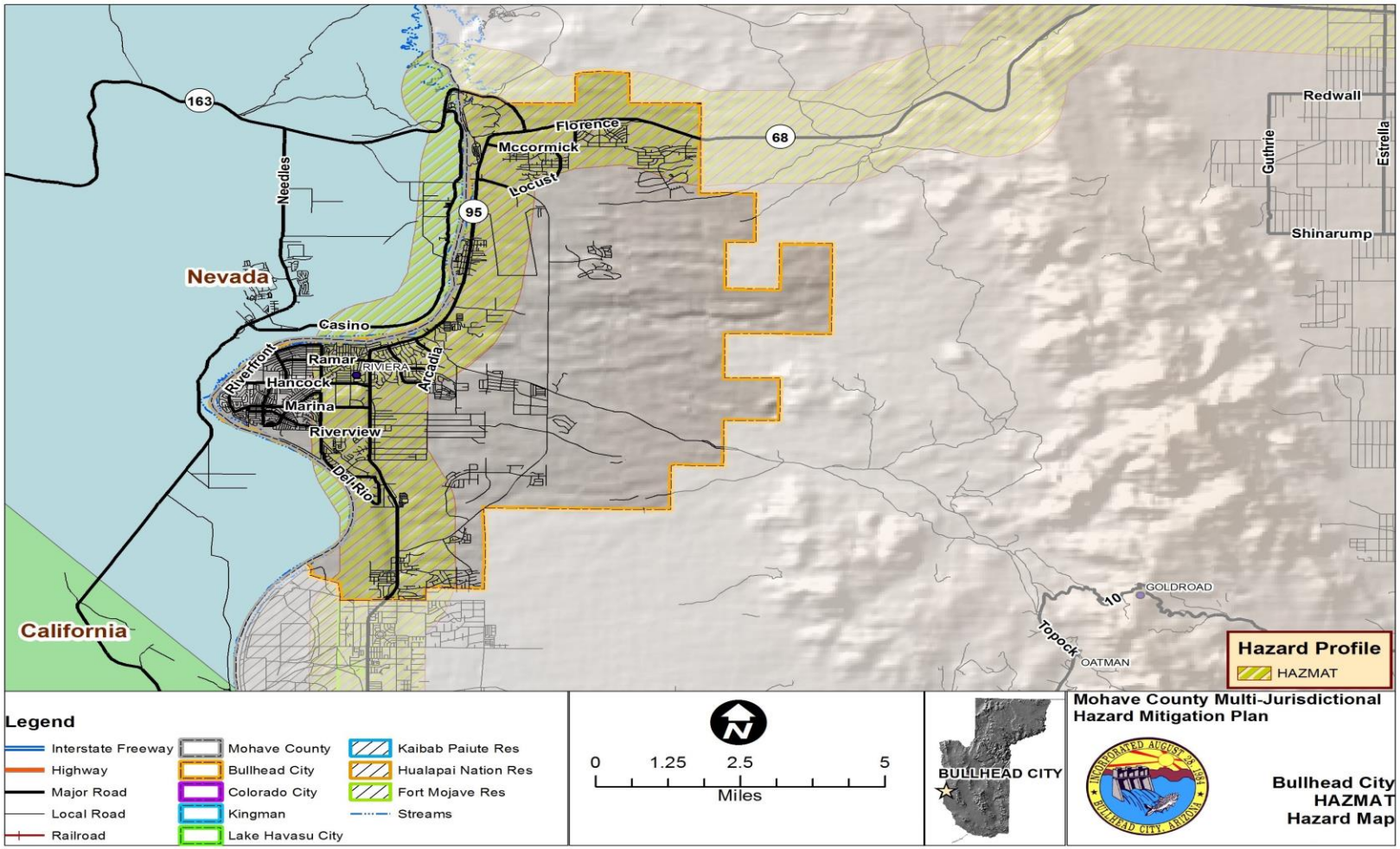
	Bullhead City	Colorado City	Kingman	Lake Havasu City	Fort Mojave Indian Tribe	Hualapai Tribe	Kaibab Paiute Indian Tribe	Unincorporated Mohave Co	Total
Total Critical Facilities	**59**	**18**	**97**	**71**	**0**	**0**	**0**	**86**	**331**
Facilities Exposed to High Hazard	42	13	86	29	0	0	0	48	218
Percentage of Total Facilities	71.19%	72.22%	88.66%	69.05%	0.00%	0.00%	0.00%	55.81%	44.62%
Estimated Exposure Value (x $1,000)	$183,437	$18,008	$204,716	$414,621	$0	$0	$0	$139,482	$960,264
Total Population	**40,884**	**4,836**	**31,013**	**57,464**	**1,117**	**1,433**	**130**	**77,984**	**214,861**
Population Exposed to High Hazard	18,835	4,568	21,659	21,659	525	1,240	37	32,535	101,058
Percent Exposed	46.07%	94.45%	69.84%	41.27%	47.09%	86.56%	28.20%	41.72%	56.90%
Total Residential Building Count	**21,156**	**449**	**12,411**	**30,000**	**431**	**393**	**91**	**40,827**	**105,758**
Estimated Replacement Cost (x $1,000)	**$2,604,199**	**$76,438**	**$1,780,842**	**$8,186,631**	**$102,113**	**$99,934**	**$22,892**	**$4,106,383**	**$16,979,432**
Structures Exposed to High Hazard	9,748	424	8,668	11,692	154	336	25	17,033	48,080
Percentage of Total Facilities	46.07%	94.45%	69.84%	40.77%	35.63%	85.55%	27.76%	41.72%	55.22%
Estimated Exposure Value (x $1,000)	$1,199,754	$72,196	$1,243,740	$3,591,759	$27,138	$86,258	$6,578	$1,713,183	$7,940,606



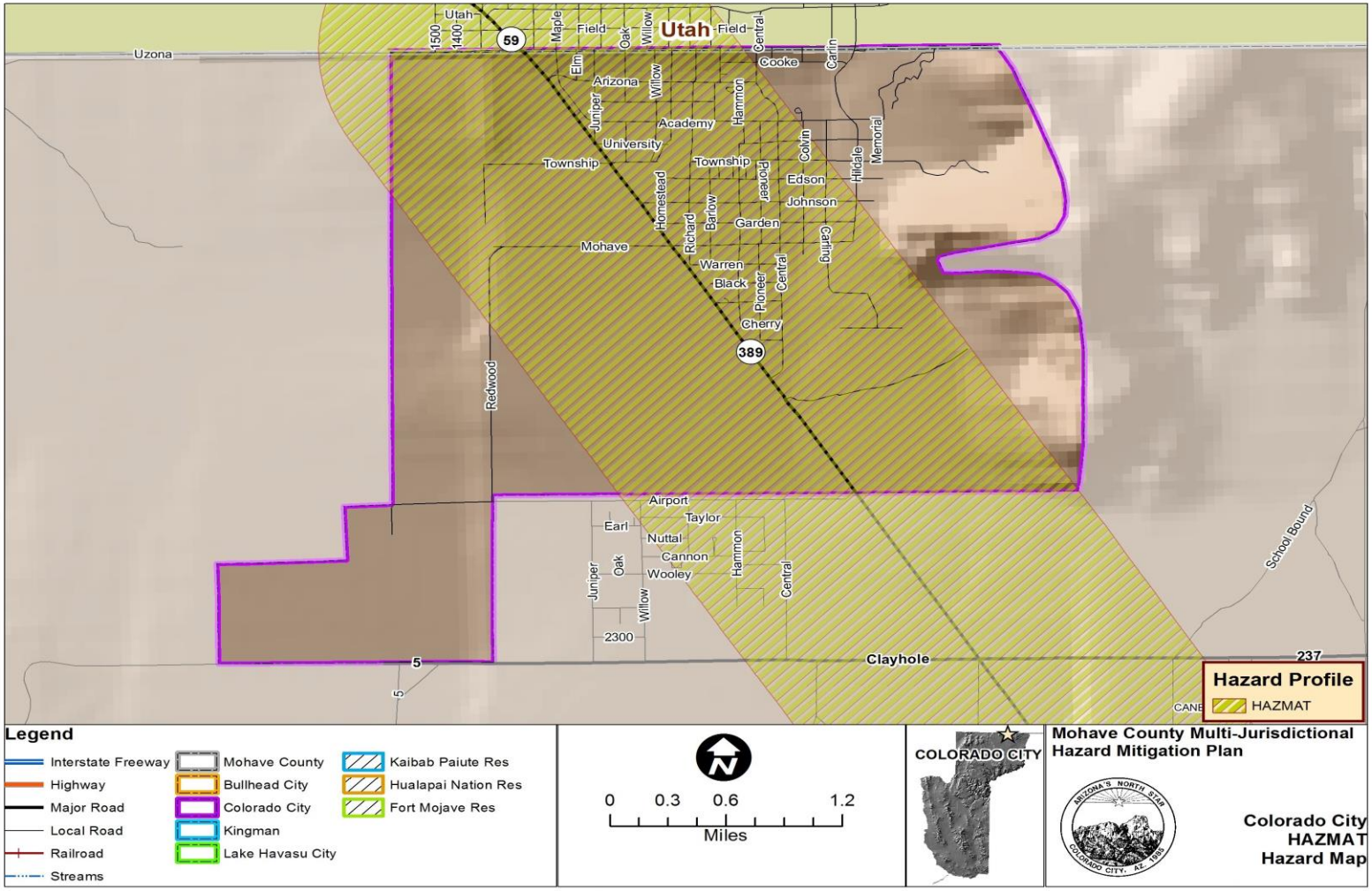
Map 4-15: HazMat Hazard, Kingman



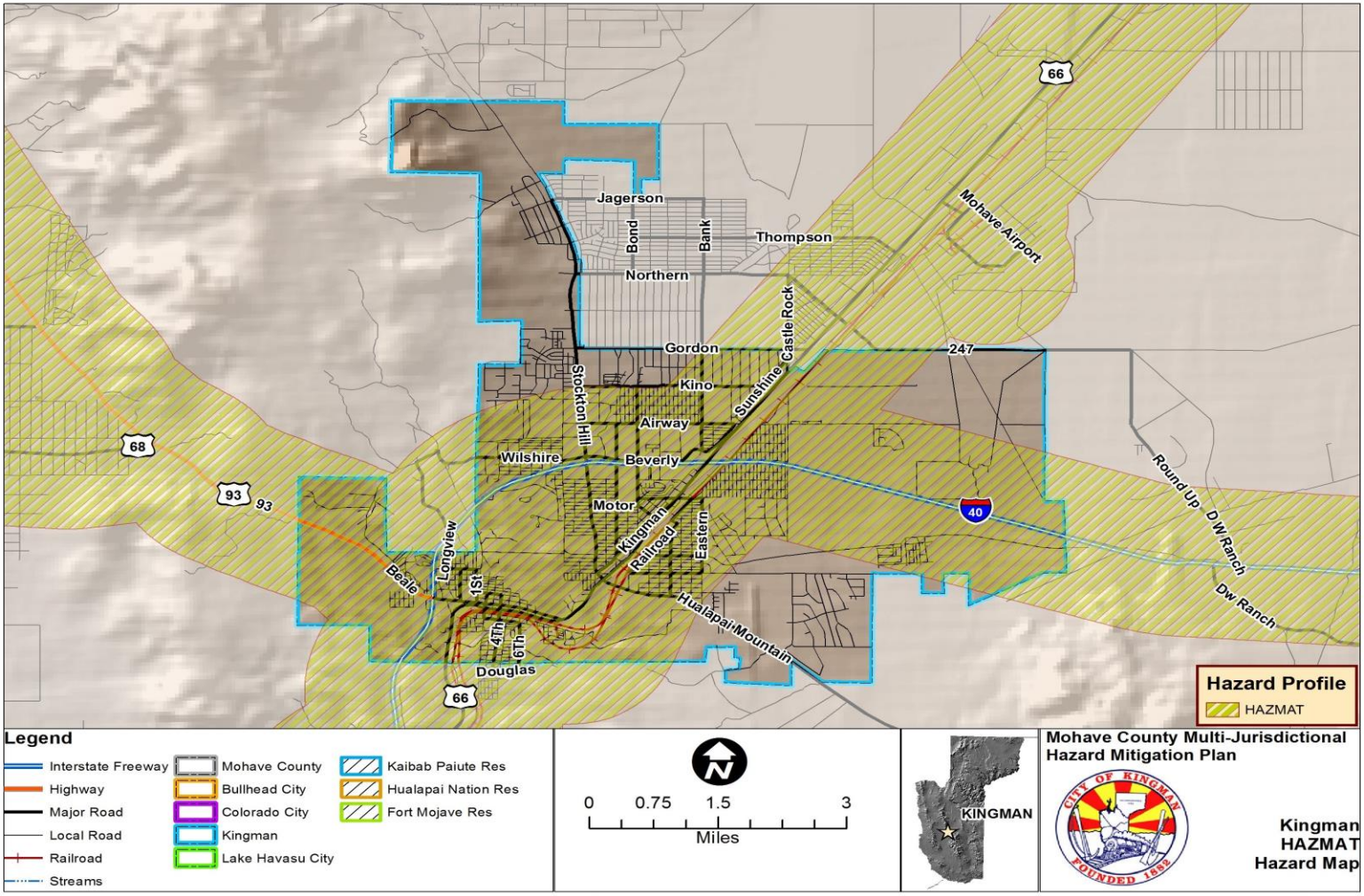
Map 4-16: HazMat Hazard, Peach Springs



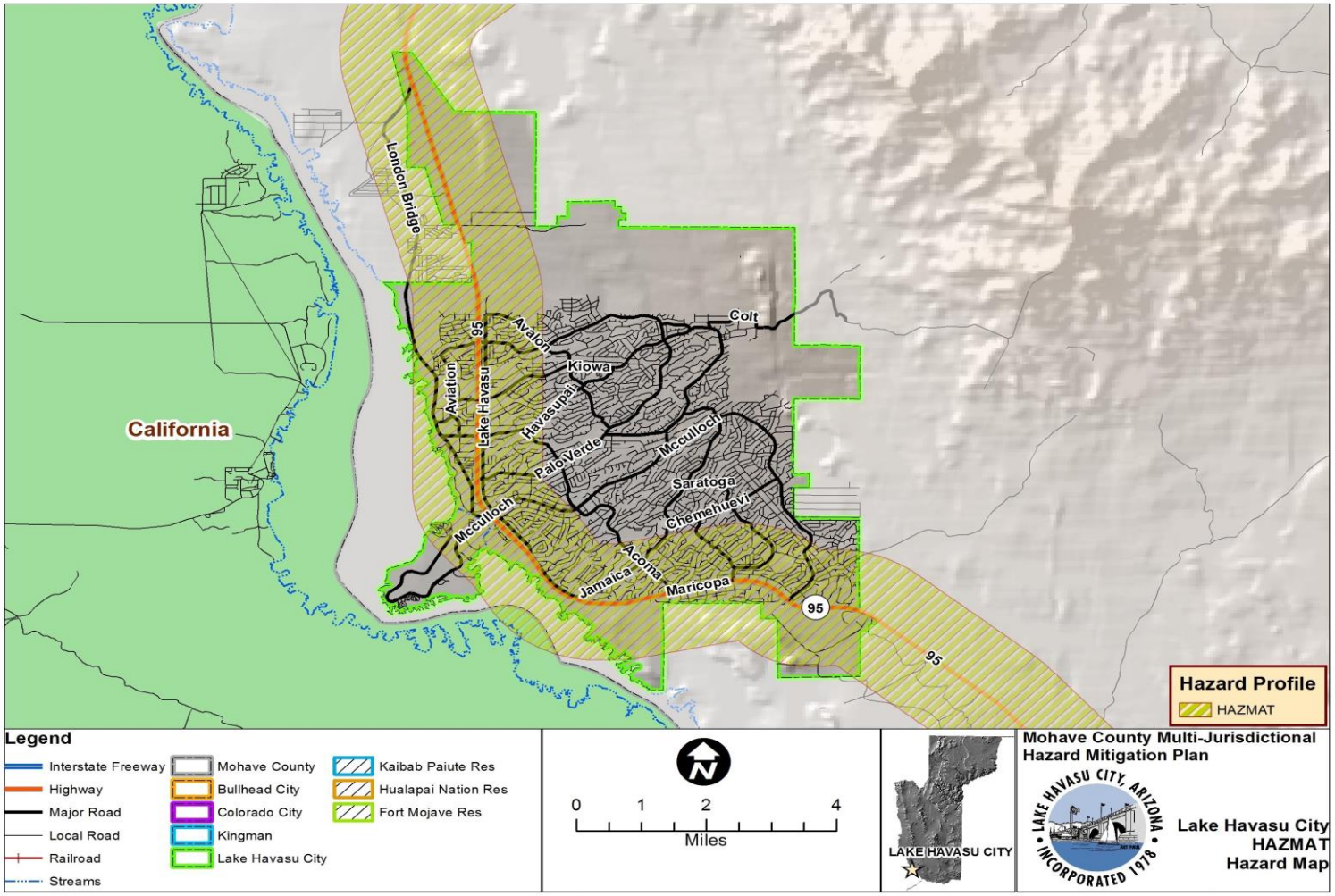
Map 4-17: HazMat Hazard, Bullhead City



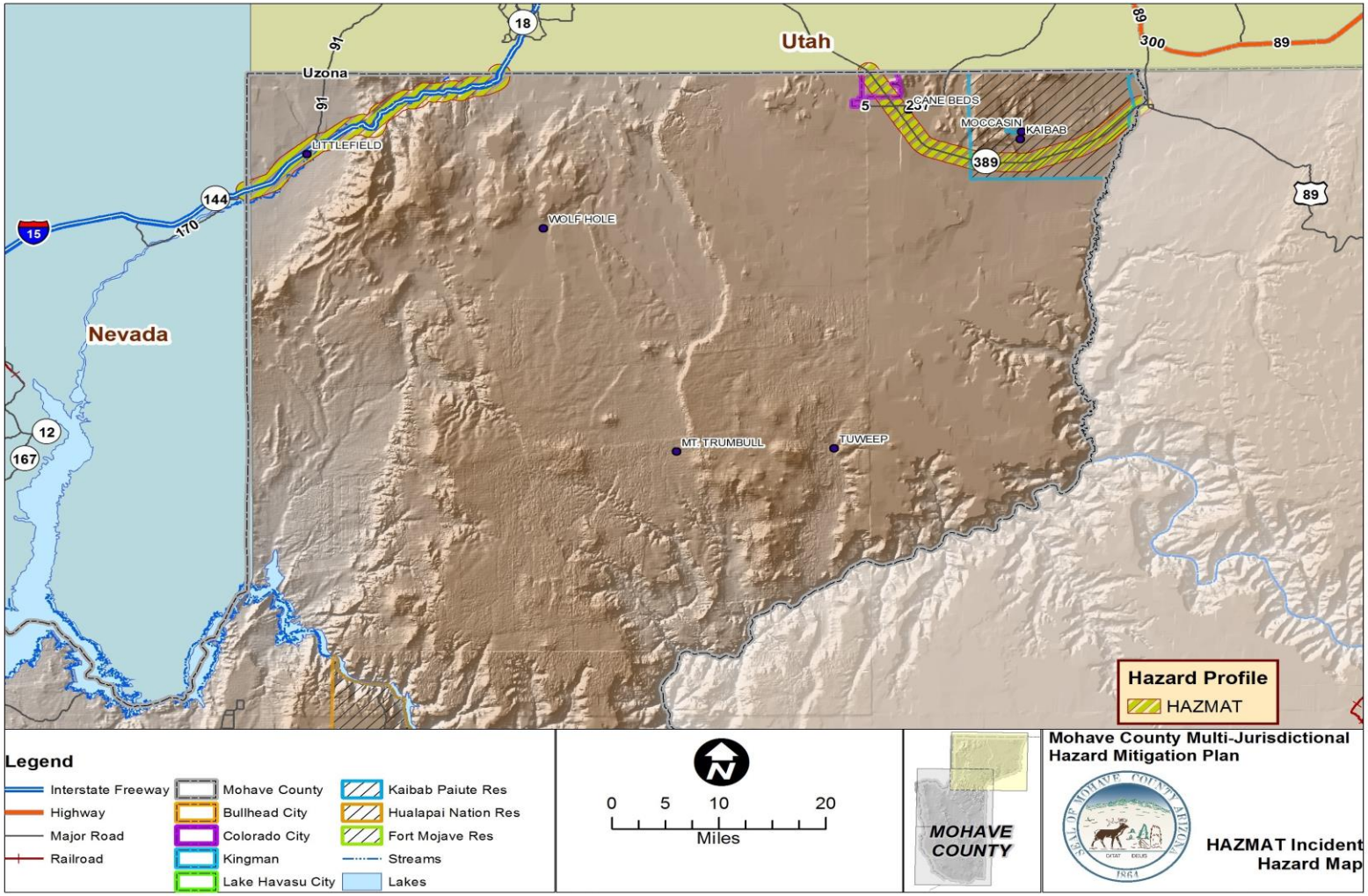
Map 4-18: HazMat Hazard, Colorado City



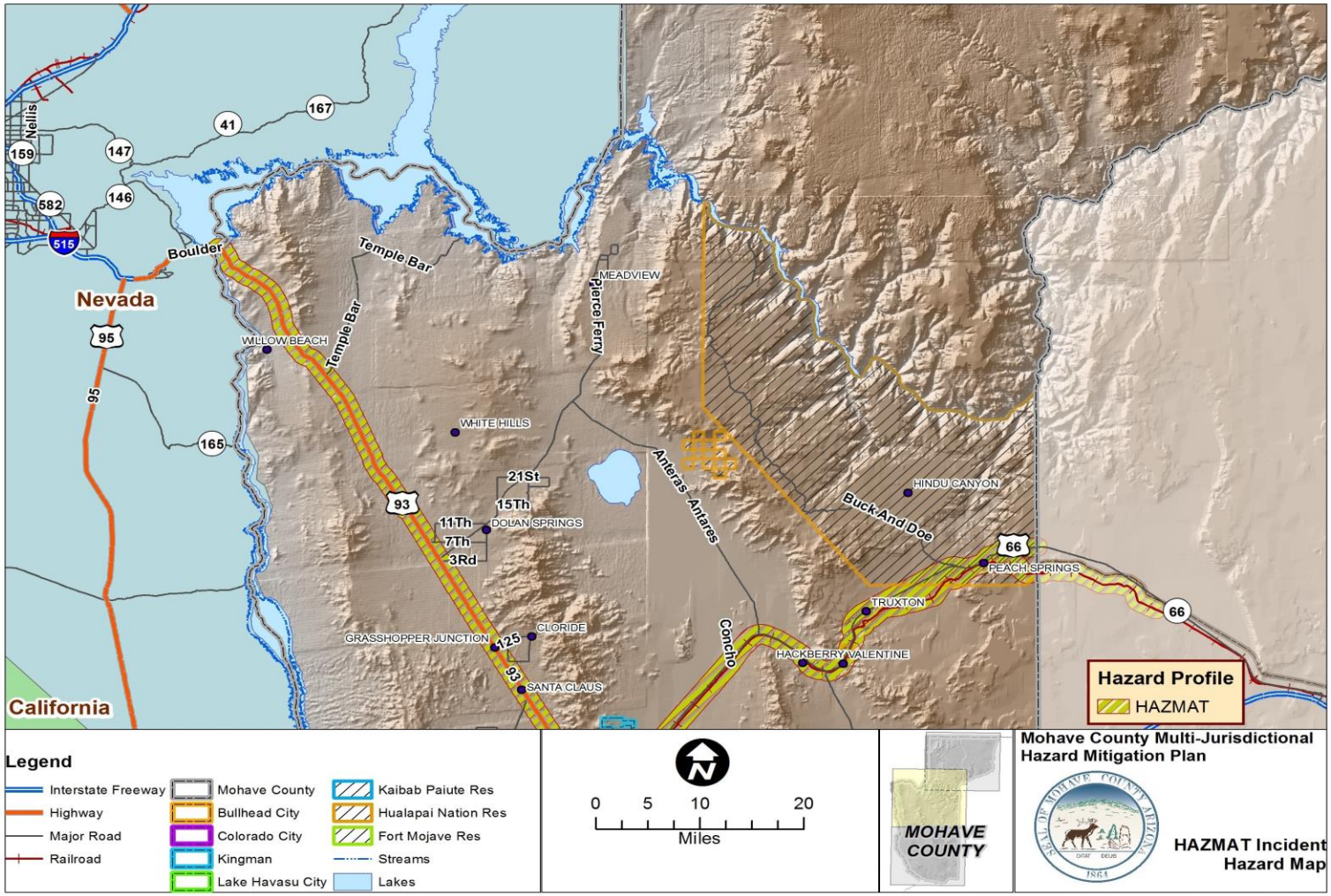
Map 4-19: HazMat Hazard, Kingman



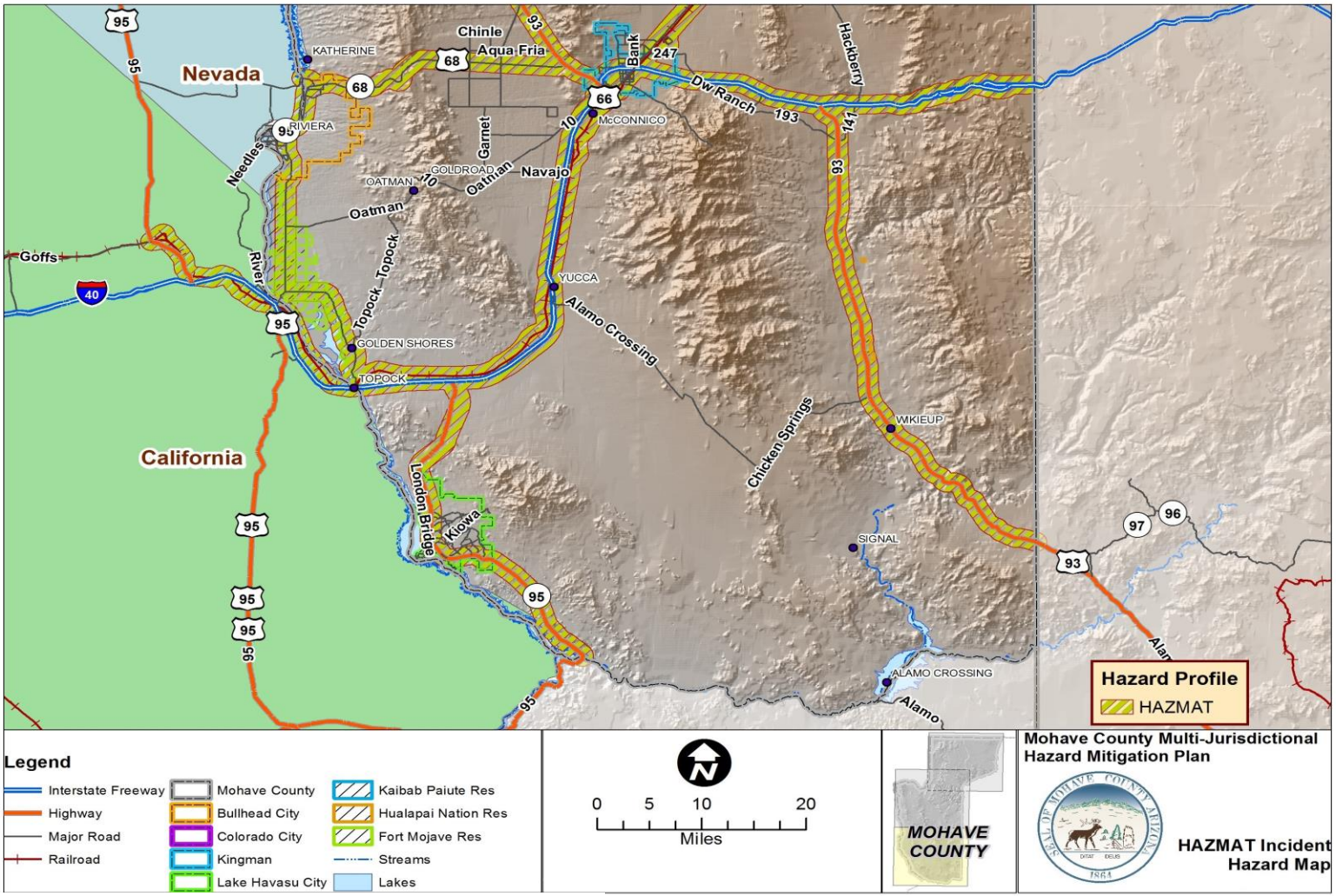
Map 4-20: HazMat Hazard, Lake Havasu City



Map 4-21: HazMat Hazard, Mohave County



Map 4-22: HazMat Hazard, Mohave County



Map 4-23: HazMat Hazard, Mohave County

4.4.7 Power Failure

Introduction

The utility infrastructure of the U.S. is comprised of many components, including the physical network of electricity transmission lines, water and sewer distribution systems, and pipelines for energy sources such as oil and natural gas. For this Plan, power and utility failure is limited to Mohave County's electric system infrastructure.

Over the years, the nation's power and utility infrastructure has grown increasingly complex and interdependent; consequently, any disruption could have far-reaching effects. Large-scale power and utility failures may result from a variety of natural causes such as geomagnetic storms, severe weather and earthquakes (the major cause of power failure in Mohave County is due to high winds). They may also result from a variety of manmade causes such as technological accidents, equipment failures or deliberate interference.

Almost every form of productive activity – whether in businesses, manufacturing plants, schools, hospitals, or homes – requires electricity. The electric system in the U.S. is an interconnected, multi-modal distribution system that consists of three major parts: generation, transmission and distribution, along with control and communications. Generation assets include fossil fuel plants, hydroelectric dams, solar, wind and nuclear power plants. Transmission systems link areas of the grid. Distribution systems manage and control the distribution of electricity into homes and businesses. Control and communications systems operate and monitor critical infrastructure components.

No standardized methodology exists for estimating vulnerability to power/utility failure. The failure of electric power facilities and systems is a frequent occurrence in Mohave County but is typically limited in the size of the affected area and duration. Large-scale, long-term blackouts (such as the September 2011, one that affected 1.1 million people in Arizona, California, and Mexico) would cause significantly more impacts in Mohave County. A similar event lasting longer than a few hours during normal summer high temperatures would not only severely impact commerce and business but would pose a major threat to human health, particularly among the sick and elderly, due to the inoperability of air conditioning systems. The Colorado River valley area, including Lake Havasu City, Bullhead City, the Ft. Mojave Tribe, and several large unincorporated communities, often reaches temperatures approaching 120°F in summer and would be especially vulnerable to a medium to long term power outage.

All electrical transmission and distribution lines are generally considered to be equally at risk to failure caused by natural or manmade events, but that risk is determined to be quite low as they are maintained to be more resistant to the forces that could potentially cause disruption, such as high winds. The greater risk of power failure in Mohave County is associated with the local neighborhood power lines and substations located throughout the area which typically have more difficulty withstanding these forces.

History

During each annual monsoon season and occasionally during the winter months, there are high wind events associated with thunderstorms that damage power lines and create outages. One such storm in 2021 resulted in damage to a mile long transmission line that resulted in day long outages to several thousand homes. Most outages last only a few hours and impact a few hundred to several thousand residents. There have been infrequent outages that have affected up to 20,000 residents for two or three days. In addition, some rural communities have experienced ongoing "brownouts" due to limited utility provider capacity.

Changes in Development in the Hazard Area

There have been no housing or commercial developments in new areas during the last five years that have substantially increased the power outage risk or impacted populations.

Probability and Magnitude

The likelihood of incurring three to six short-term (less than 24 hours) outages in various areas of the county that affect a few hundred to 20,000 residents is very high. The probability of a long-term event involving more than 20,000 residents is lower but would cause critical issues in some cities as well as in the rural areas. Power outages during high heat events pose critical and potentially life-threatening risks to residents dependent upon air conditioning or fans for cooling, and the high proportion of elderly county residents, many with health issues, are especially at risk.

Vulnerability

Table 4-20: CPRI Results for Power Outage

Participating Jurisdiction	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI Score
Bullhead City	Likely	Limited	12-24 hours	< 1 week	2.55
Colorado City	Likely	Limited	< 6 hours	< 24 hours	2.75
Kingman	Possible	Critical	< 6 hours	< 24 hours	2.60
Lake Havasu City	Likely	Critical	< 6 hours	< 1 week	3.15
Unincorporated Mohave Co	Possible	Critical	< 6 hours	< 1 week	2.70
Ft Mojave Indian Tribe	Possible	Critical	< 6 hours	< 6 hours	2.50
Hualapai Tribe	Likely	Limited	< 6 hours	< 24 hours	2.75
				County-wide average CPRI	**2.71**

4.4.8 Severe Wind

Description

The hazard of severe wind encompasses all climatic events that produce damaging winds. For Mohave County, severe winds generally result from either extreme pressure gradients that usually occur in the spring and early summer months, or from thunderstorms. Thunderstorms can occur year-round and are usually associated with cold fronts in the winter, monsoon activity in the summer, and tropical storms in the late summer or early fall.

Three types of damaging wind related features typically accompany a thunderstorm: 1) downbursts, 2) straight line winds, and infrequently, 3) tornadoes.

Downbursts are columns of air moving rapidly downward through a thunderstorm. When the air reaches the ground, it spreads out in all directions, creating horizontal wind gusts of 80 mph or higher. Downburst winds have been measured as high as 140 mph. Some of the air curls back upward with the potential to generate a new thunderstorm cell. Downbursts are called microbursts when the diameter is greater than 2.5 miles, and microbursts when the diameter is 2.5 miles or less. They can be either dry or wet downbursts, where the wet downburst contains precipitation that continues all the way down to the ground, while the precipitation in a dry downburst evaporates on the way to the ground, decreasing the air temperature and increasing the air speed. In a microburst the wind speeds are highest near the location where the downdraft reached the surface and are reduced as they move outward due to the friction of objects at the surface. Typical damage from downbursts includes uprooted trees, downed power lines, mobile homes knocked off their foundations, block walls and fences blown down, and porches and awnings blown off homes.

Straight line winds are developed like downbursts but are usually sustained for greater periods as a thunderstorm reaches the mature stage, traveling parallel to the ground surface at speeds of 75 mph or higher. These winds are frequently responsible for generating dust storms and sandstorms, reducing visibility, and creating hazardous driving conditions.

A tornado is a rapidly rotating funnel (or vortex) of air that extends toward the ground from a cumulonimbus cloud. Most funnel clouds do not touch the ground, but when the lower tip of the funnel cloud touches the earth it becomes a tornado and can cause extensive damage. For Mohave County, tornadoes are the least common severe wind to accompany a thunderstorm.

History

Mohave County has been subject to over 175 significant severe wind events, including one state declared disaster (PCA No. 21102), with a combined loss of just under over $14 million to structures and agriculture since 1955. In the 2017 to 2021 period, there were 56 significant events (42 associated with thunderstorms and 14 with non-thunderstorm high winds) with an estimated $2.4 million in damage to structures and utility lines. The following are examples of documented past events:

- August 2014, the Lake Havasu City area incurred approximately $200,000 in damage from thunderstorm winds.
- July 2014, a downburst in Havasu Heights destroyed one small residence and severely damaged a second one, damaged roofs and/or garage doors on at least two dozen homes and one fire station, and knocked down numerous power poles, with estimated damage at $150,000.
- September 2012, a thunderstorm caused approximately $250,000 in structure damage in the Mohave Valley area.
- August 2012, the Laughlin / Bullhead City International Airport sustained approximately $400,000 in structure damage from thunderstorm winds.

- September 2009, thunderstorm winds and hail ripped through the Golden Valley and Bullhead City areas. Several power poles along Bullhead City Parkway were snapped and blown down. Golf ball size hail and high wind broke all the windows on the west side of a spotter's house, broke his weather station, and damaged his shortwave radio equipment. Seven mobile home trailers were blown over in the Riviera area. Damages were estimated to exceed $545,000. (NCDC, 2010).
- August 2008, thunderstorm winds estimated at 80 to 100 mph in Mohave Valley damaged numerous roofs and outbuildings, downed trees and at least eight power lines, and damaged or destroyed 40 airplane hangars at Eagle Airpark. Golf ball sized hail was also reported. Damages were estimated to exceed $2 million. (NCDC, 2010).
- July 2002, strong thunderstorm winds blew through Kingman destroying 16 homes and damaging 36 more. Most of the damaged and destroyed homes were mobile homes in the Kingman Shadows subdivision. Four people received minor injuries from flying debris. Several power lines were also blown down knocking out power to an estimated 3,000 to 4,000 people. Damages were estimated to exceed $400,000. (NCDC, 2010).
- August 2000, a windstorm emergency was declared by the State of Arizona for Mohave County due to strong thunderstorm wind gusts of 80 -100 mph that moved through the community of Golden Shores near Lake Havasu City on August 16, 2000. Two mobile homes were destroyed, and 17 other mobile homes and frame houses were unlivable. Another 117 homes received minor damage. One injury occurred when the homeowner sought shelter in a tub in the mobile home's bathroom. As the mobile home rolled the toilet was ripped from its foundation and struck the homeowner in the head causing cuts and bruises. In addition, numerous pontoon boats were either flipped over or destroyed and several windows were broken on homes and cars. The storm snapped several power lines which cut power, in turn cutting the city's water supply. Damages were estimated at over one million dollars in damage. Lightning associated with the storm, started three fires in Lake Havasu City causing an estimated $20,000 dollars in damage. (ADEM, 2010; NCDC, 2010).

Changes in Development in the Hazard Area

There have been no major housing or commercial developments that have added to the risk or increased vulnerabilities to wind events. Growth in established population centers has been incremental. The one exception is the development of electricity generating wind farms in the county that are vulnerable to high wind events.

Probability and Magnitude

Most severe wind events are associated with thunderstorms as previously mentioned. The probability of a severe thunderstorm occurring with high velocity winds increases as the average duration and number of thunderstorm events increases. The average annual duration of thunderstorms in Mohave County ranges from 90 to over 130 minutes and is among the longest in the nation. Despite the long duration time, the highest number of thunderstorms on average in the County is 40-50 annually. Lightning strikes are another indicator of thunderstorm hazard. Mohave County has ten or fewer lightning strikes per square kilometer annually, with the highest density being found in the northeast quadrant of the county (Changnon, 1988 and ADEM, 2004). Flood Control is now gathering lightning strike data and will provide updates in subsequent updates to this document.

The NWS issues a severe thunderstorm watch when conditions are favorable for the development of severe thunderstorms. The local NWS office considers a thunderstorm severe if it produces hail at least 3/4-inch in diameter, wind of 58 mph or higher, or tornadoes. When a watch is issued for a region, residents are encouraged to continue normal activities but should remain alert for signs of approaching storms and continue to listen for weather forecasts and statements from the local NWS office. When a severe thunderstorm has been detected by weather radar or one has been reported by trained storm spotters, the local NWS office will issue a severe thunderstorm warning. A severe thunderstorm warning is an urgent message to the affected counties that a severe thunderstorm is imminent. The warning time provided by a

severe thunderstorm watch may be on the order of hours, while a severe thunderstorm warning typically provides an hour or less warning time.

Based on the historic record, the probability of tornados occurring in Mohave County is very limited; however, several sightings have occurred, and significant tornado damage to homes has occurred in adjacent counties in recent years.

EF SCALE	
EF Rating	**3 Second Gust (mph)**
0	65-85
1	86-110
2	111-135
3	136-165
4	166-200
5	Over 200

*** IMPORTANT NOTE ABOUT EF SCALE WINDS: The EF scale still is a set of wind estimates (not measurements) based on damage. Its uses three-second gusts estimated at the point of damage based on a judgment of 8 levels of damage to the 28 indicators listed below. These estimates vary with height and exposure. Important: The 3 second gust is not the same wind as in standard surface observations. Standard measurements are taken by weather stations in open exposures, using a directly measured, "one-minute mile" speed.

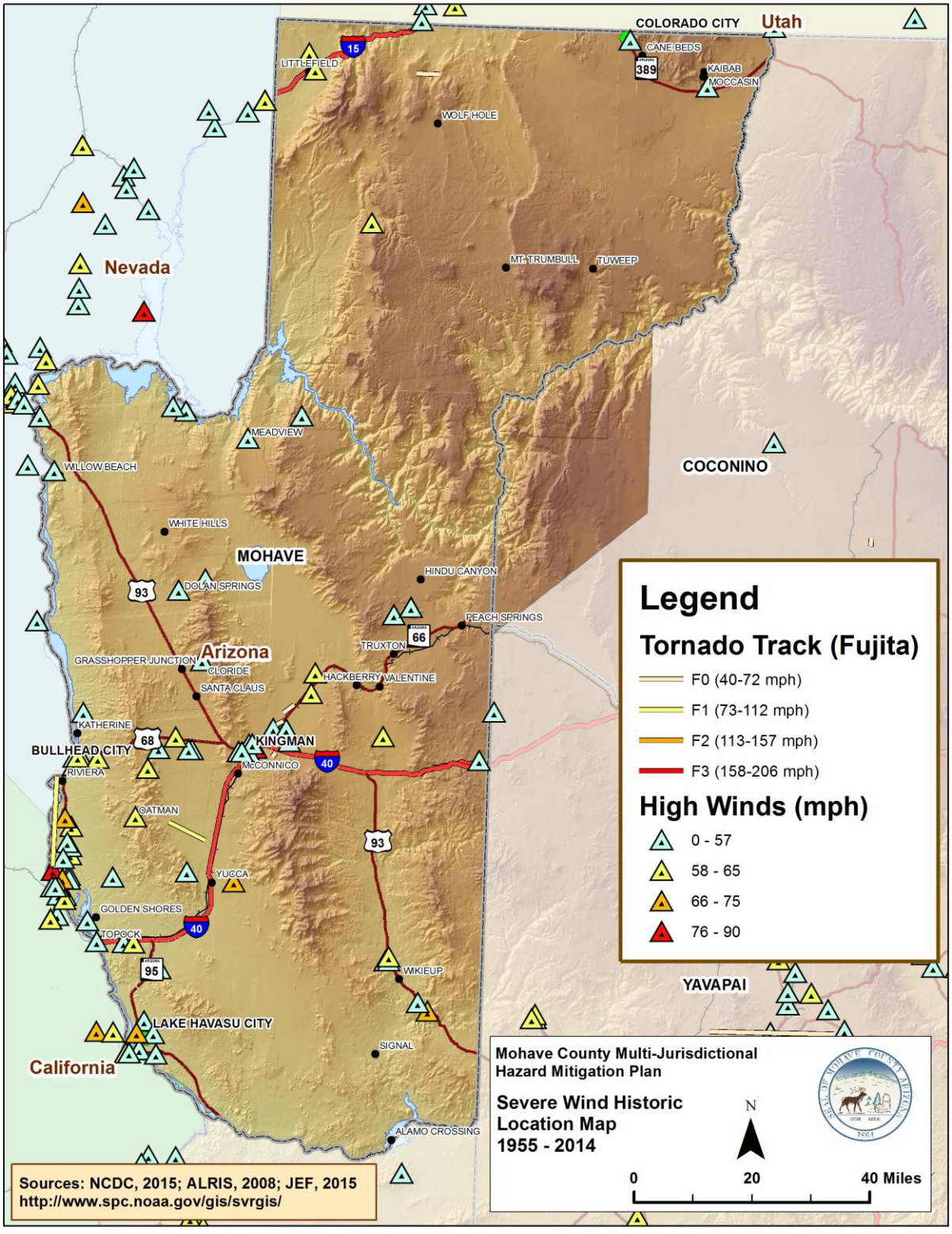
Assigning a Tornado Rating Using the EF Scale

The NWS is the only federal agency with authority to provide 'official' tornado EF Scale ratings. The goal is assigning an EF Scale category based on the highest wind speed that occurred within the damage path. First, trained NWS personnel will identify the appropriate damage indicator (DI) [see list below] from more than one of the 28 used in rating the damage. The construction or description of a building should match the DI being considered, and the observed damage should match one of the 8 degrees of damage (DOD) used by the scale. The tornado evaluator will then make a judgment within the range of upper and lower bound wind speeds, as to whether the wind speed to cause the damage is higher or lower than the expected value for the DOD. This is done for several structures not just one, before a final EF rating is determined.

Enhanced F Scale Damage Indicators

NUMBER (Details Linked)	DAMAGE INDICATOR	ABBREVIATION
1	Small barns, farm outbuildings	SBO
2	One- or two-family residences	FR12
3	Single-wide mobile home (MHSW)	MHSW
4	Double-wide mobile home	MHDW

5	Apt, condo, townhouse (3 stories or less)	ACT
6	Motel	M
7	Masonry apt. or motel	MAM
8	Small retail bldg. (fast food)	SRB
9	Small professional (doctor office, branch bank)	SPB
10	Strip mall	SM
11	Large shopping mall	LSM
12	Large, isolated ("big box") retail bldg.	LIRB
13	Automobile showroom	ASR
14	Automotive service building	ASB
15	School - 1-story elementary (interior or exterior halls)	ES
16	School - jr. or sr. high school	JHSH
17	Low-rise (1-4 story) bldg.	LRB
18	Mid-rise (5-20 story) bldg.	MRB
19	High-rise (over 20 stories)	HRB
20	Institutional bldg. (hospital, govt. or university)	IB
21	Metal building system	MBS
22	Service station canopy	SSC
23	Warehouse (tilt-up walls or heavy timber)	WHB
24	Transmission line tower	TLT
25	Free-standing tower	FST
26	Free standing pole (light, flag, luminary)	FSP
27	Tree - hardwood	TH
28	Tree - softwood	TS



Map 4-24: Historic Severe Wind Events for Mohave County

Vulnerability

Table 4-22: CPRI Results for Severe Wind					
Participating Jurisdiction	**Probability**	**Magnitude/ Severity**	**Warning Time**	**Duration**	**CPRI Score**
Bullhead City	Highly Likely	Limited	< 6 hours	< 1 week	3.3
Colorado City	Highly Likely	Limited	< 6 hours	< 1 week	3.3
Kingman	Highly Likely	Limited	< 6 hours	< 1 week	3.3
Lake Havasu City	Likely	Limited	< 6 hours	< 1 week	2.85
Unincorporated Mohave Co	Likely	Limited	< 6 hours	< 1 week	2.85
Ft Mojave Indian Tribe	Likely	Limited	< 6 hours	< 1 week	2.85
Hualapai Tribe	Likely	Limited	< 6 hours	< 1 week	2.85
				County-wide average CPRI	**3.04**

As indicated by the historical data already noted, Mohave County is susceptible to damage from thunderstorms and associated wind events on an annual basis. Areas such as Mohave Valley, Golden Shores, Lake Havasu Heights, and Golden Valley have received considerable damage in the past. Many of these areas have a significant proportion of manufactured homes and several RV parks where considerable numbers of individual units have been severely impacted and/or are vulnerable to future events. Roofs, garage doors, and windows of residences and businesses have also received damage and remain vulnerable; in some cases, more substantial structural damage has occurred to these structures, including destruction of outbuildings. Airports are susceptible to high cost damage, including damage to parked aircraft, hangers, and other structures. The most frequent type of damage occurs to utility poles, which often results in periodic power outages and sometimes causes traffic disruption due to roads and streets blocked by downed poles and power lines.

Strong winds are common in Bullhead City. These winds occasionally are strong enough to cause damage throughout this jurisdiction. Due to the young age of most structures in the City, they are resistant to all but the most severe high wind events. The City does however have several mobile and manufactured homes located throughout the City which are more vulnerable to severe weather than the site-built structures. Public safety facilities, infrastructure, and special facilities do not have a history of being vulnerable to high winds.

Colorado City is located where plains and canyons meet, making the area susceptible to constantly changing winds. Several severe windstorms occur each year, usually early spring and late summer. Tornado-like storms in the past have caused significant structural damage to buildings and power lines. Structures most likely to be damaged have been large storage sheds or barns. Asphalt type shingles on residences are also susceptible to wind damage.

Kingman's arid high desert geographical location is conducive to sustained high winds intermittently throughout the year. Monsoon season between June and September results in frequent severe thunderstorms and severe wind damages to modular and mobile homes, in addition to tree falls and downed utility lines.

Lake Havasu City is vulnerable to high winds throughout the year, especially during the Monsoon Season and extreme thunderstorms which impact the community on an annual basis. Damage from high winds have been an issue in the past and to reduce damage of this nature, the City has adopted strict building code requirements to ensure structures within the City are built with severe winds in mind. However, even with these requirements in place for newer homes, the City still has homes, especially several mobile and manufactured homes in its jurisdiction which may be subjected to damage in the event of severe winds impacting them. City Facilities, especially Public Safety facilities, do not have a history of being vulnerable to high winds and are viewed as a safe place to be during an extreme weather event.

The Fort Mojave Indian Reservation frequently has standalone high wind events, high wind events associated with thunderstorms and microburst events. Due to aging infrastructure a large proportion of the structures on the Reservation are vulnerable to severe wind events that can cause damage. The Tribal Administration

Offices, The Department of Emergency Response, Eagle Airport, and several other Tribal Program offices have had damage occur from microburst events.

Vulnerability – Loss Estimations

The entire county is assumed to be equally exposed to the damage risks associated with the severe winds. Typically, incidents are localized, and damages associated with individual events are relatively small. Based on the historic record over the last 30 years, it is feasible to expect average annual losses of $150,000 to $200,000 (county-wide). It is difficult to estimate losses for individual jurisdictions within the County due to the lack of discrete data. The lack of this type of data is not likely to change.

Vulnerability – Development Trend Analysis

The entire county is assumed to be equally exposed to the damage risks associated with the severe winds. Typically, incidents are fairly localized, and damages associated with individual events are relatively small. Based on the historic record over the last several years, it is feasible to expect average annual losses of $400,000 to $500,000 (county-wide).

Sources

Changnon, Jr. S.,1988, *Climatology of Thunder Events in the Conterminous U.S., Part I: Temporal Aspects* and *Part II: Spatial Aspects*, Journal of Climate, Vol. 1, No. 4, pp. 389-405.

U.S. Dept of Commerce, National Climatic Data Center, Storm Events Database: http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms

4.4.9 Wildfire

Description

A wildfire is an uncontrolled fire spreading through wildland vegetative fuels and/or urban interface areas where fuels may include structures. They often begin unnoticed, spread quickly, and are usually signaled by dense smoke that may fill the area for miles around. Wildfires can be human caused through acts such as arson or campfires or can be caused by natural events such as lightning. If not promptly controlled, wildfires may grow into an emergency or disaster. Even small fires can threaten lives, resources, and destroy improved properties.

The indirect effects of wildfires can also be catastrophic. In addition to stripping the land of vegetation and destroying forest resources and personal property, large, intense fires can harm the soil, waterways, and the land itself. Soil exposed to intense heat may temporarily lose its capability to absorb moisture and support life. Exposed soils in denuded watersheds erode quickly and are easily transported to rivers and streams thereby enhancing flood potential, harming aquatic life and degrading water quality. Lands stripped of vegetation are also subject to increased landslide hazards.

History

Mohave County has been part of at least 20 statewide wildfire declarations since 1966. For the period of 1980 to 2010, data compiled by the Arizona State Forestry Division for the 2010 State Plan update indicates that at least 406 wildfires greater than 100 acres in size, have occurred in all of Mohave County. Fourteen of those fires were larger than 10,000 acres. For the period of 2002 to 2014, a total of 13 wildfires were reported by the National Wildfire Coordination Group (NWCG, 2010), the largest of those fires are described below:

- April 2021, the Flag Fire in the Hualapai Mountains started in the Hualapai Mountains and was of unknown but likely human origin. Its proximity to the Pine Lake Community and the Mohave County Hualapai Mountain Park caused an immediate, no notice evacuation of those areas. Although total acreage burned was 1265, two Incident Management Teams were deployed with suppression costs running close to $2 million, and loss of numerous residences was only narrowly averted.

- August 2020, the Ridge Fire in the Hualapai Mountains was started by lightning and threatened the Pine Lake Community before being controlled by an Incident Management Team; over 3000 acres were burned.

- March 2019, the Beach Fire in Lake Havasu City, burned 80 acres of shoreline brush. Local mutual aid along with state and federal resources used to control the fire.

- August 2015, the Willow Fire was started by lightning in Mohave Valley. The fire started on August 8, 2015, and burned over 6000 acres, forcing the evacuation of 900 residences, and destroying 11 homes.

- June 2013, the Dean Peak Fire was started by lightning on the northeast side of the Hualapai Mountains 15 miles south of Kingman. The fire started on June 29, 2015 and was controlled in July 2013 after burning a total of 5400 acres with over $4 million in fire suppression costs.

- July 2007, the Black Rock Gulch Fire was started by lightning and burned an area 30 miles south of St. George, Utah. The fire started July 5, 2007 and was controlled July 25, 2007 and burned a total of 22,387 acres with over $1.9 million in fire suppression costs and one destroyed outbuilding (NWCG, 2010).

- July 2006, the Pocket Complex Fire was started by lightning and burned an area 15 miles south of Mesquite, NV. The fire started July 24, 2006 and was controlled July 31, 2006 and burned a total of 11,236 acres with over $1.1 million in fire suppression costs (NWCG, 2010).

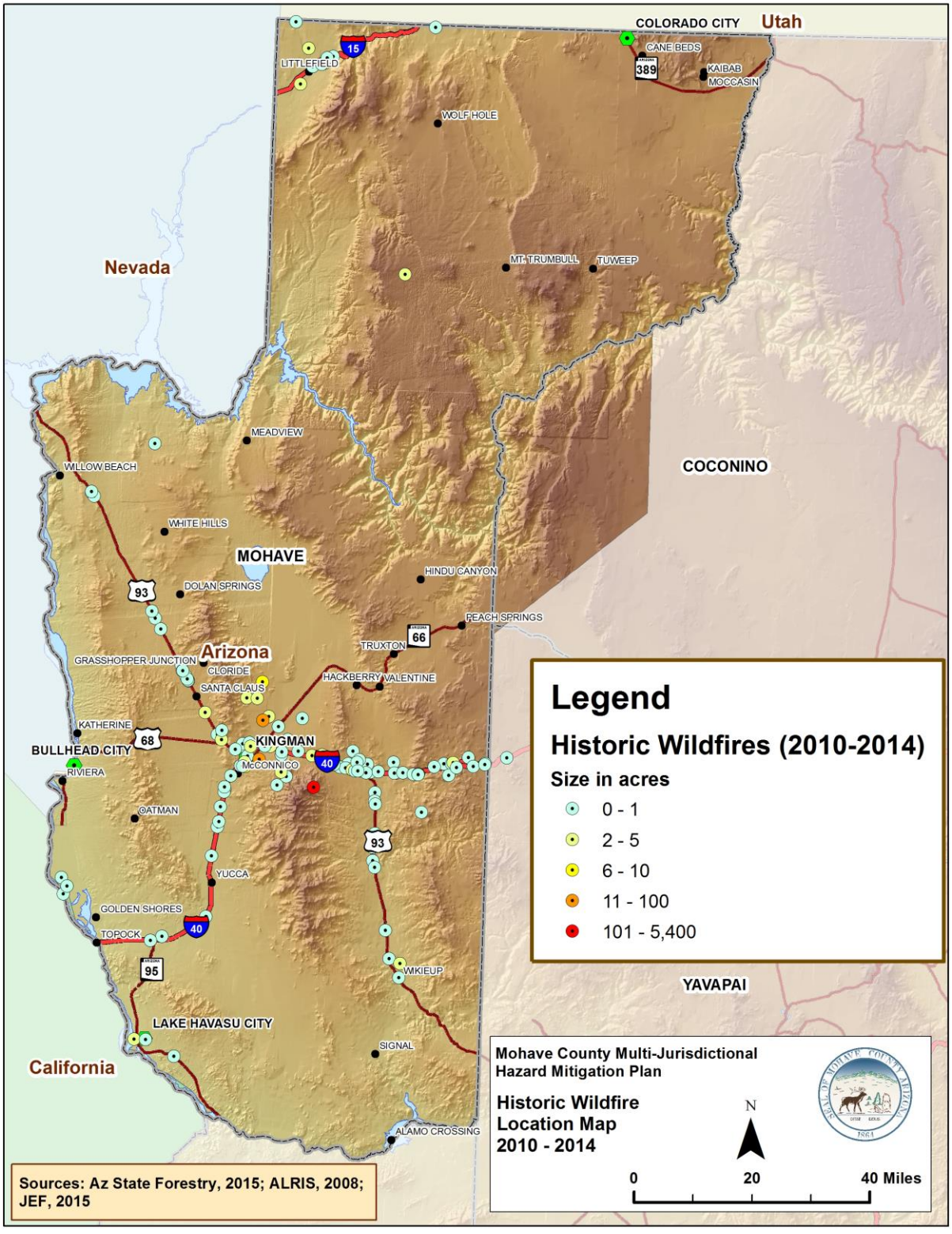
- July 2005, the Twin Mills Fire was started by lightning and burned an area northwest of Kingman and northeast of Bullhead City. The fire started July 22, 2005 and was controlled July 27, 2005 and burned a total of 11,967 acres with over $1.0 million in fire suppression costs (NWCG, 2010).
- July 2005, the Tank Complex Fire was started by humans and burned an area 40 miles south of St. George, Utah. The fire started July 19, 2005 and was controlled July 27, 2005 and burned a total of 69,934 acres with over $2.2 million in fire suppression costs and two destroyed outbuildings (NWCG, 2010).
- June 2005, the Perkins Complex Fire was started by lightning and burned an area northwest of Kingman and northeast of Bullhead City. The fire started June 22, 2005 and was controlled July 30, 2005 and consumed a total of 21,600 acres with over $1.6 million in fire suppression costs (NWCG, 2010).

The most vulnerable area of the county is the northern part of the Hualapai Mountains with numerous small communities with limited road access, as well as the county Hualapai Mountain Park, the Levi Levi Boy Scout Camp, and several BLM recreation areas. The 2013 Dean Peak Fire caused the evacuation of the Pine Lake and Pinion Pines communities and the Hualapai Mountain Park for a period of several days, and only numerous air attack sorties and favorable wind conditions prevented the loss of structures. However, other areas both in the mountains and valleys can become vulnerable due to the ongoing drought conditions and lack of sufficient rainfall, and evacuations due to wildfires have taken place in other areas of the county including Golden Valley and Mohave Valley.

The Planning Team recognized that the declared disaster and historic hazard data collected for this Plan does not adequately reflect the true cost of a wildfire; particularly, the cost of wildfire mitigation efforts to prevent structure and human loss and the cost of emergency responder and volunteer commitments that are sometimes not included in suppression cost totals.

Changes in Development in the Hazard Area

Additional encroachment on the Wildland Urban Interface has not occurred on a large scale and in fact has been stable in terms of number of homes at risk. This is potentially changing in view of the current (2021) new home construction boom, but most of this construction is not in the WUI. The estimated number of residents at risk has increased by almost 2,000 persons based on a reinterpretation of demographic information.



Map 4-25: Historic Wildfires for Mohave County

Probability and Magnitude

The probability and magnitude of wildfire incidents for Mohave County are influenced by numerous factors including vegetation densities, previous burn history, hydrologic conditions, climatic conditions such as temperature, humidity, and wind, ignition source (human or natural), topographic aspect and slope, and remoteness of area.

Two sources were used to map the wildfire risk for Mohave County. The first is the data developed for the Mohave County Community Wildfire Protection Plan (LSDI, 2008). The second is a statewide coverage developed by the State of Arizona as a part of the 2003/04 Arizona Wildland Urban Interface Assessment (AWUIA) project (Fisher, 2004).

Mohave County and participating jurisdictions developed a county-wide community wildfire protection plan in 2008 (LSDI, 2008). The primary objective of the Mohave County Community Wildfire Protection Plan (MCCWPP) was to help local governments, fire departments and districts, and residents identify at-risk public and private lands to better protect those lands from severe wildfire threat. Elements identified in the PCCWPP include delineation of the wildland urban interface areas, mapping of vegetative fuels and topographical slope and aspect elements impacting wildfire risk, and mapping of wildfire risk zones that include consideration for the built environment.

The MCCWPP also identified two models of wildland fuel hazards: a typical year of rainfall and an extraordinarily heavy rainfall year, to present a range of wildland fuel hazards across the county. Each model divided the fuel hazard into three categories: high, medium, and low. The Planning Team chose to use the extraordinary rainfall fuel hazard model.

Wildfire hazard areas have been identified by the State of Arizona as a part of the 2003/04 Arizona Wildland Urban Interface Assessment (AWUIA) project (Fisher, 2004). The increasing growth of Arizona's rural populations, urban sprawl, and increasing wildland fuel loads ads to create a mix of situations that is known as the wildland urban interface. The purpose of the AWUIA was to attempt to conduct an analysis on a statewide basis using a common spatial model, for validation of those communities listed in the federal register as WUI, and further identify possible other communities at risk. The AWUIA approach used four main data layers:

- TOPO – aspect and slope derived from 30-meter Digital Elevation Model data from USGS.
- RISK – historical fire density using point data from fire record years 1986–1996 from all wildland agencies.
- HAZARD – fuels, natural fire regimes and condition class.
- HOUSE – houses and/or structures

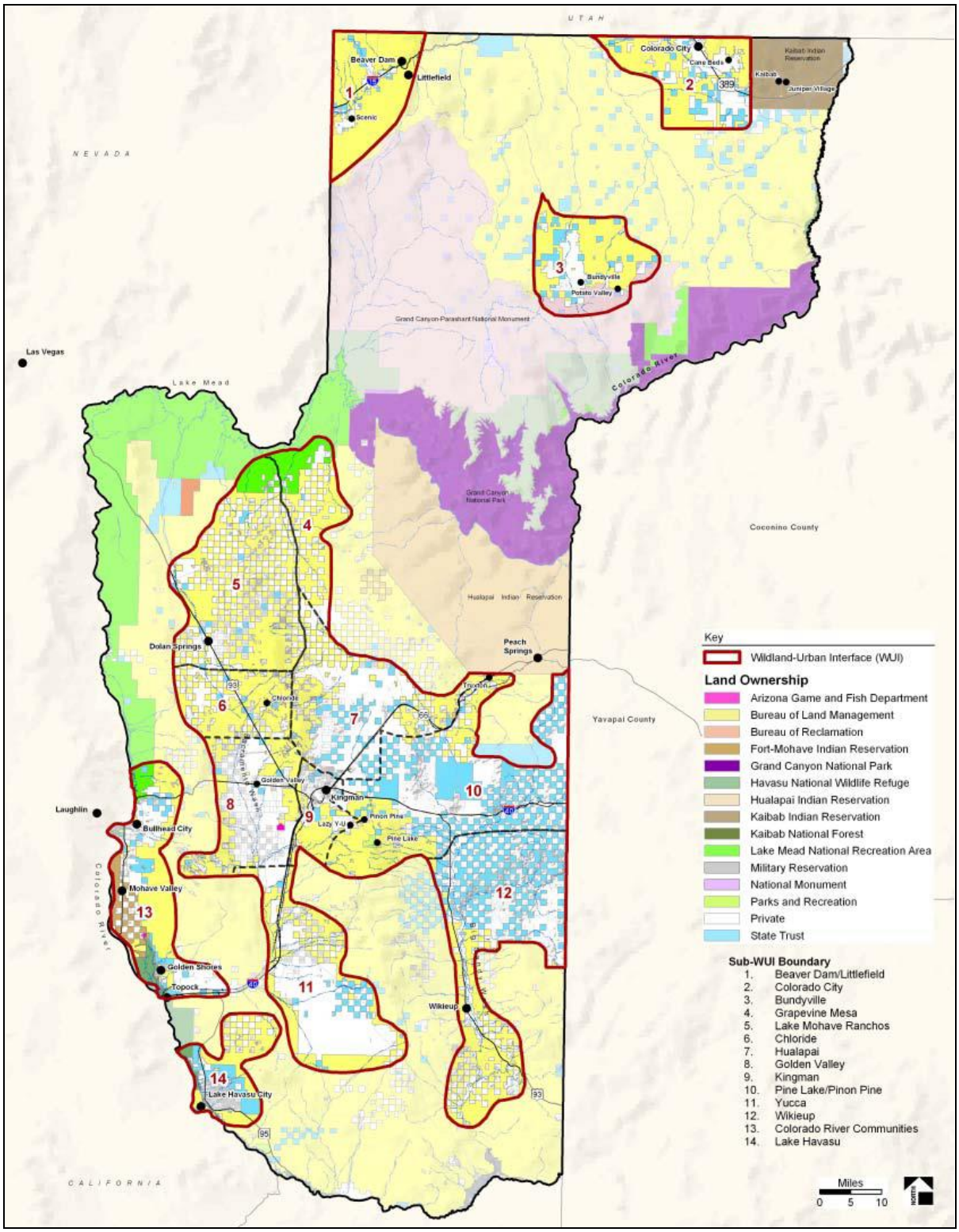
A value rating of 1-15 was used for all layers.

Two separate results were developed. The first coverage used an applied weighting scheme that combined each of the four data layers to develop a ranking model for identifying WUI communities at greatest risk. The second coverage, referred to as the "Land Hazard", also applied a weighting scheme that combined only the TOPO, RISK, and HAZARD layers, as follows:

LAND HAZARD = (HAZARD*70%)+(RISK*20%)+(TOPO*10%)

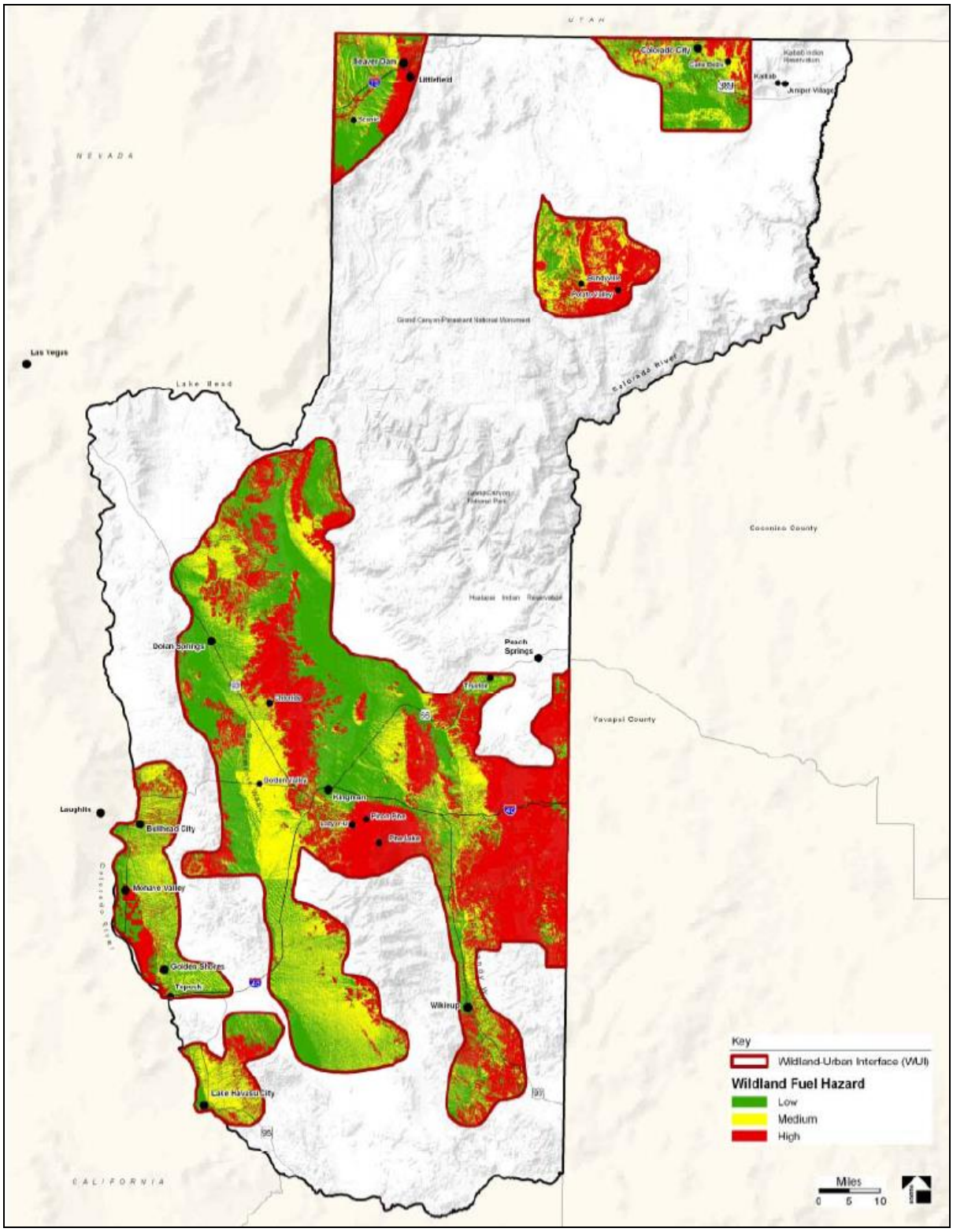
Weighing percentages were determined through discussion with the Arizona Interagency Coordinating Group. The "Land Hazard" layer produced from this model is based on a 250-meter raster grid (some data originated at 1,000-meter). The resultant raster values range from 1-15 and were classified into three groups to depict wildfire hazard without the influence of structures: HIGH (values of 10-15), MEDIUM (values of 7-9), and LOW (values of 1-6).

The AWUIA identified three Mohave County WUI communities (Mohave Mountain, Point of Pines, and William Creek NFH) as having a moderate wildfire risk.



Source: MCCWPP, July 2008

Map 4-26: Wildland Urban Interface Area, Mohave County



Source: MCCWPP, July 2008

Map 4-27: Extraordinary Year Fuel Hazards, Mohave County

The final wildfire hazard profile map for this Plan depicts the three levels of hazard previously discussed from each source, with the MCCWPP identified WUI area replicating the extraordinary precipitation year hazards, and the rest of the area reflecting the statewide AWUIA "Land Hazard" area. The maps in this profile indicate the various wildfire hazard areas for Mohave County based on the "Land Hazard" layer.

Vulnerability

Table 4-23: CPRI Results for Wildfire

Participating Jurisdiction	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI Score
Bullhead City	Possibly	Limited	< 6 hours	< 24 hours	2.30
Colorado City	Possibly	Limited	< 6 hours	< 24 hours	2.30
Kingman	Highly Likely	Limited	< 6 hours	< 6 hours	3.10
Lake Havasu City	Unlikely	Negligible	< 6 hours	< 6 hours	1.45
Unincorporated Mohave Co	Highly Likely	Critical	< 6 hours	< 1 week	3.60
Ft Mojave Indian Tribe	Highly Likely	Critical	< 6 hours	< 1 week	3.60
Hualapai Tribe	Highly Likely	Limited	< 6 hours	< 1 week	3.30
				County-wide average CPRI	**2.81**

Wildfires are a common occurrence on the Hualapai Reservation with an average of nearly 56 fires occurring per year from 1991-2000. Wildfire has occurred near Grand Canyon West at least once every five years over the past twenty years. Wildfire will continue to be a threat to Grand Canyon West due to its remote location and lack of fire-fighting equipment. Most of the fires are caused by lightning with many fewer fires being caused by children, debris burning, smoking, railroads, campfires, arson and equipment use. Fires on the west side of the reservation are usually extinguished rapidly due to the low fuel loads found there. Occasionally, a fire will spread on the west side due to high winds. These fires are monitored closely by the BIA Forestry Program and extinguished if structures or other assets are in danger. On the east side of the reservation in the ponderosa pine and pinyon pine/juniper woodlands, there are much higher fuel loads and greater potential for catastrophic wildfires. Through prescribed burning and mechanical fuels management activities, the BIA Forestry Program has successfully reduced the threat from catastrophic fire in much of the eastern reservation. There have been significant wildfires, however, in the past. The main hazard area for wildfire is the eastern ponderosa pine and pinyon-juniper woodlands portions of the reservation. In addition, the urban/wildfire interface around the town of Peach Springs is considered by the BIA Forestry Program (Richard Powskey, personal communication) as having a low potential for catastrophic fire and structure damage.

Based on previous occurrences and its geographic location, wildfires will remain a threat to the Reservation.

Vulnerability – Loss Estimations

The estimation of potential exposure to high wildfire risk was accomplished by intersecting the human and facility assets with the wildfire hazard limits depicted in their respective maps. The Wildfire Loss Estimation table summarizes the exposure of critical facilities, residences, and population to high hazard fire events.

It should be noted that these exposure dollar amounts do not include the cost of wildfire suppression which can be substantial. For example, a Type 1 wildfire suppression effort could cost $1 million per day, particularly if air assets are utilized. Typically, deaths and injuries not related to firefighting activities are rare. However, it is feasible to assume that at least one death and/or injury may be plausible. There is also a high probability of population displacement during a wildfire event, and especially in the urban wildland interface areas.

It is noted that the loss and exposure numbers presented represent a comprehensive evaluation of the County as a whole. It is unlikely that a wildfire would occur that would impact all the high hazard areas at the same time. Accordingly, actual event-based losses and exposure are likely to be only a fraction of those summarized.

Table 4-24: Estimated Exposure and Potential Losses Due to Wildfire

	Bullhead City	Colorado City	Kingman	Lake Havasu City	Fort Mojave Indian Tribe	Hualapai Tribe	Kaibab Paiute Indian Tribe	Unincorporated Mohave Co	Total
Total Critical Facilities	**59**	**18**	**97**	**71**	**0**	**0**	**0**	**86**	**331**
Facilities Exposed to High Hazard	1	2	0	0	0	0	0	13	16
Percentage of Total Facilities	1.69%	11.11%	0.00%	0.00%	0.00%	0.00%	0.00%	15.12%	5.30%
Estimated Exposure Value (x $1,000)	$750	$470	$0	$0	$0	$0	$0	$56,175	$57,395
Total Population	**40,884**	**4,836**	**31,013**	**57,464**	**1,117**	**1,433**	**130**	**77,984**	**214,861**
Population Exposed to High Hazard	1,329	172	636	402	532	550	65	9,662	13,348
Percent Exposed	3.25%	3.56%	2.05%	0.7%	47.59%	38.35%	49.85%	12.39%	19.71%
Total Residential Building Count	**21,156**	**449**	**12,411**	**30,000**	**431**	**393**	**91**	**40,827**	**105,758**
Estimated Replacement Cost (x $1,000)	**$2,604,199**	**$76,438**	**$1,780,842**	**$9,000,000**	**$102,113**	**$99,934**	**$22,892**	**$4,106,383**	**$33,832,801**
Structures Exposed to High Hazard	688	16	254	264	154	160	47	5,060	6,643
Percentage of Total Facilities	3.25%	3.56%	2.05%	0.87%	35.61%	40.59%	51.85%	12.39%	18.77%
Estimated Exposure Value (x $1,000)	$84,636	$2,721	$36,507	$79,200	$27,629	$41,955	$11,976	$508,781	$793,405

Vulnerability – Development Trend Analysis

By its very definition, the WUI represents the fringe of urban development as it intersects with the natural environment. As previously discussed, wildfire risks are very significant for a sizeable portion of the county and most of the populated areas. Any future development will only increase the WUI areas and expand the potential exposure of structures to wildfire hazards. The various CWPPs address mitigation opportunities for expanding WUI areas and provide recommended guidelines for safe building and land-use practices in wildfire hazard areas.

Sources

Fisher, M., 2004, AZ Wildland Urban Interface Assessment, 2003, prepared for the AZ Interagency Coordination Group.
http://www.azsf.az.gov/UserFiles/PDF/Arizona%20Wildland%20Urban%20Interface%20Assessment%2005MAR04.pdf

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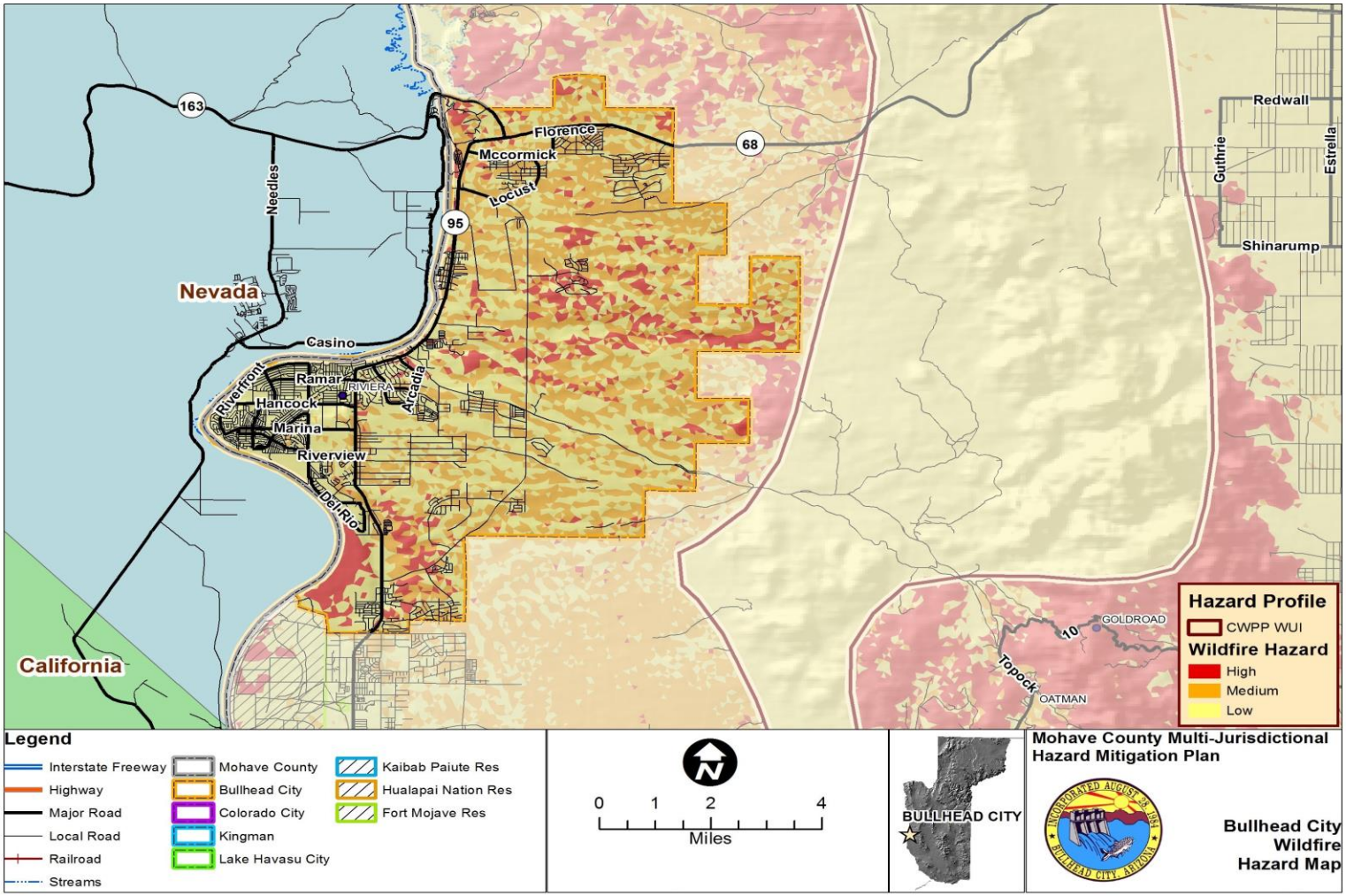
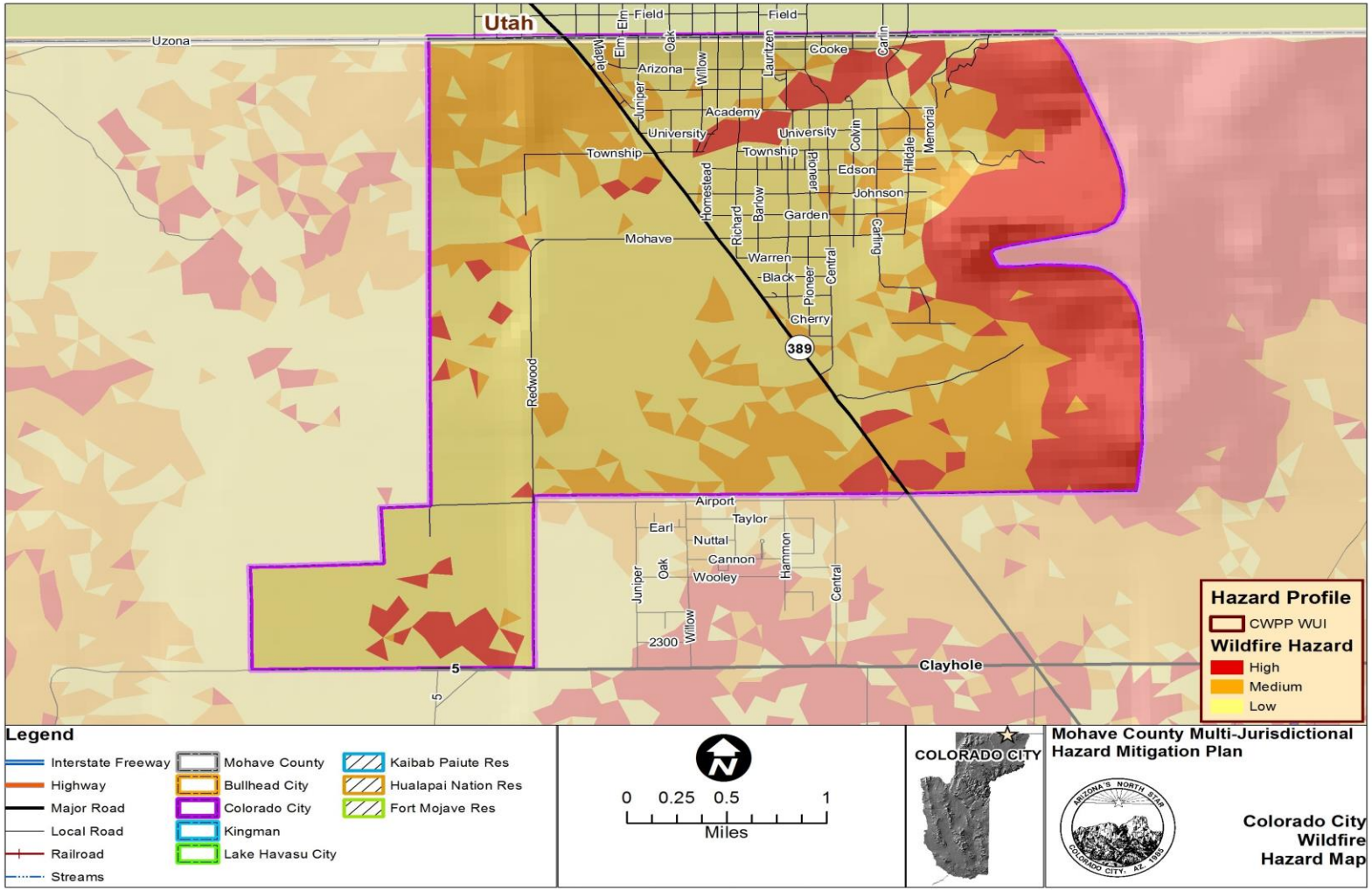
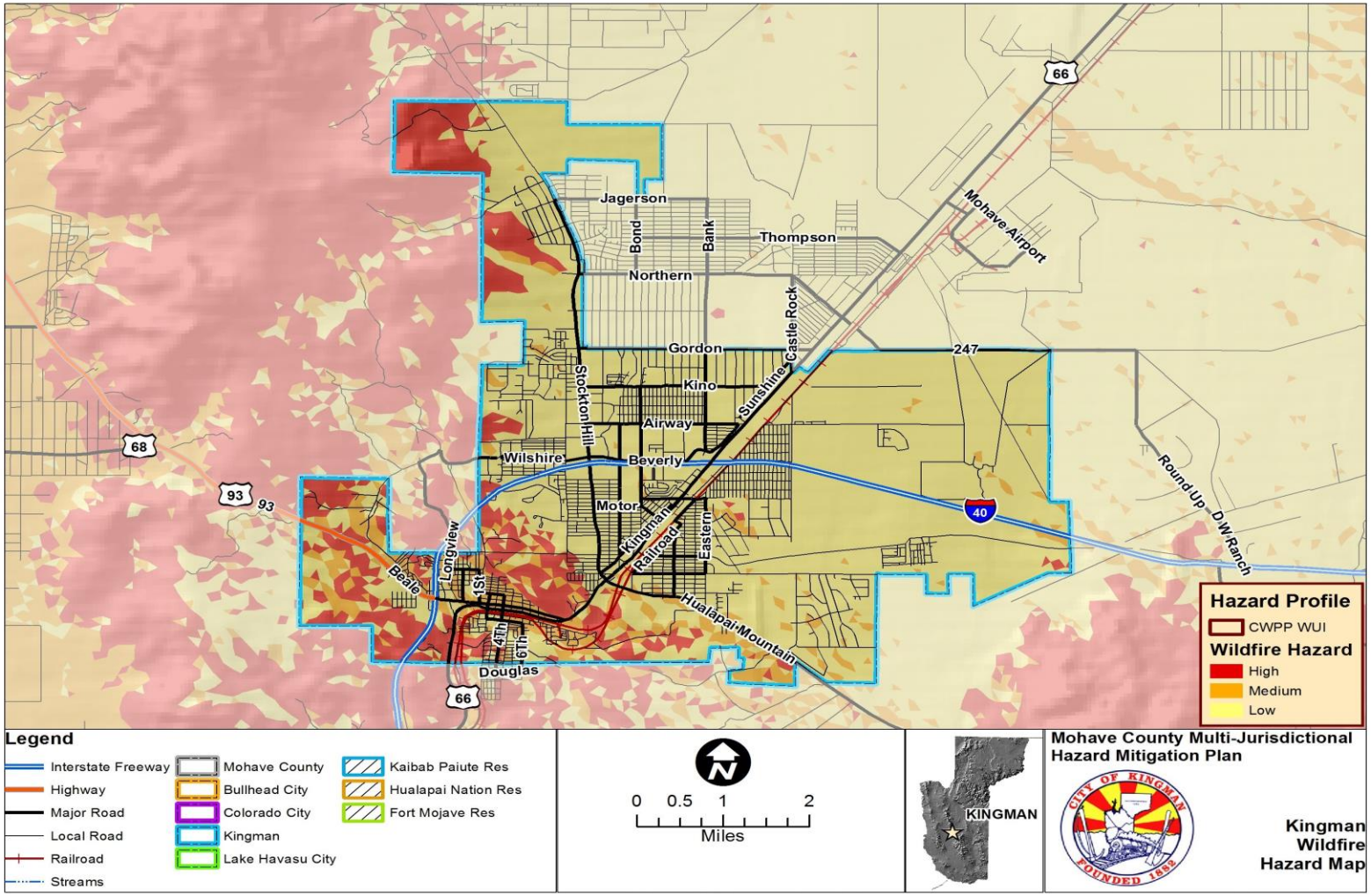
Southwest Area Incident Management Team, 2004, website data at:
http://www.fireteam-sw.com/oltrogge/incidents/nuttall/maps/index.htm



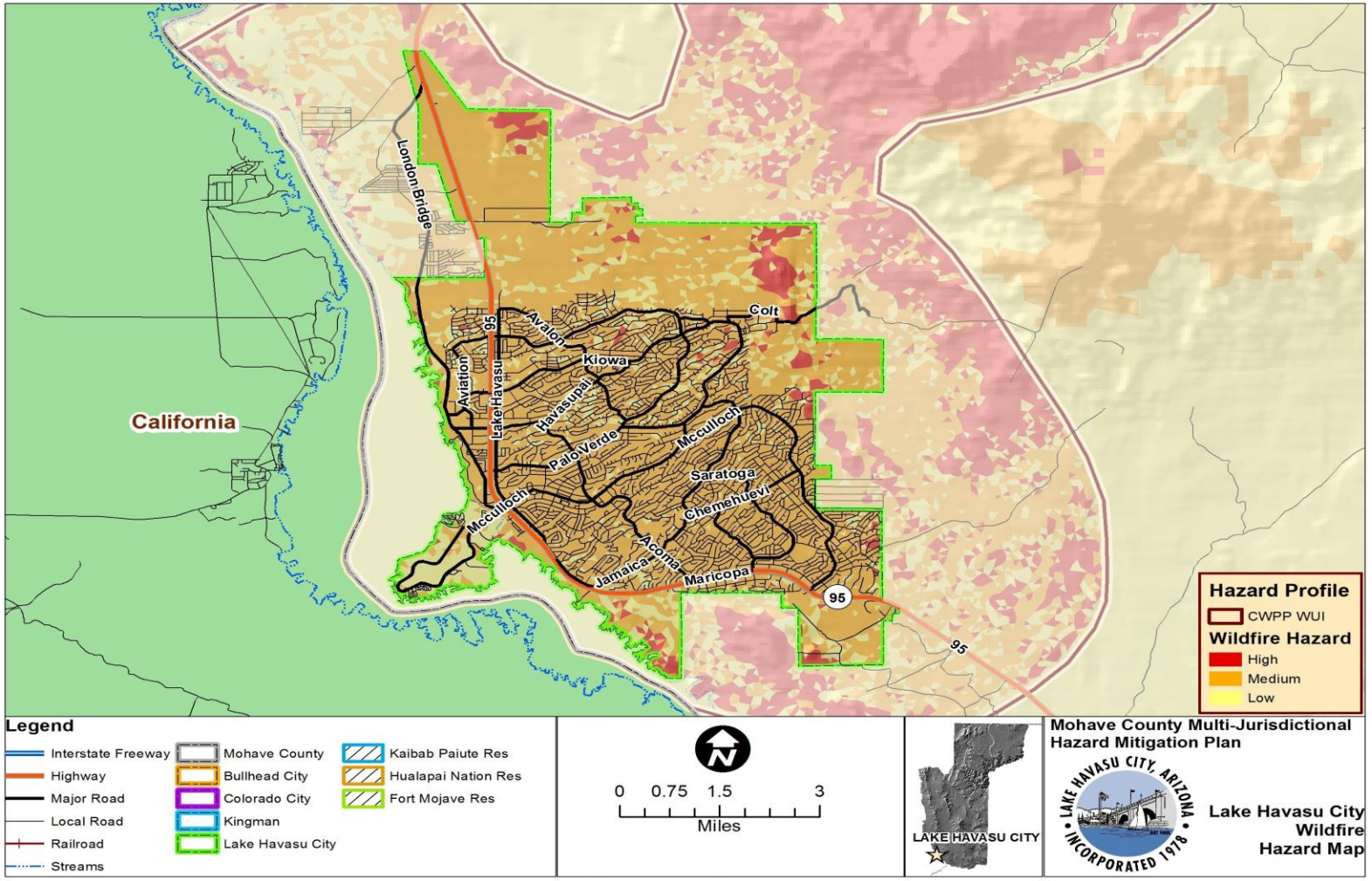
Map 4-28: Wildfire Hazard, Bullhead City



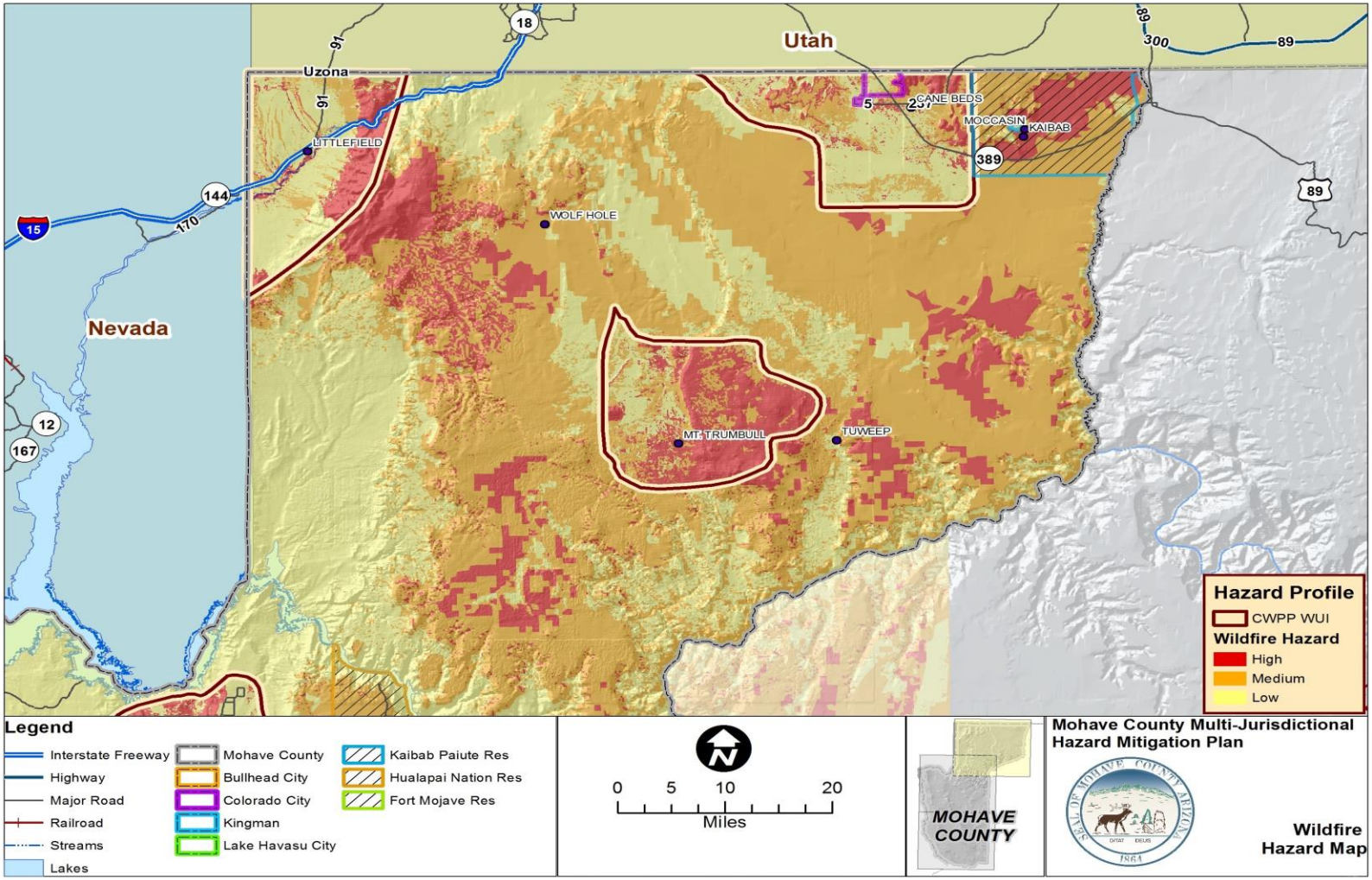
Map 4-29: Wildfire Hazard, Colorado City



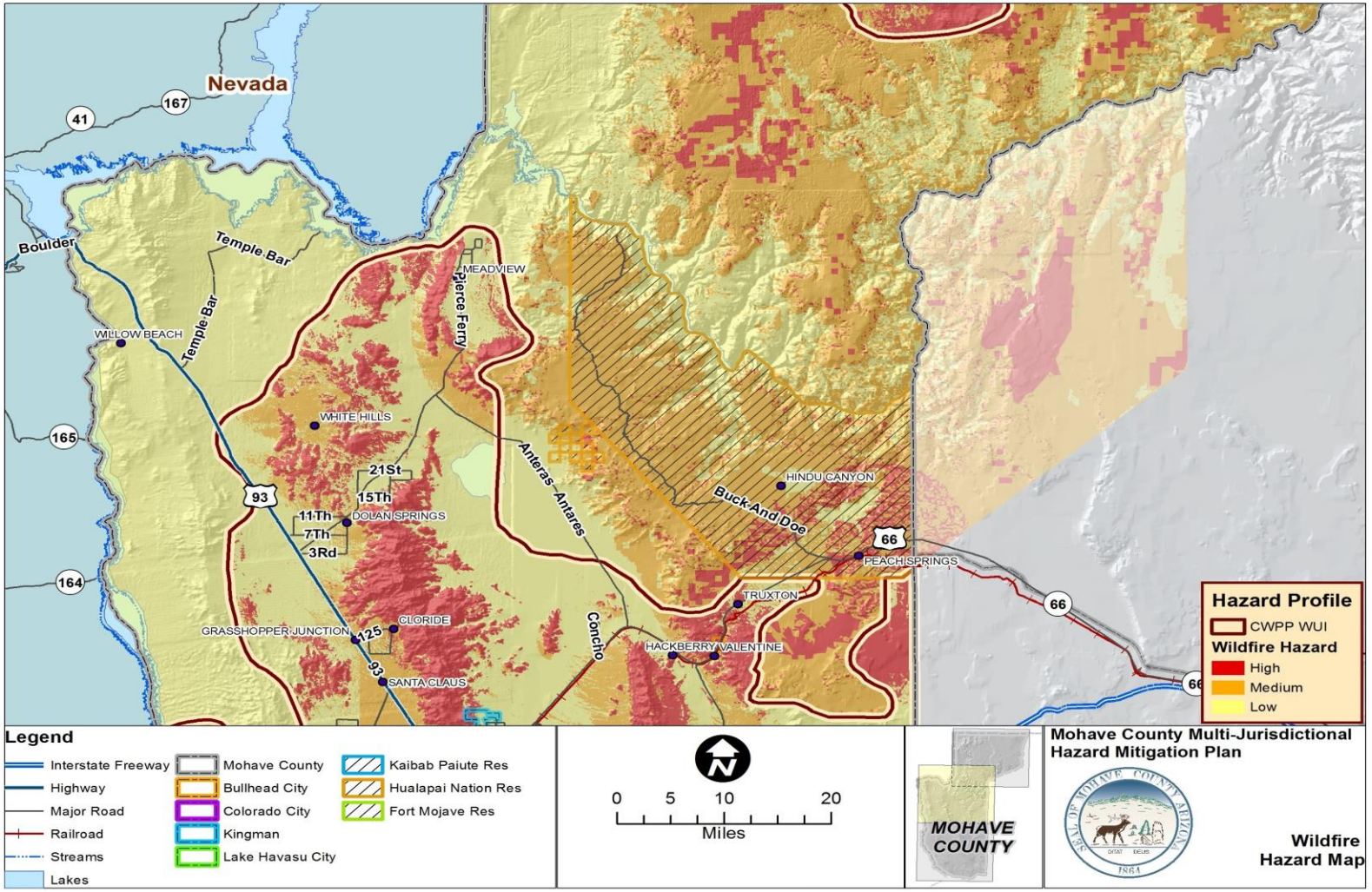
Map 4-30: Wildfire Hazard, Kingman



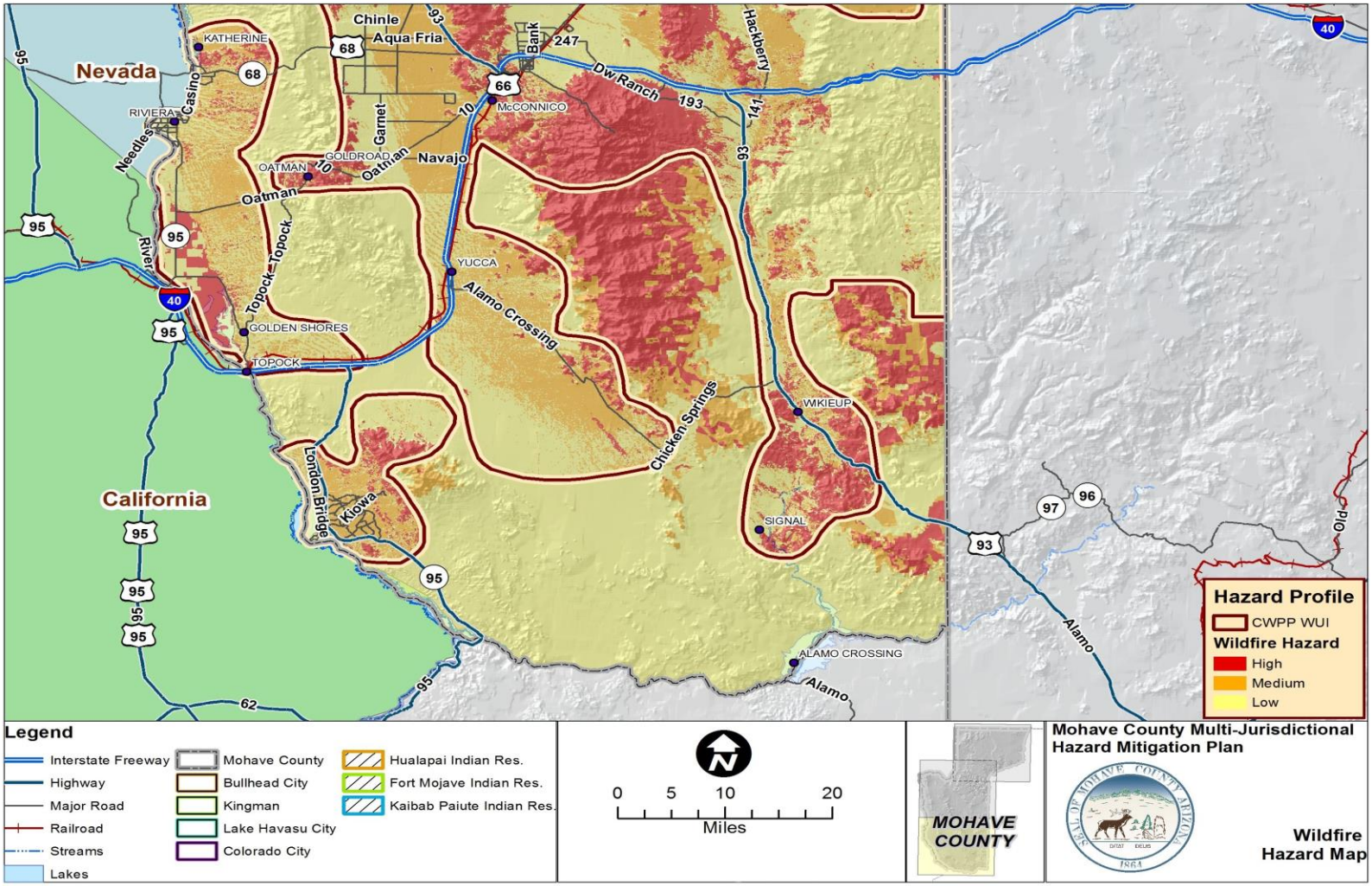
Map 4-31: Wildfire Hazard, Lake Havasu City



Map 4-32: Wildfire Hazard, Mohave County



Map 4-33: Wildfire Hazard, Mohave County



Map 4-34: Wildfire Hazard, Mohave County

4.4.10 Earthquake New Section

Description

For the purpose of this Plan, the hazard from earthquakes addressed in this section will pertain to earthquakes that resulted from past events and the possibility of future threat probability.

History

On July 6,2019 communities along the Colorado River felt the shaking from a 7.1 magnitude earthquake located near Ridgecrest Ca. Proceeding this event, Mohave County along with State and Federal Officials begin reviewing regional earthquake risks and emergency response plans to ensure downstream communities were better prepared for future seismic events. After receiving new hazardous risk information from the State of Arizona Geological Survey and the USGS regarding the Mead Slope and Needles Fault Zones, Mohave County Officials decided to accelerate mitigation planning efforts within the communities at risk. It was also found that ageing utility and transportation infrastructure locate downstream from Hoover Dam along the Colorado River were now placed into a higher risk category from a local earthquake event. It was with this increase in seismic risk that Mohave County included a new earthquake mitigation section into its all hazards mitigation plans.

Mohave – Abstract

Mohave County is underlain by several major Neogene tectonic fault systems. The earthquake risk in Mohave County ranges from high in the northern portions of the County to low in the south. The Hurricane fault located in northern Mohave County has the fastest displacement rate, longest length, and largest Maximum Credible Earthquake (M7.75) of any Arizona fault (Bausch and Brumbaugh, 1997). The Grand Wash, Hurricane and Toroweap faults straddle the boundary between the Basin and Range Province and the Colorado Plateau. Rupture along these major fault systems is infrequent, but they can produce moderate to large magnitude earthquakes up to M7.0+ event. According to Bausch and Brumbaugh (1997) these boundary faults represent the bulk of earthquake hazard to Mohave County. The Colorado River communities of Mohave County are threatened by the Mead Slope, Needles Fold and California's San Andreas faults. A moderate- to large-magnitude seismic event from any of these faults could cause damage within the Colorado River communities of Lake Havasu, Desert Hills, Havasu Heights, Topock, Golden Shores, Mohave Valley, City of Needles CA, Fort Mojave Indian Community, Laughlin NV, Oatman and Bullhead City. A failure of Glen Canyon, Hoover, Davis or Parker dams along the Colorado River as a result of an earthquake would greatly extend the scope of an earthquake disaster. While Glen Canyon, Hoover and Parker are concrete arch dams, that are historically the most resistant to earthquake damage, Davis Dam is an earthen dam, a design that historically performs much more poorly in earthquakes. The earthquake hazard for northern Mohave County is generally greater than that for southern Mohave County. A large ground rupturing earthquake on either of these boundary faults is considered a worst-case scenario for Mohave County, and would result in significant damage. Because of these risks, Arizona is designated by the Federal Emergency Management Agency National Earthquake Hazards Reduction Program as a "High Risk" state for earthquakes.

According to US Geological Survey's

Earthquake Magnitude, Intensity & Modified Mercalli Scale

Moment magnitude (Mw) is a measure of the energy released by an earthquake and provides the basis for comparing earthquakes; all Mw4.0 earthquakes, for example, release the same amount of energy. With each increase in unit of magnitude, say from Mw5.0 to Mw6.0, there is a 32-fold increase in energy release; from Mw5.0 to Mw7.0, the total increase in magnitude is about 1000-fold (32 * 32)! An increase in magnitude corresponds to an increase in the size of the area impacted, the duration of shaking, and the potential for damage.

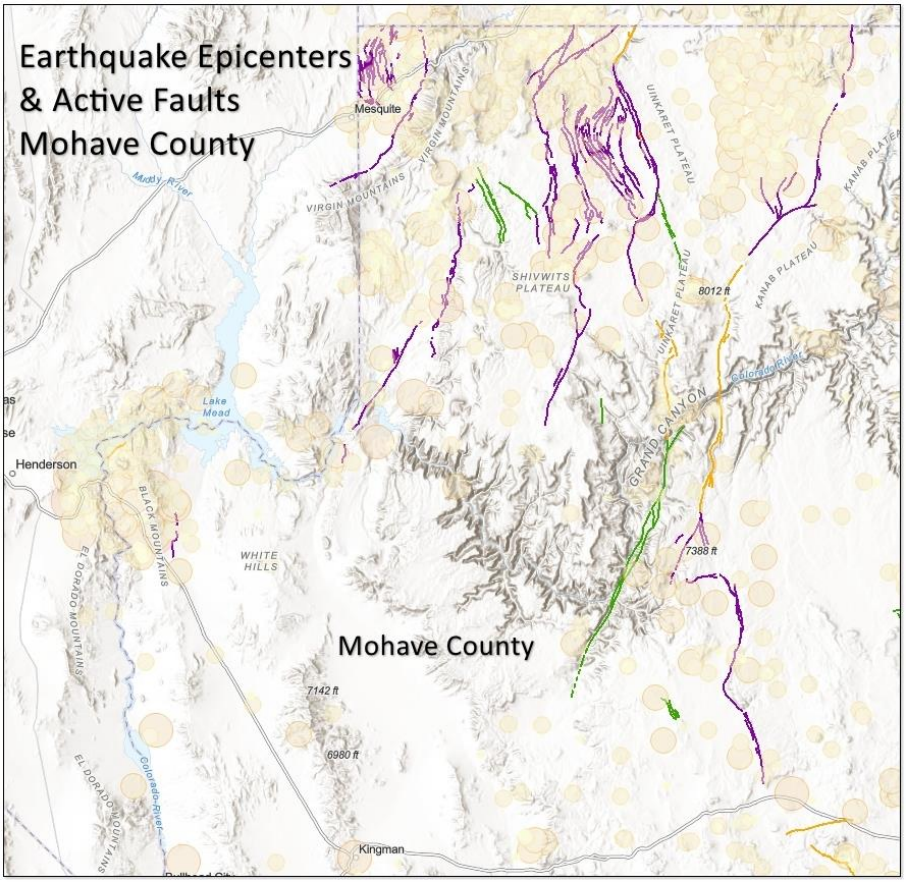
Intensity is a measure of local ground shaking that directly impacts human society and is best characterized by the Modified Mercalli Scale (Table n). Proximity to the earthquake source, population density, building style(s), substrate, and environmental setting greatly influence the intensity of an earthquake. The Modified Mercalli Intensity Scale (MMI), enumerates in Roman numerals the 12 intensity steps. For instance, an MMI value of 3 is felt locally and may cause hanging objects to swing to and from; an MMI value of IX, on the other hand, is accompanied by violent shaking, general panic, and damage to masonry buildings and underground pipes.

Table n. Modified Mercalli Intensity Scale. (Source, U.S. Geological Survey)

Intensity	Shaking	Description/Damage
I	Not felt	Not felt except by a very few under especially favorable conditions.
II	Weak	Felt only by a few persons at rest,especially on upper floors of buildings.
III	Weak	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
IV	Light	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Moderate	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Very strong	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Severe	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Violent	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Extreme	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

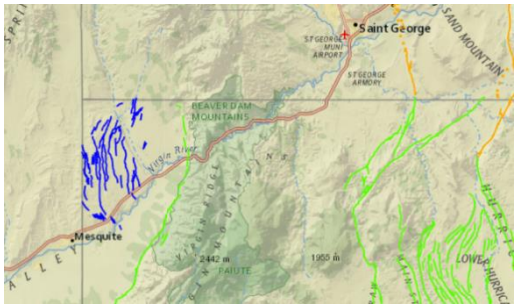
Cascading Events

Cascading events are those phenomena – e.g., ground shaking, landslides, rock fall, tsunamis, liquefaction, drainage disruption, and a host of society-related events: urban fires, water main breaks, collapsed building and infrastructure, utility lines breaks … - triggered by an earthquake and representing a simultaneous or near-simultaneous, complementary hazard. Throughout most of Mohave County, landslides along with infrastructure damage are the most likely cascading events. Additional cascading events are possible along the Colorado River corridor and could include liquefaction and dam malfunction or collapse (Bausch and Brumbaugh, 1997).

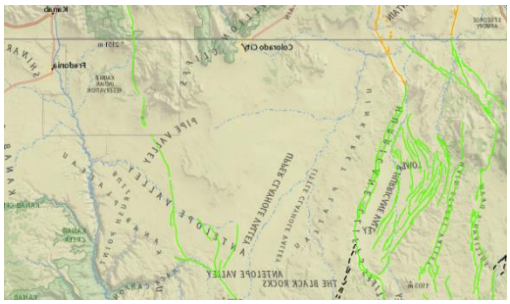


Earthquake epicenters (light orange circles) and Quaternary faults of Mohave County (purple, gold and green lines or line segments). Epicenter circle size increases with increasing earthquake magnitude. Hundreds of earthquakes have occurred in Mohave County and environs.

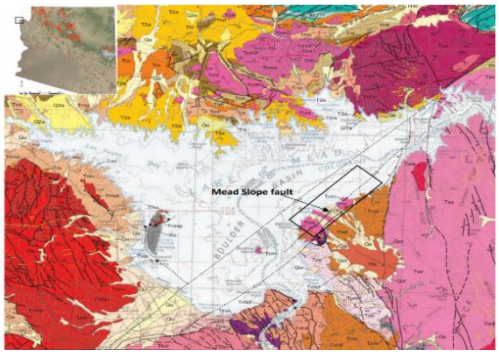
Source: Natural Hazards in Arizona Viewer: earthquake epicenter catalog from 1852 to Sept. 2021.



Beaver Dam Fault Zones

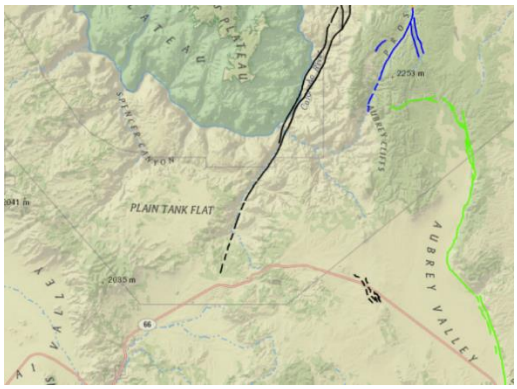


Colorado City Fault Zones

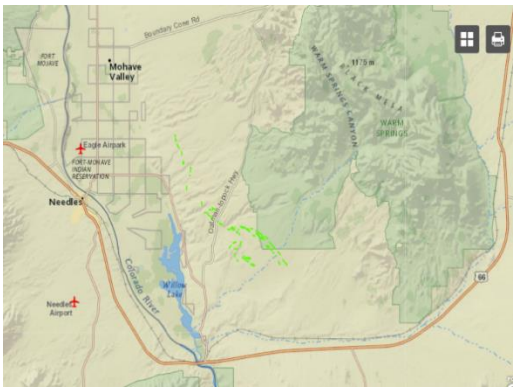


Mead Slope Fault Zones

South Cove / Meadview Fault Zone



Peach Springs Fault Zone



Needles Fold Fault Zone

Earthquake 'clearly present both a High to Low Risk across Mohave County. Hundreds of earthquakes have originated in Mohave County and adjacent border areas of California, Coconino County, Nevada, and Utah. Historically, seismic station coverage in Mohave County has been poor, therefore past events may have been underrepresented. Arizona Geological Survey Broadband Seismic Network is now capable of detecting most Mw2.5 and greater earthquakes. In December 2018 and January 2019, a swarm of small magnitudes earthquakes – including two events larger than Mw 3.0 - occurred on or adjacent to the Washington Fault of northern Mohave County (Ben-Horin, 2019). The following incidents represent examples of moderate- to large magnitude earthquake activity that has impacted the County:

- 1 Colorado River, Fort Mojave near Needles Ca in 1800'S
- 2 Hoover Dam, May 1939. M 5.0
- 3 Needles, May 1947 M 3.4
- 4 Fredonia, July 1959. M 5.75
- 5 Laughlin, July 1966 M 3.8
- 6 Mohave Valley, 1983 M 3.1
- 7 Landers California, 1992, M 7.3
- 8 Hector Mine California, 1999 M 7.1
- 9 Ridgecrest California, 2019, M 6.4

Changes in Development in the Hazard Area

This is a newly added hazard to this plan. The addition is not due to any new residential or commercial developments in earthquake prone areas but rather a new interpretation of the earthquake risk within the county. New information on the number and size of faults in the county as well as a reevaluation of the probabilities of seismic activity at damaging magnitudes have prompted the addition.

Probability and Magnitude of future events

For the purposes of this Plan, the probability and magnitude of earthquake hazards in Mohave County jurisdictions are based on a maximum probable earthquake of M 6.0 at a distance between 0-100 miles from epicenter.

The 2019 US National Seismic Hazard Model of the U.S. Geological Survey places Mohave County in the 19% to 36% and the 4% to 19% chance area of minor damaging earthquake – MMI VI - between 2019 and 2119. It is unlikely that the USGS models incorporate the fresh strain data of the southern Basin and Range Province recently reported by Broermann and others (2021). These new data could potentially lead to an increase in the probability of MMI VI ground shaking in the next 100 years throughout Arizona's Basin and Range Province.

Vulnerability

Table 4-14: CPRI Results for Earthquake

Participating Jurisdiction	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI Score
Bullhead City	Likely	Limited	< 6 hours	< 1 week	2.85
Colorado City	Highly Likely	Critical	< 6 hours	<1 week	3.60
Kingman	Unlikely	Negligible	< 6 hours	<1 week	1.65
Lake Havasu City	Unlikely	Limited	< 6 hours	<1 week	1.95
Unincorp Mohave County	Likely	Limited	< 6 hours	>1 week	2.95
Ft Mojave Indian Tribe	Likely	Limited	< 6 hours	>1 week	2.95
Hualapai Tribe	Likely	Negligible	< 6 hours	< 1 week	2.55
				County-wide average CPRI	**2.64**

Earthquakes could potentially disrupt major transportation routes near and inside Mohave County. These include Interstates U.S 93 and I-40, State Routes 66, 95 and 389. The Burlington-Northern Santa Fe (BNSF) Railway runs through the middle of the county. Railroad cargo includes hazardous materials such as numerous TIER II reportable products and the highly volatile Bakken crude product. The AMTRAK passenger trains also operate on the BNSF lines with depots located in Kingman. Air traffic in Lake Havasu City, Bullhead City and Kingman could also be impacted. Several Natural gas pipelines crossing Mohave County from east to west located near the Needles Fault Zone. Regional power transmission lines between Parker and Davis Dams also cross the Needles Fault Zone near Golden Shores. In addition, a liquefaction risks are possible along the Colorado River Communities below Davis Dam. (In 1997 the BOR classified Davis Dams as a High Hazard to earthquake impacts). The BOR lists earthquake hazards as its most likely catastrophic threat to both Hoover and Davis Dams location near the Mead Slope and the Needles Fault Zones. (All regional BOR dams are listing earthquake risks as their probable threat to facilities for dam failure for emergency planning efforts).

These are events that can occur because of the earthquake and can continually build upon the challenges Emergency Management, First Responders, etc., face when dealing with the effects of an earthquake. The type or range of cascading events are largely determined by the magnitude and location of the event, and various other factors including proximity to the epicenter, nature of the substrate (soil type, solid rock, unconsolidated sediments, saturated sediments), building style (e.g., unreinforced masonry buildings vs. reinforced masonry or wood frame buildings), age and type of structures, time of day, and bodies of water. Building materials and construction standards play a significant role in the extent of earthquake damage.

Additional cascading events may include ruptured gas and water lines and collapsed bridges along the previously mentioned transportation routes. Breached dams, landslides, rock falls and communications failures are also possibilities.

Regulatory Context (from Coconino County 2021 draft multi-jurisdictional hazard mitigation plan**).**
Arizona does not have specific regulations related to seismic hazards, State l Administrative Code Title 7, Education Chapter 6, Section 760. Laws and Building Codes states: To the extent required by law, school buildings shall follow federal, state and local building and fire codes and laws that are applicable to the particular building. At a minimum, the 1997 Uniform Building Code (UBC) is required to be met for new school facility construction and as required, for building renovations in existing schools.

Vulnerability – Loss Estimations

Loss estimates to all facilities located within the earthquake hazard areas were identified based on the loss estimation tables published in the FEMA HAZUS Earthquake Global Risk Report Golden Shores, October 19, 2020 located in Appendix E.

Sources

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NAU Earthquake Hazard Evaluation Mohave County Report, July 1997 Bausch, D.B. and Brumbaugh, D.S., 1997, Earthquake Hazard Evaluation, Mohave County, Arizona. Arizona Earthquake Information Center, Flagstaff, Arizona.

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Petersen, M.D., Shumway, A.M. and Powers, P.M., 2019, The 2018 update of the US National Seismic Hazard Model: Overview of model and implications. Sage Journals, Earthquake Spectra, https://doi.org/10.1177/8755293019878199

Arizona GEO Survey AZ HWY 95 Realignment Corridor, June 2009

Pearthree, Philip A., Ferguson, Charles A., Johnson, Bradford J., and Guynn, Jerome, 2009, Geologic Map and Report for the Proposed State Route 95 Realignment Corridor, Mohave County, Arizona: Arizona Geological Survey Digital Geologic Map DGM-65, version 1.0, map scale 1:24,000, 47 p. and 5 map sheets. (http://repository.azgs.az.gov/uri_gin/azgs/dlio/619)

BOR Hoover, Davis, Parker Dams EAP, August 2018

Davis Dam Technical Memo # DP-8312-3, May 1996

SECTION 5: MITIGATION STRATEGY

5.1 Section Changes

- A new format/table was used to analyze the capabilities and resources.

The mitigation strategy provides the "what, when, and how" of actions that will reduce or possibly remove the community's exposure to hazard risks. The primary components of the mitigation strategy are:

Goals and Objectives

Capability Assessment

Mitigation Actions/Projects and Implementation Strategy

5.2 Goals and Objectives

The 2016 Plan goal and objectives were reviewed by the Planning Team and it was determined there was no need for change as they adequately illustrated the efforts that should continue.

- **GOAL:** Reduce or eliminate the risk to people and property from natural hazards.
    - **Objective 1:** Reduce or eliminate risks that threaten life and property in the incorporated, unincorporated, and Tribal jurisdictions within Mohave County.
    - **Objective 2:** Reduce risk to critical facilities and infrastructure from natural hazards.
    - **Objective 3:** Promote hazard mitigation throughout the incorporated, unincorporated, and Tribal jurisdictions within Mohave County.
    - **Objective 4:** Increase public awareness of hazards and risks that threaten the incorporated, unincorporated, and Tribal jurisdictions within Mohave County.

5.3 Capability Assessment

An important component of the Mitigation Strategy is the identification and review of resources needed to effectively mitigate the effects of hazards. The Capability Assessment is comprised of several components:

- Planning and Regulatory – Plans, policies, codes and ordinances that prevent and reduce the impacts of hazards.
- Administrative and Technical – Staff and their skills and tools that can be used for mitigation planning and to implement mitigation activities.
- Financial – Resources the community has access to or is eligible to use for hazard mitigation.
- Education and Outreach – Methods in place that could be used to implement mitigation activities and communicate hazard-related information.

For this update, the Planning Team chose a slightly different and more informative table format to list their capabilities. The tables are intended to be adjusted over time to better illustrate the resources and capabilities of the communities. The following tables summarize the above components for each jurisdiction and tribe.

Table 5-1: Capability Assessment for Mohave County		
PLANNING and REGULATORY		
PLANS	**Yes/No Year**	**Does the plan address hazards? Does the plan ID projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?**
Capital Improvements Plan	Yes, 2021	No, no, no
Community Wildfire Protection Plan	Yes, 2019	Yes, yes, yes
Comprehensive/Master Plan	Yes, 2015	Yes, no, yes
Continuity of Operations Plan	Yes, 2019	Yes, no, no
Economic Development Plan	Yes, 2020	No, no, no
Emergency Operations Plan	Yes, 2020	Yes, no, yes
Stormwater Management Plan	No	
Transportation Plan	Yes, 2015	Yes, no, yes
BUILDING CODES, PERMITTING, INSPECTIONS	**Yes/No**	**What type of codes? Are codes adequately enforced?**
Building Codes	Yes	2012 Code was changed to the 2018 Code in 2021 Yes
Site plan review requirements	Yes	
LAND USE PLANNING & ORDINANCES	**Yes/No**	**Is the ordinance effective for reducing hazard impacts? Is the ordinance adequately administered and enforced?**
Floodplain ordinance	Yes	Yes, yes
Subdivision ordinance	Yes	Yes, yes
Zoning ordinance	Yes	Yes, yes
How can capabilities be expanded and improved to reduce risk? County is moving to the Integrated Preparedness Planning model to merge training and exercises more closely with operations, logistics, and planning functions for emergencies. More frequent reviews of all plans and associated exercises are needed. Additional grant funding for identified projects under the Community Wildfire Protection Plan is being requested and obtained. More detailed expansion of subsidiary functional planning under the Emergency Operations and Continuity of Operations Plans is needed.		
ADMINISTRATIVE and TECHNICAL		
ADMINISTRATION	**Yes/No**	**Describe capability. Is coordination effective?**
Mutual aid agreements	Yes	County signatory to Arizona Mutual Aid Compact for state, counties, cities, tribes, and special districts. Coordination is effective through DEMA.
Planning Commission	Yes	Advises BOS on orderly growth and development. Yes.
TECHNICAL STAFF	**Yes/No FT/PT**	**Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective? Have skills/expertise been used to assess/mitigate risk in the past?**
Building Official	Yes	Yes, yes, yes
Community Planner	Yes	Yes, yes, yes
Emergency Manager	Yes	Yes, yes, yes

Engineer	Yes	Yes, yes, yes
Floodplain Manager/Administrator	Yes	Yes, yes, yes
GIS/HAZUS Coordinator	Yes	Yes, yes, yes
Grant writer	Yes	Yes, yes, yes
How can capabilities be expanded and improved to reduce risk? Additional training for the various technical staff in hazards and mitigation would be beneficial. Coordination among the technical staff is generally good but could be improved. The biggest challenge is acquiring and retaining qualified personnel, which the County is attempting to address through comprehensive wage increases. Increased wages will improve retention of experienced building inspectors and public works engineers and staff as well as hiring of qualified personnel, which enhances project planning and implementation capabilities.		
FINANCIAL		
FINANCIAL	**Yes/No**	**Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions?**
Capital improvements project funding	Yes	Yes, for county facilities and infrastructure. No.
Community Development Block Grant	Yes	Yes, for community development projects. No.
Authority to levy taxes for specific purposes	Yes	Special Districts include schools, water and fire. Yes.
Impact fees for new development	No	
Incur debt through special tax bond	No	
Incur debt through general obligation bonds	Yes	Unknown
How can capabilities be expanded and improved to reduce risk? Most fire districts are at the maximum allowable tax rates but are still experiencing a lack of funds for personnel retention and for acquiring and maintaining specialized capabilities. This can be addressed by continued attention to seeking grant funding and with enhanced planning for mutual aid and coordinated procedures for handling emergencies. Grants are available for hiring of fire personnel, which will expand response capability for wildfires and Hazmat events. In addition, the Flood Control District is seeking grant funding for several identified flood control infrastructure projects. Pre-planning for coordinated procedures for enhanced mutual aid allows for identification of area gaps in functions, such as interoperable communications and specialized equipment, and the mitigation measures to close those gaps.		
EDUCATION and OUTREACH		
PROGRAM / ORGANIZATION	**Access / Eligibility (Yes/No)**	**Describe program/organization and how it relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?**
Firewise Communities certification	No	Helps Inform homeowners how to mitigate for wildfires and is a possible future program. Yes.
StormReady certification	Yes	Hazardous weather public notification/warning preparedness and citizen awareness. Yes.
Citizen groups focused on emergency preparedness, environmental protection, etc.	Yes	CERT organizations address disaster preparedness. Are primarily response oriented but can provide some mitigation assistance.
Public education/information programs (fire safety, household preparedness, responsible water use, etc)	Yes	Mohave Co Flood Control Division has a Program for Public Involvement with a steering committee that includes public representatives. This program provides information to the public regarding flood preparedness and safety, flood insurance, and mitigation measures. A Flood Risk Management Plan has also been developed in conjunction with the MCFCD through a steering committee.
Public-private partnership initiatives addressing disaster-related issues	Yes	Emergency Management works with NGO's and community service groups to plan for emergencies and promote citizen preparedness measures; most of this does not include mitigation measures, other than encouragement of defensible space preparation and protection

		options for homes threatened by burn scar flooding..
How can capabilities be expanded and improved to reduce risk? Additional public outreach programs can be developed and implemented, particularly regarding the wildfire and power outage hazards. It is planned to expand information on the Emergency Management webpage and to conduct additional Firewise outreach in higher risk communities. Expansion of the Community Organizations Active in Disaster group is needed to engage more organizations in preparedness and mitigation planning.		

Table 5-2: Capability Assessment for Ft. Mojave Indian Tribe		
PLANNING and REGULATORY		
PLANS	**Yes/No Year**	**Does the plan address hazards? Does the plan ID projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?**
Capital Improvements Plan	Yes	Fort Mojave Tribal Utility Authority (FMTUA) All tribal corporations (for profit entities)
Community Wildfire Protection Plan	No	
Comprehensive/Master Plan	Yes	(In draft form pending Council adoption)
Continuity of Operations Plan	Yes, 2013	The COOP plan is in draft form and currently being updated to add new information. Upon update, it will be formally adopted by Tribal Council. The plan addresses hazards, IDs projects that can be used in the mitigation strategy and portions could be used to implement mitigation actions.
Economic Development Plan	No	Not Applicable
Emergency Operations Plan	Yes 2005 updated yearly	Tribal Emergency Response Plan (TERP) written and implemented in 12-2005. Updated yearly (DHS is higher level of authority)
Stormwater Management Plan	Yes 2009	The Tribe has adopted the Floodplain Management Ordinance of 2009 which includes NFIP studies and new mapping
Transportation Plan	Yes	The plan addresses hazards and can be used to implement mitigation actions.
The FMIT Emergency Operations Center is responsible for integrating Tribal Leadership, Department Directors, & Entity Managers into all planning processes related to Emergency Response & Environmental Protection. Each Department Director and Entity Manager is incorporated into the EOC Emergency Operation Strategy. DER Staff provide outreach and updates to all stakeholders within the Tribe. DER also works directly with the Tribal Planning Department, Building Office, Law Enforcement, & Health Department to ensure that all plans are integrated and optimized for the Tribe. The DER office participates in federal, regional, and state planning efforts to make sure that the Tribe is included in any planning efforts that impact the Fort Mojave Reservation.		
BUILDING CODES, PERMITTING, INSPECTIONS	**Yes/No**	**What type of codes? Are codes adequately enforced?**
Building Codes	Yes	Since 2003- International Building Code. Codes are adequately enforced by Tribal Building Inspector.
Site plan review requirements		FMIT Planned Area Development Sub-Division Ordinance Adopted Development Standards Design Review Guidelines (For developments)
LAND USE PLANNING & ORDINANCES	**Yes/No**	**Is the ordinance effective for reducing hazard impacts?**

		Is the ordinance adequately administered and enforced?
Floodplain ordinance	Yes	Effective June 9, 2020 the Fort Mohave Floodplain Ordinance achieved the status of compliant by FEMA Region 9
Subdivision ordinance	Yes	FMIT Planned Area Development Sub-Division Ordinance.
Zoning ordinance	Yes	Performance based land use approval process and development standards.
How can capabilities be expanded and improved to reduce risk? Plans are reviewed and updated on a regular basis. Draft plans will be formally adopted by Tribal Council. Having formally approved plans protects the FMIT Community and allows FMIT to be a better partner when coordinating safety mitigation with neighboring localities & regions which is especially important in our Tri-State Area. The plans allows our staff to implement operations with the guidance approved in our plans thereby improving the Tribe's ability to provide effective mitigation as the plans serve as guides to enhance the overall capabilities of the human capital and resources available to our Team.		
ADMINISTRATIVE and TECHNICAL		
ADMINISTRATION	**Yes/No**	**Describe capability.** **Is coordination effective?**
Mutual aid agreements	No	DER is working on mutual aid agreements with Mohave County Emergency Management and the Arizona Statewide Mutual Assistance Compact. DER has been granted the authority to pursue these agreements in late 2014.
Planning Commission	No	Not Applicable
TECHNICAL STAFF	**Yes/No** **FT/PT**	**Is staff trained on hazards and mitigation?** **Is coordination between agencies and staff effective?** **Have skills/expertise been used to assess/mitigate risk in the past?**
Building Official	Yes	Staff is trained on hazards and mitigation and has been part of the planning team since 2005. Coordination between agencies is effective
Community Planner	Yes	On the planning team committee since 2009.
Emergency Manager	Yes	Staff is trained on hazards and mitigation and has been part of the planning team since 2005. Coordination between agencies is effective
Engineer	Yes	On the planning team committee since 2009.
Floodplain Manager/Administrator	Yes	On the planning team committee since 2009.
GIS/HAZUS Coordinator	Yes	Staff is trained on hazards and mitigation and has been part of the planning team since 2005. Coordination between agencies is effective
Grant writer	Yes	Staff is trained on hazards and mitigation and has been part of the planning team since 2009. Each department has grant writing abilities
How can capabilities be expanded and improved to reduce risk? An annual investment towards continuous staff training allows FMIT staff to remain equipped to mitigate emergencies within the FMIT Community. The Tribe intends to provide annual training to staff to increase safety knowledge and enhance emergency preparedness responsiveness. FMIT relies heavily on regional and local partnerships, ensuring FMIT staff is trained allows for building substantial and necessary partners. These partnerships help the Tribe participate in multi-jurisdictional strategies that help offset the costs that could be barriers in safety mitigation efforts. Continuing Mutual Aid agreements with Mohave County and ADEM help the Tribe enhance on-reservation resources with local and regional stakeholders. These agreements provide necessary supports that the Tribe's coordinated response strategy requires to operate efficiently and effectively.		
FINANCIAL		
FINANCIAL	**Yes/No**	**Has the funding resource been used in past and for what type of activities?**

		Could the resource be used to fund future mitigation actions?
Capital improvements project funding	Yes	Eligible for water projects, roads and infrastructure. This resource could be used to fund future mitigation actions.
Community Development Block Grant	Yes	Eligible and completed for JBs Restaurant and Boys and Girls Club. This resource could be used to fund future mitigation actions.
Authority to levy taxes for specific purposes	Yes	Tribal Business Privilege Tax Tobacco Tax; Fuel tax Property Tax This resource could be used to fund future mitigation actions.
Impact fees for new development	Yes	Mesquite Creek Development (Phase I- 210 homes) (Phase II- 65 homes) Desert Springs Development (413 homes) Development agreement for non-residential developments This resource could be used to fund future mitigation actions.
Incur debt through special tax bond	Yes	Water and sewer (assess people benefiting) This resource could be used to fund future mitigation actions.
Incur debt through general obligation bonds	Yes	Eligible for Fort Mojave Tribal Utility Authority (FMTUA) This resource could be used to fund future mitigation actions.
How can capabilities be expanded and improved to reduce risk? By Leverage existing funding sources and continuing to evaluate new funding sources for mitigation projects, the Tribe benefits from partnering with neighboring local and regional partners to enhance mitigation supports and resources within the FMIT community. Without these key partnerships, the enormity of the risks to our area with increased drought and fire danger & the lack of emergency services on the reservation would prevent FMIT staff from being able to operationalize appropriate mitigation protocols within the Tribe. The Tribe updates inter-governmental agreements (IGAs) as needed annually to ensure that the Tribe and our partners have necessary systems in place to operationalize mitigation efforts.		
The Fort Mojave Indian Tribe provides the Department of Emergency Response & Environmental Protection Agency (DER/EPA) an annual budget for hazard mitigation projects. The DER/EPA Office undergoes the review process every fiscal year and provides Tribal Leadership an identified list of projects that require hazard mitigation funding. The Tribe then prioritizes the projects based on need and provides an annual budget to the FMIT EPA/DER office for the year from their General Fund.		
The Fort Mojave Tribal Council undergoes an annual budgetary process for the FMIT DER/EPA Office which provide annual resources for hazard mitigation projects identified by the FMIT DER/EPA department.		
The Fort Mojave Indian Tribe has used funding to help build outcomes for HMGP. The Tribe consults with the DOI and BIA to mitigate wildland fires that are an immediate threat to the FMIT Reservation.		
EDUCATION and OUTREACH		
PROGRAM / ORGANIZATION	**Access / Eligibility (Yes/No)**	**Describe program/organization and how it relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?**
Firewise Communities certification	No	Not Applicable
StormReady certification	No	Not Applicable
Citizen groups focused on emergency preparedness, environmental protection, etc.	No	Not Applicable
Public education/information programs (fire safety, household preparedness, responsible water use, etc)	Yes	Program administered by FMIT Department of Emergency Response (DER). The FMIT DER administers household preparedness programs and EPA education programs. These programs are continuous and will be used to help implement future mitigation activities.

Public-private partnership initiatives addressing disaster-related issues	Yes	FMIT DER has implemented FEMA's all threat/hazard, whole community approach. These programs are continuous and will be used to help implement future mitigation activities.
How can capabilities be expanded and improved to reduce risk? The Tribe invests annually into systems that help alert our community on different levels. FMIT staff currently operation the Red Alert system to notify of immediate emergencies, shutdowns, and/or evacuation protocols. FMIT staff also operate a heavy social media and 1:1 communications presence that includes weekly door-to-door notices, daily door-to-door notices when necessary on the FMIT reservation, two electronic community billboards, and digital public addresses by Tribal Leadership and FMIT staff experts via zoom or Facebook Live. By continuing public education will strengthen FMIT's ability to be more resilient when hazards and disasters arise.		
The DER office is responsible with coordinating with the FMIT Public Relations Officer to make sure that the public aware of all plans being reviewed, implemented or in draft form for the Tribe. The FMIT Public Relations Officer uses a mixed media message of traditional notice and social media optimization to make sure that the public has access to the information. The DER office provides on-site information to the Tribal Public by appointment of all plans within their oversight.		
Table 5-3: Capability Assessment for Hualapai Tribe		
PLANNING and REGULATORY		
PLANS	**Yes/No Year**	**Does the plan address hazards? Does the plan ID projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?**
Capital Improvements Plan	No	
Community Wildfire Protection Plan		
Comprehensive/Master Plan	Yes (Draft)	Hualapai 5-yr Strategic Plan / Only addresses railroad, flood control and drainage issues
Continuity of Operations Plan	No	
Economic Development Plan	Yes (Draft)	Part of Strategic Plan
Emergency Operations Plan	No	
Stormwater Management Plan	No	
Transportation Plan	Yes	Yes
BUILDING CODES, PERMITTING, INSPECTIONS	**Yes/No**	**What type of codes? Are codes adequately enforced?**
Building Codes	Yes	IBC 2009 and NEC 2008 These are used and enforced
Site plan review requirements	No	No, we hire out to Mohave County when needed / Not a lot of activity
LAND USE PLANNING & ORDINANCES	**Yes/No**	**Is the ordinance effective for reducing hazard impacts? Is the ordinance adequately administered and enforced?**
Floodplain ordinance	No	
Subdivision ordinance	No	
Zoning ordinance	No	
How can capabilities be expanded and improved to reduce risk? Need to have floodplain analysis performed and hazard areas identified. This would provide information for the development of either storm water management plans or flood protection infrastructure as well as regulatory measures for new building.		
The Tribe has used the Hazard mitigation planning process to inform other planning efforts such as: • Truxton Triangle Master Plan reserved 47 acres of flood prone area as open space. • 69 KV powerline to GCW will clear vegetation under the lines and cut "danger" tress that may fall on the circuits. • Emergency Operation Center's site location away from train tracks and outside of a floodplain**.**		

ADMINISTRATIVE and TECHNICAL		
ADMINISTRATION	**Yes/No**	**Describe capability. Is coordination effective?**
Mutual aid agreements	Yes	Fire and Police /Coordination is Effective
Planning Commission	Yes	Tribal Environmental Review Commission (TERC)
TECHNICAL STAFF	**Yes/No FT/PT**	**Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective? Have skills/expertise been used to assess/mitigate risk in the past?**
Building Official	Yes / FT	Somewhat / Yes
Community Planner	Yes / FT	Yes, holds several FEMA certifications / Coordinates well
Emergency Manager	No	
Engineer	Yes / FT	FEMA G393 Trained, (previous ICS and CFM certified Floodplain Manager/ Coordinates well/ Has assessed and mitigated risks in the past
Floodplain Manager/Administrator	No	
GIS/HAZUS Coordinator	No	Some staff have GIS capability
Grant writer	Yes / FT	No.
How can capabilities be expanded and improved to reduce risk? Training to obtain or renew Certifications / Establish emergency manager position.		
FINANCIAL		
FINANCIAL	**Yes/No**	**Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions?**
Capital improvements project funding	No	
Community Development Block Grant	Yes	Project Specific
Authority to levy taxes for specific purposes	Yes	
Impact fees for new development	No	
Incur debt through special tax bond	No	
Incur debt through general obligation bonds	No	
How can capabilities be expanded and improved to reduce risk? Develop capital improvement policies, procedures and plan.		

The Hualapai Tribal Forestry Department utilizes funds through PL92-638 Indian Self Determination and Education Act of 1975 to perform all their functions including prescribed burns to mitigate wildland fire hazards.

Hualapai Public Services and Water Resources have and continue to use general funds/EPA to:

- construct burn pits for public use (Public Services)
- contract for aquifer studies to: (both departments)
    - Develop aggressive interception and recharge programs to mitigate the impact of climate change on the Tribe's water sources
    - Incorporate Alert Weather gaging to:
        - Provide early flood warning and provide input to watershed models for
        - Flooding
        - Drought Monitoring

The Tribe has not utilized federal grant funding from HMPG/PA/FMAG/or other grants but will be looking at future opportunities to apply for future grants as part of

the Hazard Mitigation process.		
EDUCATION and OUTREACH		
PROGRAM / ORGANIZATION	**Access / Eligibility (Yes/No)**	**Describe program/organization and how it relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?**
Firewise Communities certification	No	
Storm Ready certification	No	
Citizen groups focused on emergency preparedness, environmental protection, etc.	No	
Public education/information programs (fire safety, household preparedness, responsible water use, etc)	Yes	Only have Smokey the Bear visit in October of each year for national fire prevention awareness month
Public-private partnership initiatives addressing disaster-related issues	No	NWS has spoken on occasion
How can capabilities be expanded and improved to reduce risk? Develop and implement outreach programs to inform and organize public for hazard awareness and preparation. Research and develop plans to get StormReady and Firewise.		

Table 5-4: Capability Assessment for Bullhead City		
PLANNING and REGULATORY		
PLANS	**Yes/No Year**	**Does the plan address hazards? Does the plan ID projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?**
Capital Improvements Plan	Yes	Yes to all 3 questions
Community Wildfire Protection Plan	No	
Comprehensive/Master Plan	Yes/2002	Yes, to all3 Plan update in 2014 was not approved by voters
Continuity of Operations Plan	Yes	
Economic Development Plan	No	City does not have official Economic Development Plan
Emergency Operations Plan	Yes	Yes, to all 3
Stormwater Management Plan	Yes	Yes, to all 3
Transportation Plan	Yes	Yes, to all 3
BUILDING CODES, PERMITTING, INSPECTIONS	**Yes/No**	**What type of codes? Are codes adequately enforced?**
Building Codes	Yes	IBC 2006
Site plan review requirements	Yes	City Code
LAND USE PLANNING & ORDINANCES		**Is the ordinance effective for reducing hazard impacts? Is the ordinance adequately administered and enforced?**
Floodplain ordinance	Yes	Yes/yes
Subdivision ordinance	No	
Zoning ordinance	Yes	Yes/Yes

How can capabilities be expanded and improved to reduce risk? The city's capabilities in this area appear to be adequate to reduce risk., but an overall assessment is required to determine any gaps and improvement needs. Recently revised estimates of the earthquake hazard along the Colorado River have raised awareness that could drive additional planning. Adequacy of the current numbers of code enforcement and building inspector personnel can be evaluated.		
ADMINISTRATIVE and TECHNICAL		
ADMINISTRATION	**Yes/No**	**Describe capability.** **Is coordination effective?**
Mutual aid agreements	Yes	Shared resources/emergency response. Coordination is effective
Planning Commission	Yes	City has a Planning/Zoning Commission – advisory to City Council
TECHNICAL STAFF	**Yes/No** **FT/PT**	**Is staff trained on hazards and mitigation?** **Is coordination between agencies and staff effective?** **Have skills/expertise been used to assess/mitigate risk in the past?**
Building Official	Yes/FT	Yes, to all 3
Community Planner	Yes/FT	Yes, to all 3
Emergency Manager	Yes/PT	Chief of police serves at emergency manager
Engineer	Yes/FT	Yes, to all 3
Floodplain Manager/Administrator	Yes/PT	Yes, to all 3
GIS/HAZUS Coordinator	GIS Yes	Yes, to all 3
Grant writer	No	The city no longer has a dedicated grant writer. Grants are written within the departments
How can capabilities be expanded and improved to reduce risk? The city could enhance the Emergency Management function by creating a budget to provide a full time Emergency Manager. This would allow a full-time effort to address and constantly review the mitigation needs, particularly regarding Colorado River flooding event planning and associated public warning and evacuation mitigation measures.		
FINANCIAL		
FINANCIAL	**Yes/No**	**Has the funding resource been used in past and for what type of activities?** **Could the resource be used to fund future mitigation actions?**
Capital improvements project funding	Yes	Yes, this funding has been used for flood control and street projects.
Community Development Block Grant	Yes	Yes, street projects
Authority to levy taxes for specific purposes	No	Only with voter approval. Has not been used for mitigation activities
Impact fees for new development	No	
Incur debt through special tax bond	No	Only with voter approval. Has not been used for mitigation activities
Incur debt through general obligation bonds	No	Only with voter approval. Has not been used for mitigation activities
How can capabilities be expanded and improved to reduce risk? The city can continue to concentrate on mitigation projects with available funding sources, but it is unlikely that additional tax revenue will be made available for major projects. The city will assess mitigation needs, develop appropriate projects, and look for opportunities to apply for mitigation grant funding from federal and other sources.		
EDUCATION and OUTREACH		
PROGRAM / ORGANIZATION	**Access / Eligibility (Yes/No)**	**Describe program/organization and how it relates to disaster resilience and mitigation.** **Could the program/organization help implement future mitigation activities?**
Firewise Communities certification	No	
StormReady certification	No	

Citizen groups focused on emergency preparedness, environmental protection, etc.	Yes	CERT organizations address disaster preparedness. Are primarily response oriented but can provide some mitigation assistance.
Public education/information programs (fire safety, household preparedness, responsible water use, etc)	Yes	The police and fire departments both give numerous presentations to schools, community groups and businesses relating to fire safety and emergency preparedness. These programs are designed to teach individuals and, groups and businesses how to mitigate the impact on an emergency to them, their group or business by teaching them preparedness skills.
Public-private partnership initiatives addressing disaster-related issues	Yes	The city is partnering with a local group to build a large food bank. This building and the food can also be used to feed displaced people during an emergency. The city also conducts emergency preparedness training with local businesses.
How can capabilities be expanded and improved to reduce risk? The city can engage in more public private partnerships. These are particularly applicable to the anticipated broadening of the Colorado River Flood Evacuation Plan, which now includes overarching planning segments for the both the city jurisdiction and the County unincorporated areas, to include coordinated planning, mitigation identification, and public outreach with schools, hospitals, businesses, charitable organizations, and general public.		

Table 5-5: Capability Assessment for Colorado City

PLANNING and REGULATORY		
PLANS	**Yes/No Year**	**Does the plan address hazards? Does the plan ID projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?**
Capital Improvements Plan	No	Very outdated version only.
Community Wildfire Protection Plan	Yes / 2019	
Comprehensive/Master Plan	Yes / 2015	To a small degree.
Continuity of Operations Plan	No	
Economic Development Plan	No	
Emergency Operations Plan	No	
Stormwater Management Plan	Yes / 2015	Yes. Yes. Yes.
Transportation Plan	Yes / 2010	To a small degree.
BUILDING CODES, PERMITTING, INSPECTIONS	**Yes/No**	**What type of codes? Are codes adequately enforced?**
Building Codes	Yes / 2006, 2010	IBC, IRC, IPC, IMC, NEC, IEEC, IFC, Town Code
Site plan review requirements	Yes / 2006	IBC
LAND USE PLANNING & ORDINANCES	**Yes/No**	**Is the ordinance effective for reducing hazard impacts? Is the ordinance adequately administered and enforced?**
Floodplain ordinance	Yes / 2010	Yes. Yes.
Subdivision ordinance	Yes / 2014	Yes. To the degree possible.

Zoning ordinance	No	Airport Only
How can capabilities be expanded and improved to reduce risk? The Town does now have a comprehensive Zoning Ordinance. Expand; Improve: Use zoning to limit and control development in WUI Zones to require defensible space and prevent wildfire spread. Continue to use zoning controls to guide development in Airport approach zones to prevent encroachment and residential development in hazard zones.		
ADMINISTRATIVE and TECHNICAL		
ADMINISTRATION	**Yes/No**	**Describe capability.** **Is coordination effective?**
Mutual aid agreements	Yes	Fire and Emergency Medical, used routinely
Planning Commission	Yes	Volunteer citizens board, meet bi-monthly
TECHNICAL STAFF	**Yes/No** **FT/PT**	**Is staff trained on hazards and mitigation?** **Is coordination between agencies and staff effective?** **Have skills/expertise been used to assess/mitigate risk in the past?**
Building Official	Yes	Yes. Yes. Yes.
Community Planner	Yes	Yes. Yes. Yes.
Emergency Manager	Yes	Yes. Yes. Yes.
Engineer	Yes /Contract	Yes. Yes. Yes.
Floodplain Manager/Administrator	Yes	Yes. Yes. Yes.
GIS/HAZUS Coordinator	Yes	Yes. Yes. New.
Grant writer	Yes	Yes. Yes. Yes.
How can capabilities be expanded and improved to reduce risk? Increase funding and staff time for Emergency Management specific planning and projects. EM resources are needed to coordinate projects, seek and manage mitigation grant funding, and follow-up with implementation plans.		
FINANCIAL		
FINANCIAL	**Yes/No**	**Has the funding resource been used in past and for what type of activities?** **Could the resource be used to fund future mitigation actions?**
Capital improvements project funding	No	
Community Development Block Grant	Yes	Yes, street storm drainage. Possibly.
Authority to levy taxes for specific purposes	Yes	No. Possibly.
Impact fees for new development	Yes	No. Unlikely.
Incur debt through special tax bond	Yes	No. Possibly.
Incur debt through general obligation bonds	Yes	No. Possibly.
How can capabilities be expanded and improved to reduce risk? Continue seeking funding sources for flood control and storm water management.		
EDUCATION and OUTREACH		
PROGRAM / ORGANIZATION	**Access / Eligibility (Yes/No)**	**Describe program/organization and how it relates to disaster resilience and mitigation.** **Could the program/organization help implement future mitigation activities?**
Firewise Communities certification	No	
StormReady certification	No	
Citizen groups focused on emergency preparedness, environmental protection, etc.	Yes	Community Emergency Response Team

Public education/information programs (fire safety, household preparedness, responsible water use, etc)	Yes	Fire Safety (Classes, Open Houses, Flyers & Brochures, Door Hangars, Home Visits), Flood Safety (Open Houses, Flyers & Brochures), Water Conservation (Utility Mailings)
Public-private partnership initiatives addressing disaster-related issues	No	
How can capabilities be expanded and improved to reduce risk? Increase public education opportunities through social media, community outreach, public meetings, speakers bureau, and increased cooperation with community partners.		

Table 5-6: Capability Assessment for Kingman		
PLANNING and REGULATORY		
PLANS	**Yes/No Year**	**Does the plan address hazards? Does the plan ID projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?**
Capital Improvements Plan	Yes/2015	Annual basis, plan can be used for planning and regulatory requirements
Community Wildfire Protection Plan	Yes/2015	Annual regional project; can be used for planning and regulatory requirements
Comprehensive/Master Plan	Yes 2014-2030	Five-year revisions; can be used for planning and regulatory requirements
Continuity of Operations Plan	Yes/2014	Part of the EOP plan which is being revised; can be used for planning and regulatory requirements.
Economic Development Plan	Yes/2007	Can be used for planning and regulatory requirements
Emergency Operations Plan	Yes/2007	Currently being reformatted target date Sept 2015; can be used for planning and regulatory requirements.
Stormwater Management Plan	No	
Transportation Plan	Yes/2011	Can be used for planning and regulatory requirements
BUILDING CODES, PERMITTING, INSPECTIONS	**Yes/No**	**What type of codes? Are codes adequately enforced?**
Building Codes	Yes/2012	Yes, ICC Family of Codes.
Site plan review requirements	Yes	Yes
LAND USE PLANNING & ORDINANCES		**Is the ordinance effective for reducing hazard impacts? Is the ordinance adequately administered and enforced?**
Floodplain ordinance	Yes	Yes
Subdivision ordinance	Yes/2011	Yes
Zoning ordinance	Yes/2015	Yes
How can capabilities be expanded and improved to reduce risk? Continually review and update to current standards and regulations, be consistent with code adoptions so we are aligned with neighboring jurisdictions. Building Codes can be reviewed regularly to determine the desirability of adopting more recent International versions or ones that have been adopted by adjacent jurisdictions, such as the County. If structures built to older codes are more susceptible to fire, severe weather, or earthquake damage, collateral damage to neighboring jurisdictions could occur so close interjurisdictional coordination can identify and potentially mitigation issues.		

ADMINISTRATIVE and TECHNICAL		
ADMINISTRATION	**Yes/No**	**Describe capability. Is coordination effective?**
Mutual aid agreements	Yes	Numerous mutual aid agreements; continuously being updated and revised. Yes
Planning Commission	Yes	
TECHNICAL STAFF	**Yes/No FT/PT**	**Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective? Have skills/expertise been used to assess/mitigate risk in the past?**
Building Official	Yes/FT	
Community Planner	Yes/FT	Continuous evaluation
Emergency Manager	Yes	City Manager
Engineer	Yes/FT	Yes, continuous evaluation
Floodplain Manager/Administrator	No	Use County services.
GIS/HAZUS Coordinator	Yes/FT	Yes, continuous evaluation
Grant writer	Yes	Departmental staff functions
How can capabilities be expanded and improved to reduce risk? Continue to update and revise all planning documents and agreements, evaluate all training of personnel to stay consistent with current standards. Continual upgrading of plans and personnel training increases the knowledge level of city staff, emergency managers, and first responders to identify specific threats within each designated hazard and develop mitigation and preparedness measures. Mutual aid agreements can be revised to include planning, preparedness, and mitigation activities in response to newly identified or revised threat aspects. This includes hazards that become more threatening as the jurisdiction expands into areas more prone to flooding and wildfire or new businesses with hazardous materials inventories are built.		
FINANCIAL		
FINANCIAL	**Yes/No**	**Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions?**
Capital improvements project funding	Yes	Various projects from various sources.
Community Development Block Grant	Yes	Yes; wastewater collection lines
Authority to levy taxes for specific purposes	Yes	Yes; railroad crossing grade separation
Impact fees for new development	No	Yes, storm water, water, sewer, transportation
Incur debt through special tax bond	Yes	Yes, generally used for road improvements
Incur debt through general obligation bonds	Yes	Parks, roadways
How can capabilities be expanded and improved to reduce risk? Continue to work with city and County government to review and improve all funding capabilities. The County Flood Control district seeks federal and state funding for flood control projects that mitigate threats within the city as part of a collaborative effort with city officials. As the city expands, this city/county coordination effort will increase to include new developments and result in closer review of how city and county funding sources or staff time can contribute to mitigation projects and the pursuit of additional grants.		
EDUCATION and OUTREACH		
PROGRAM / ORGANIZATION	**Access / Eligibility (Yes/No)**	**Describe program/organization and how it relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?**
Firewise Communities certification	No	
StormReady certification	No	

Citizen groups focused on emergency preparedness, environmental protection, etc.	Yes	MRC: Medical Reserve Corps
Public education/information programs (fire safety, household preparedness, responsible water use, etc)	Yes	Multifaceted all hazards approach. Kingman Regional Medical Center provides Stop the Bleed Training
Public-private partnership initiatives addressing disaster-related issues	No	
How can capabilities be expanded and improved to reduce risk? Continually focus on best practices and training requirements for all personnel, continually evaluate all programs for improvements and deficiencies. Through partnership with the County Flood Control District, public information on flood threats and preparedness is provided through websites, social media, and press releases. A Community Organizations Active in Disasters (COAD) effort to develop networks within each city and countywide is being pursued to allow distribution of hazard awareness, emergency preparedness, and mitigation options to community groups; this also provides a mechanism to better coordinate disaster response. Safety awareness presentations are done at public events, schools, and other venues.		

Table 5-7: Capability Assessment for Lake Havasu City		
PLANNING and REGULATORY		
PLANS	**Yes/No Year**	**Does the plan address hazards? Does the plan ID projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?**
Capital Improvements Plan	Yes/2014	It addresses hazards such as flood control and it helps with mitigation strategies
Community Wildfire Protection Plan	No	The City follows the County Plan
Comprehensive/Master Plan	Yes/2004	The City is a Master Planned Community and addresses flooding as its main hazard
Continuity of Operations Plan	Yes/2013	Each department within the City has its own plan which addresses specific hazards
Economic Development Plan	No	The Partnership for Economic Development has their own plan but does not address hazard mitigation or specific hazards in the community
Emergency Operations Plan	Yes/2014	This manual addresses a variety of hazards and the steps needed to mitigate them
Stormwater Management Plan	Yes/2008	Drainage master plan address flooding hazards and the actions to mitigate them
Transportation Plan	Yes/2008	The City's transportation division will assist in an emergency, however there is no mitigation plan or strategy developed
BUILDING CODES, PERMITTING, INSPECTIONS	**Yes/No**	**What type of codes? Are codes adequately enforced?**
Building Codes	Yes	2018 Int. Building Code, 2018 Int. Electrical Code, 2018 Int. Fire Code.
Site plan review requirements	Yes	LHC Planning & Zoning require site development plans prior to the actual design phase where input is provided to the designer from a variety of public utilities and the City.
LAND USE PLANNING & ORDINANCES	**Yes/No**	**Is the ordinance effective for reducing hazard impacts? Is the ordinance adequately administered and enforced?**
Floodplain ordinance	Yes	City Ordinance 08-935 adopted 8/12/08. Yes, it is effective, and it is enforced
Subdivision ordinance	Yes	City Ordinance 08-913 adopted 3/11/08. Yes, it is effective and it is enforced

Zoning ordinance	Yes	City Ordinance 04-741 adopted 03/23/2016. Yes, it is effective, and it is enforced
Weed abatement ordinance	Yes	City Ordinance 16-1154. Yes, it is effective and it is enforced
How can capabilities be expanded and improved to reduce risk? Power outage issues are more likely to be a hazard for the community during the extreme heat conditions experienced in the community between June and September every year. Capabilities to reduce harms would be to develop a plan which requires emergency generators for all assemblies and large facilities where public safety would be improved.		
ADMINISTRATIVE and TECHNICAL		
ADMINISTRATION	**Yes/No**	**Describe capability.** **Is coordination effective?**
Mutual aid agreements	Yes	Local automatic aid agreements and County and State Mutual aid Agreements are in place. Yes they are effective and are coordinated when needed.
Planning Commission	Yes	The City has a planning commission which meets monthly. They are very effective.
TECHNICAL STAFF	**Yes/No** **FT/PT**	**Is staff trained on hazards and mitigation?** **Is coordination between agencies and staff effective?** **Have skills/expertise been used to assess/mitigate risk in the past?**
Building Official	Yes	He is trained, he works with a variety of agencies and staff effectively, and he has the skills or has access to those who do to assess or mitigate potential risks.
Community Planner	Yes	There are two well-trained planners
Emergency Manager	Yes	The City Fire Chief is assigned as the Emergency Manager for the community
Engineer	Yes	The City has three Engineers and three professional plans examiners
Floodplain Manager/Administrator	Yes	The City has one manager within the Community Services Division of the City
GIS/HAZUS Coordinator	Yes	There are two within the I.T. department trained in both and one in the Planning and Development Division of the City
Grant writer	Yes	The City Administrative Services Division has one individual who manages all grants of the City.
How can capabilities be expanded and improved to reduce risk? Public awareness and education are critical components of mitigating the risks associated with natural and man-made disasters. Individuals must be made aware of potential hazards within the community. They should be aware of the specific preparations that should be made prior to an event, the actions that should be taken during the event, and the actions that should be taken following the event. The City and County can continue to reduce the risks through more education programs related to flooding, extreme heat, earthquakes, heavy winds, fires and human caused events.		
FINANCIAL		
FINANCIAL	**Yes/No**	**Has the funding resource been used in past and for what type of activities?** **Could the resource be used to fund future mitigation actions?**
Capital improvements project funding	Yes	Funds have been used to maintain facilities and keep them in proper working order. This action alone helps mitigate or reduce problems from transpiring in the future.
Community Development Block Grant	Yes	For housing rehabilitation and due to the City does not have a community wide Low-Mod area it cannot use CDBG funds
Authority to levy taxes for specific purposes	Yes	The city has the authority, but there are no specific taxes for hazard mitigation
Impact fees for new development	No	Impact fees were discontinued in 2010 and are no longer collected by the City
Incur debt through special tax bond	Yes	Hard to receive due to Proposition 201 (Limit on taxation)
Incur debt through general obligation bonds	Yes	This has been used for water and sewer bonds, but not for hazard mitigation activities
How can capabilities be expanded and improved to reduce risk? The City or County could levy a special tax to fund emergency preparedness, which would help expand		

and improve community safety and risk reduction. The funding could bolster future mitigation efforts by providing the city with additional resources to implement community risk-reduction projects.		
EDUCATION and OUTREACH		
PROGRAM / ORGANIZATION	**Access / Eligibility (Yes/No)**	**Describe program/organization and how it relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?**
Firewise Communities certification	No	Lake Havasu has limited to no urban interface with wildland fire threats
StormReady certification	No	There is no indication the City will pursue this certification in the future
Citizen groups focused on emergency preparedness, environmental protection, etc.	Yes	Lake Havasu City C.E.R.T. is very well versed in emergency preparedness and assists the City often.
Public education/information programs (fire safety, household preparedness, responsible water use, etc)	Yes	Lake Havasu City Fire Department has a PE program that reaches out to all children from K-12 grades in these areas, especially fire safety, fire preventions, and household emergency planning
Public-private partnership initiatives addressing disaster-related issues	No	
How can capabilities be expanded and improved to reduce risk? Create relationships with faith-based leaders to ensure their facilities and all their congregations are prepared for home emergencies as well as large scale emergencies in the community; the impact on Public Safety entities will be reduced. If churches learn to take care of their own parishioners during an emergency, resources in the community would be freed up and allowed to assist others.		

5.4 Actions and Projects

Mitigation actions/projects (A/P) are those activities identified by a jurisdiction, that when implemented, will have the effect of reducing the community's exposure and risk to the hazard or hazards being mitigated. Each A/P includes an implementation strategy to address "*how, when, and by whom?*" they will be implemented.

The update process for defining the new list of mitigation A/Ps for the Plan was accomplished in three steps. First, an assessment of the actions and projects in the 2016 Plan was performed, wherein each jurisdiction evaluated their specific list. A new list of A/Ps was then developed by combining the carry forward results from the assessment with new A/Ps. The process and results are discussed below.

Previous Mitigation Actions/Projects Assessment

The jurisdictions participating in this Plan assessed the actions and projects listed in the 2016 Plan. The assessment included evaluating and classifying each of the previously identified A/Ps based on status and disposition, while providing brief explanations of progress and the reason for no progress.

Any A/P with a disposition classification of "Keep" or "Revise" was carried forward to become part of the new A/P list for this Plan. All A/Ps identified for deletion were removed and are not included in this Plan. The results of the assessment of the 2016 Plan actions and projects are in this Plan's Appendix.

New Mitigation Actions and Projects

Upon completion of the Risk Assessment, the Planning Team developed new A/Ps using the goal and objectives, results of the vulnerability analysis and capability assessment, and the Planning Team's institutional knowledge of hazard mitigation needs in the community. For each A/P, the following elements were identified:

- **Description**
- **Hazard(s) Mitigated**
- **Estimated Cost**
- **Anticipated Completion Date**
- **Lead Agency**
- **Potential Funding Source(s)**

Priority Ranking – each A/P was assigned a priority ranking of either "High", "Medium", or "Low". The assignments were subjectively made using a simple process that assessed how well the A/P satisfied the following considerations:

- A favorable benefit versus cost evaluation, wherein the perceived direct and indirect benefits outweighed the project cost.
- A direct beneficial impact on the ability to protect life and/or property from natural hazards.
- A mitigation solution with a long-term effectiveness

The Mitigation Strategies for the participating jurisdictions/tribes are as follows:

Table 5-8: Mitigation Strategy for Mohave County					
Project Name Description	**Hazard(s) Mitigated**	**Estimated Cost & Completion Date**	**Project Lead Agency**	**Potential Funding Source(s)**	**Status or Comments**
HIGH PRIORITY					
Drainage crossing upgrade over Holy Moses Wash at Shinarump Road to entail twenty-six 12 x 8 Reinforced Concrete Box Culverts	Flood	$1,000,000 2025	Flood Control	BRIC or HGMP/Local	A recent flow analysis study has indicated that potential flows from a 1 percent annual chance storm warrant an upgrade of the culverts in this location. BRIC and/or HGMP grant funding will be sought in the 2023 grant cycle. Target for construction is not later than 2025 if grant funds are awarded.
Develop Community Flood Hazard Awareness Outreach to increase public awareness of current and future vulnerability to flooding and benefits of flood insurance.	Flood	Staff Time 2022 and then ongoing	Flood Control	Hazard Mitigation Grants	In progress - Awareness Outreach is being coordinated between Flood Control and MCEM with public input.
East Kingman Retention Basins proposed for BLM/State land	Flood	$18,000,000 2023-2026	Mohave County Flood Control District	State Funding appropriation	Existing concept report
Rattlesnake Wash Retention Basin north of I-40	Flood	$1M 2025	Developer/Kingman City	Developer/Sales Tax	Developer Driven in conjunction with I-40 Rattlesnake Interchange
Continue to ensure that Mohave Co residents are safe from flooding by meeting the NFIP requirements for development within a Special Flood Hazard Area through enforcement of the Floodplain Ordinance, including regular PSA's or other community outreach to educate citizens on NFIP compliance and availability	Flood	$5,000 Staff Time Annually	Mohave Co Flood Control District / District Engineer	Special Tax District	In progress -
Develop a program to compile comprehensive data on specific hazard locations, the need for local resident outreach or hazard warning signage, and seek funding to implement physical onsite warnings and social media outreach	All	$25,000 Annually	Emergency Management / Coordinator	Homeland Security Grants	New program

Table 5-8: Mitigation Strategy for Mohave County

Project Name Description	Hazard(s) Mitigated	Estimated Cost & Completion Date	Project Lead Agency	Potential Funding Source(s)	Status or Comments
Obtain aerial topographic and photogrammetric data to provide current topographic information and base mapping data for watershed studies, watershed master plans, FEMA map updates, permit administration, and other critical Flood Control functions.	Flood	$1.5M 2010-Ongoing	Flood Control / Programs Manager	FEMA CTP Grant/Local	Ongoing
Continue to develop/expand the County's flood detection (flood warning) system. This includes the installation of new ALERT precipitation and stage gages, repeaters, and possibly additional base station(s) and software. The system would add a county-wide benefit (incorporated and unincorporated) in the areas of public safety and emergency response.	Flood	$250,000 Ongoing	Flood Control	Flood Control	In progress - Adding approximately 10 gauges per year
Floodplain Risk Mapping to continue to accurately evaluate risks associated with flooding in Mohave County	Flood	$500,000 Ongoing	Flood Control/ Programs Manager	FEMA CTP Grant/Local	Ongoing
Obtain chipper/shredder, grinders, or other equipment for treatment and processing of vegetative slash for wildland fuel mitigation throughout county.	Wildfire	$50,000 Ongoing	Emergency Management	Grants (BLM, others)	In progress - BLM is working with Pinion Pine Fire District to provide burn pit for homeowner slash disposal.
Railroad Channel Project. Limited protection (10 year) interim project with smaller area of mitigation to alleviate flooding and maintain access to critical facilities.	Flood	$550,000 2029	Flood Control / Project Engineer	FEMA BRIC Grant/Local	In progress - Pending grant funding
Public Outreach Program as defined in the program for public information document -To continue to inform and educate the public regarding flood risks and mitigation strategies that will improve the community overall, including residential construction location and protective structures to reduce risk of residential damage.	Flood, Erosion, Stormwater	$100,000 Ongoing	Flood Control/ Programs Manager	Flood Control	In progress - Developing Risk MAP non regulatory products, continue to develop web viewers for public awareness and education, updating web site
Drainage impacts to state rt 95 from airport property	Flood	$1,000,000 2022-Ongoing	Flood Control/Bullhead City	Federal Grant/Local	Existing Hazard.

Table 5-8: Mitigation Strategy for Mohave County

Project Name Description	Hazard(s) Mitigated	Estimated Cost & Completion Date	Project Lead Agency	Potential Funding Source(s)	Status or Comments
Add culverts to Airport Avenue in Colorado City to allow flow to pass under road and into Basin	Flood	$35,000 2024-2025	Flood Control	BRIC/PDMG	Newly discovered hazard in scoping phase.
Add 6 12x12 culverts under Central St in Short Creek in Colorado City	Flood	$5,000,000 2022-2024	Flood Control	BRIC/Local	Newly discovered Area of Mitigation Interest
Add 3,000ft to 5,000ft storm drain on Gordon/Bank Street from Gordon to Mohave Wash tributary	Flood	$1,000,000 2022-2023	Flood Control	Federal Grant Funding	Not scoped.
Grace Neal Flood Mitigation Project (Retention Basin/conveyance to Mohave Wash)	Flood	$6,000,000 to $15,000,000 2022-Ongoing	Flood Control	FEMA Grant/Local	In Progress – Pending Grant funding and alternative selection from draft design concept report to determine final cost
Increase capacity of Pine Lake Community culverts for post fire storm water runoff/RCP	Flood	$600,000 2022-2023	Flood Control	State Forestry Fire Funds	Ongoing
Update the County Hazardous Materials Emergency Response and Recovery Plan and coordinate Hazmat response training and exercises. The Plan emphasizes preparedness functions but also establishes a framework where fire departments can assess local facilities and transportation networks for potential mitigation measures, such as pre-incident containment methods and public warning or containment infrastructures. .	Hazardous Materials Incidents	$10,000 Staff Time Ongoing	Emergency Management, Fire Depts	Emergency Management, Fire Depts	Ongoing – Emergency Management facilitates annual reviews of the Hazardous Materials Emergency Response and Recovery Plan by the Mohave Co Local Emergency Planning Committee and coordinates Hazardous Materials Incident training and exercises. The cities, tribes, and fire departments participate in the plan reviews, training, and exercises. Fixed facility partners with Hazmat inventories are included in identifying potential mitigation measures.

Table 5-8: Mitigation Strategy for Mohave County					
Project Name Description	**Hazard(s) Mitigated**	**Estimated Cost & Completion Date**	**Project Lead Agency**	**Potential Funding Source(s)**	**Status or Comments**
Continue to identify, complete, and maintain wildland fuel reduction and fuel break projects in the Hualapai Mountains in or near the Wildland Urban Interface. Previous and ongoing activities have resulted in tree thinning, undergrowth removal, and fuel break construction in the Hualapai Mountains, utilizing BLM and State Forestry grants as well as allocated County funds, that contributed to preserving the Pine Lake Community and County Park from a rapid onset wildfire in 2021. Additional work is required to mitigate the threat in other mountain communities.	Wildfire	$10,000 - $50,000 Annually	Emergency Management	BLM and State Forestry wildland protection grants/Local fire department and County funds	Ongoing – Emergency Management has partnered with the BLM, State Forestry, and Fire Districts to conduct extensive wildland fuel modification work in the Hualapai Mountains over the last few years.
MEDIUM PRIORITY					
Update the 2019 Community Wildfire Protection Plan to incorporate lessons from the 2021 Flag Fire. Utilize plan as part of a public outreach campaign to promote home defensible space protection and other pre-fire mitigation measures. Seek funding for projects identified in the 2019 revision and subsequent update.	Wildfire	$80,000 2023 -Annual outreach continuing at $5,000 – Annual projects at $10,000-20,000	Fire Districts / Fire Chief	Community Wildfire Defense Grant Program, other grants (BLM, State Forestry) / Emergency Mgmt Budget	The new Community Wildfire Defense Grant offers an opportunity to apply for funding for CWPP update, public outreach, and implementation of structural mitigation measures identified in the CWPP.
Conduct fuel modification and vegetative hazard removal in Willow Valley and Topock Lake Ranchero Subdivisions, Mohave Valley	Wildfire	$100,000 2023 and Ongoing	Fire Districts / Fire Chief	Grants (BLM, others)	In progress - Mohave Valley FD does ongoing evaluation of hazardous properties, but funding and personnel shortages have slowed implementation.
Identify cooling station facilities and obtain backup generators for these facilities for mitigation of health risk to vulnerable populations in extreme heat events	Extreme Heat	$500,000, Staff Time 2021-2026	Emergency Management / Coordinator	Homeland Security grants; Local NGO grants, others	In progress - Cooling and shelter facility survey has been done. Funding for generators has been limited or unavailable. Funding opportunities will continually be sought.

Table 5-8: Mitigation Strategy for Mohave County

Project Name Description	Hazard(s) Mitigated	Estimated Cost & Completion Date	Project Lead Agency	Potential Funding Source(s)	Status or Comments
Implement National Weather Service Storm Ready Program provisions, including public awareness campaigns	Severe Wind	$5,000 Staff time annually 2021-2026	Emergency Management / Coordinator	General Fund	In progress - Mohave Co has received a Storm Ready designation and will continue to implement measures for future Storm Ready compliance in coming years, as well as partnering with the National Weather Service to reach out to the public through PSA's, press releases, County social media platforms, and community meetings..
Actively encourage through county development services review and permitting procedures, the development of fire services for new residential housing and commercial developments. Encourage formation of new fire districts or annexation into existing districts. Encourage communities to follow the recommended mitigation measures in the Community Wildfire Protection Plan for higher threat areas within the Wildland Urban Interface.	Wildfire	$15,000 Staff Time 2023 & annually	Emergency Management / Coordinator	Emergency Mgmt Budget / Development Services Budget	In progress - County Development Services (Planning and Zoning) has established procedures to encourage this and includes MCEM in process. .
Develop an overall county government continuity plan, with site-specific plans for each critical facility. Upgrade facilities where necessary with emergency power, communication and security systems.	All	$5,000 Staff Time 2023 and Revisions as Needed	Emergency Management / Coordinator	Emergency Mgmt Budget/ General Fund	In progress - County department continuity plans and integration into overall county government plan are completed and were implemented during the COVID-19 pandemic; full review and plan updates scheduled for 2023.
Provide public information on hazard threats, preparedness measures, and mitigation actions, including structural protection activities, to reduce risk, with an emphasis on actions the public can take prior to emergencies.	All	$3,000 Staff Time annually Ongoing	Emergency Management / Coordinator	Emergency Mgmt Budget / FEMA	In progress - Information is being supplied through MCEM website, Facebook, and Twitter rather than booklet. This will be ongoing.
Develop a list of school and public health facilities in higher risk areas, particularly those in flood zones or proximate to HazMat, and conduct joint planning to mitigate threats though early notification, evacuation or shelter-in-place, and structural protection measures.	Flood, Wildfire	$5,000 Staff time 2023 and Ongoing	Emergency Management / Coordinator	Emergency Mgmt Budget	In progress - Facility Planning has occurred with several school districts and hospitals and will be ongoing with a planned completion date in 2023.

Table 5-8: Mitigation Strategy for Mohave County

Project Name Description	Hazard(s) Mitigated	Estimated Cost & Completion Date	Project Lead Agency	Potential Funding Source(s)	Status or Comments
Update the Pandemic Response Plan to incorporate lessons from the COVID-19 pandemic and coordinate training and exercises with the Public Health and Medical Sectors. Lessons learned from the pandemic will inform decisions on potential mitigation measures, particularly with regard to equipment and supply stockpiles.	Biological	$5,000 Staff Time 2022 & Ongoing	Public Health	Public Health Budget	Ongoing - The County Public Health Dept maintains a Pandemic Response Plan that includes preparedness, mitigation, and response measures for the health and medical sectors in a biological event. The Plan was implemented during the COVID-19 pandemic and revised as needed. A Pandemic Annex to the County COOP was continually revised and provided to employees as the pandemic progressed and CDC guidance was updated.
Develop and implement a Colorado River Emergency Plan, including identification of specific mitigation measures, in coordination with Bullhead City, Lake Havasu City, Fort Mojave Tribe, and the Mohave Valley Fire District. Mitigation measures could include evacuation route upgrades, structural protection measures, and public warning infrastructure improvements.	Flood, Severe Wind, Extreme Heat	$15,000 Staff Time 2023	Emergency Management / Coordinator	Emergency Mgmt / Homeland Security Grants	An overarching evacuation plan was completed in April, 2021. It is planned to continue meetings with individual jurisdictions along the river to add more details and conduct outreach to community partners to both inform and obtain input to aid in a continuous improvement process.
Railroad Channel Project - Multi jurisdictional project to alleviate flooding and access problems to critical facilities.	Flood	$34M 2030	Flood Control / Project Engineer	State or Federal Grant funding	No progress due to staffing workloads
Horizon 6/State Land upstream extension	Flood	$2M, 2028	Flood Control	State or Federal Grant Funding	No progress due to staffing workloads
Virtual GPS network expansion	Surveying	$300,000 2024-2029	Flood Control/public works	County/Federal Grants/ADOT	Survey work is undertaken as needed.
Dry well installations	Flood/Drought Mitigation	$50,000 each 2023-2029	Flood Control	State and Federal Grant Funding	Approximately 400 to 500 drywells could be installed as funding availability materializes for flood control and groundwater recharge.

Table 5-8: Mitigation Strategy for Mohave County					
Project Name Description	**Hazard(s) Mitigated**	**Estimated Cost & Completion Date**	**Project Lead Agency**	**Potential Funding Source(s)**	**Status or Comments**
ALERT station installation to augment existing system	Flood	$1M 2025-2029	Flood Control	Flood Control/ State or Federal grant funding	Future needs may outstrip local funding for this project and require supplemental grant funding to advance system.
Repair or reestablishment of Berm or Levee upstream of Kingman Airport	Flood	$8,500,000 2025	City of Kingman	Federal Grant	Concept report and desire to complete prior to new floodplain maps including parts of the runway and industrial development sites in the floodplain
Rancho Grande subdivision in Fort Mohave drainage easement modification	Flood	$250,000 2026-2029	Flood Control	State or Federal Grant Funding	No progress due to staffing workloads
Infiltration Basin near the Gordon/Bank intersection to take water off of Bank Street	Flood	$500,000 2029-2032	Flood Control	State or Federal Grant Funding	In progress with initial design and cost estimate developed - Pending grant funding
Colorado River Bank Vulnerability Survey – Identify locations of bank sections that are vulnerable to overtopping based on historical flood event data and current bank condition; identify responsible jurisdiction (Federal – BOR or COE, County, Tribal, City, Private) and potential remedial mitigation measures and estimated costs.	Dam Failure/ Emergency Release	$35,000 / 2016-Ongoing	Flood Control	Staff Time/ Federal Grant	Preliminary review of prior bank overtopping events has been initiated
Obtain additional seismic monitoring station for Colorado River Valley region	Earthquake	$ 100,000 2023	Arizona GEO Survey	USGS Grant	Initial identification of station location and grant funding was undertaken in 2021
Provide Earthquake Safety outreach education along the Colorado River Communities	Earthquake	$10,000 2022-2023	Emergency Management / Coordinator	County General Fund	Project was identified in 2021 and project cost estimated
Conduct an earthquake fault study of the Needles Fault Zone, Mohave Valley	Earthquake	$5,000 2023	Arizona GEO Survey	USGS Grant	Project was identified in 2021 and project cost estimated

Table 5-8: Mitigation Strategy for Mohave County					
Project Name Description	**Hazard(s) Mitigated**	**Estimated Cost & Completion Date**	**Project Lead Agency**	**Potential Funding Source(s)**	**Status or Comments**
Revise and implement new BOR Hoover Dam ERP Plan to include Lake Powell Inundation mapping	Flood	$100,000 2022-2023	BOR Emergency Management Staff	Federal (BOR)	Discussion held with BOR in 2021 - Pending on BOR Planning Efforts
LOW PRIORITY					
Retrofit existing wells or water supply sites for local Fire District use and immediate fire protection use in multiple locations in county. Additional sites are more of a mitigation effort than a response one, since many of these are located in residential areas for the specific purpose of having on-scene water supplies to mitigate the immediate threat to homes.	Wildfire	$50,000 2022-2026	Fire Districts / Fire Chief	Grants (BLM, State Forestry)	In progress - MCEM has utilized county funding to install fire service connections on fire protection tanks inside the Hualapai Mountain Park
Obtain additional water tenders (3-4) and Type 6 engines (3-4) for wildland fire suppression for selected fire districts	Wildfire	$560,000 2023-2026	Fire Districts / Fire Chief	Grants (BLM, others)	In progress - Some additional equipment has been obtained by individual FD's.
Continue Review and enforcement of building code provisions regarding earthquake mitigation	Earthquake	County Staff time 2023-Ongoing	Development Services / Building Officials	General Fund	In progress - Mohave Co in 2021 adopted the 2018 International Building, Fire and Property Maintenance Codes and will continue enforcement.
Develop more detailed procedures and perform training on the Debris Management section of the Mohave Co Public Works Emergency Response Manual. This effort is meant to allow rapid debris cleanup to mitigate immediate or long term fire hazards or potential debris flow from flooding that threatens homes.	Flood, Severe Wind	County Staff Time 2024	Public Works / EM Coordinator	Public Works Budget	In progress - Procedures have been evaluated and updated, but additional reviews and updates are planned.

Table 5-9: Mitigation Strategy for Ft. Mojave Indian Tribe

Project Name Description	Hazard(s) Mitigated	Project Lead Agency	Estimated Cost & Completion Date	Potential Funding Source(s)	Status or Comments
HIGH PRIORITY					
Continue to work toward the long-term goal of having a comprehensive Climate Change Adaptation Plan that will identify hazards, risks and vulnerabilities and contain long term mitigation strategies to protect human health, cultural resources, critical infrastructures, and economic resources.	Drought, Extreme Heat, Flooding & Severe Wind all related to climate change	Fort Mojave EPA	$100,000 initially completed October 2018 scheduled for review Q4 2022	EPA General Assistance Fund	New mitigation project
Community Siren Warning System. Install community siren warning system in lower Mohave Valley areas.	All	Mohave Valley Fire Dept/Fort Mojave Tribal Police/EM	$750,000 partially completed September 30, 2020 scheduled for review to revisit potential funding in Q3 2022	FEMA Mitigation Grant Programs	No progress - This project was researched but there was inadequate funding sources to proceed
Public Awareness and Education System. Increase awareness and public education on all hazards through communications media(s). Community Awareness will also address personal emergency preparedness, updating the Tribal Public on current Emergency Plans, wildfire safety information, the Emergency Alert and Warning System and potential weather pattern changes due to climate change.	All	FMIT/PIO	Approx. $180,000 Annually	FEMA, USDA-NRCS, Nat'l Science Foundation, Dept of Commerce-Disaster Mitigation Planning & Technical Assistance, Public Health Preparedness Program	In progress - Ongoing project of continuous Public awareness and education. Information sent in weekly Tribal news packet sent out by Tribal Administration, new FMIT Department of Emergency Response Facebook page will be an ongoing source of emergency information, warnings and public education.

Table 5-9: Mitigation Strategy for Ft. Mojave Indian Tribe

Project Name Description	Hazard(s) Mitigated	Project Lead Agency	Estimated Cost & Completion Date	Potential Funding Source(s)	Status or Comments
Valley-Wide Emergency Alert and Evacuation Plan. Develop a Valley-wide emergency alert and evacuation plan for dam failure in coordination with Mohave County.	Dam Failure	Fort Mojave Emergency Management and Mohave Co	$80,000 initially completed September 30, 2020. Reviewed Annually	FEMA Mitigation Grants, Dept of Commerce-Automated Flood Warning Systems, Safety of Dams on Indian Lands Public Health Preparedness Funding	Emergency Alert and Warning system to be purchased in 2016 through Public Health Preparedness Funding that will include the ability to send warnings through landline phone, text messages, email, fax, face book and twitter. Continue to work with local LEPC and Mohave County on a region wide evacuation plan.
Topock Lakes Rancheros Subdivision. Propose the removal of brush, vegetation and other wildfire hazard fuels from the south side of Topock Lake Rancheros subdivision.	Wildfire	Mohave Valley Fire District/Fort Mojave Tribe	$50,000 Risk Identified December 15, 2017. Reviewed Annually.	FEMA Mitigation Grants, Fire Management Assistance Grant; Dept of Interior-Wildland Urban Interface Community & Rural Fire Assistance	No progress due to lack of funding
Willow Valley Subdivision. Remove brush, vegetation and other wildfire hazard fuels from the north side of Willow Valley subdivision.	Wildfire	Mohave Valley Fire District/Fort Mojave Tribe	$50,000 Risk Identified December 15, 2017. Reviewed Annually.	FEMA Mitigation Grants, Fire Management Assistance Grant; Dept of Interior-Wildland Urban Interface Community & Rural Fire Assistance	No progress due to lack of funding
MEDIUM PRIORITY					
Coordinate annually with federal, state and local dam owners to get updates on any changes in dam safety conditions and emergency action plan information.	Dam failure and flooding	FMIT Dept of Emergency Response	Staff time + $1,000 Annual ongoing	Tribal General fund	New mitigation project
Inform and educate residents about dam safety through the FMIT website, Facebook page, Dept of Emergency Response Facebook page and provide links to local flood control agencies.	Dam failure and flooding	FMIT Dept of Emergency Response	Staff time + $1,000 Annual Ongoing	Tribal General Fund	New mitigation project
Educate the community on actions and resources	Extreme	Public Health	Staff time	CDC – PHEP pass through	New mitigation project

Table 5-9: Mitigation Strategy for Ft. Mojave Indian Tribe

Project Name Description	Hazard(s) Mitigated	Project Lead Agency	Estimated Cost & Completion Date	Potential Funding Source(s)	Status or Comments
to protect residents that do not have adequate ways to cool their homes in the event of an extreme heat event through the FMIT Website, Facebook page and the Dept of Emergency Response Facebook page.	Heat	Preparedness Coordinator	$1000 Annual Ongoing yearly	grant	
Perform a public information campaign at the onset of the extreme heat season to help educate the general public on ways to remain safe during periods of extreme heat.	Extreme Heat	Public Health Preparedness Coordinator	Staff time $3,000 Annually	CDC – PHEP pass through grant	New mitigation project
Perform a public information campaign on the different forms of severe wind events, the difference between advisories and warnings and how to better protect their homes and property in severe wind events.	Severe wind	Public Health Preparedness Coordinator	Staff time $3,000 Annually	CDC – PHEP pass through grant	New mitigation project
Yearly update to Tribal Emergency Operations Plan.	All	Fort Mojave Emergency Management	Staff time By October 1 of each year	Dept of Homeland Security – State and Local All Hazards Emergency Operation Planning; EMPG	The Tribal Planning team completed the first Tribal Emergency Operations Plan on 10/17/2013. Ongoing work includes updating the plan each year as new information, planning considerations and partnerships are identified.
Upgrade Utility Infrastructure. Provide major utility upgrades for wind and seismic hazard occurrences.	Power/ Utility failure	FMTUA/AMPS/FMTI	$6M Annually	Rural Development Assistance, USDA-Rural Utilities Service	In progress - Continuing to upgrade Utility Infrastructure as funding becomes available.
Back-up Generators. Obtain back-up generators for Tribal critical systems. Generators are needed for Tribal Administration, EOC facilities, Fort Mojave Tribal Clinic and 2 shelter locations.	All	Fort Mojave Tribal Building Dept	$1M Risk Identified April 30, 2020, Annual planning to address funding barrier.	FEMA Mitigation Grant Programs	No progress - Inadequate funding

Table 5-10: Mitigation Strategy for Hualapai Tribe

Project Name Description	Hazard(s) Mitigated	Project Lead Agency	Estimated Cost & Completion Date	Potential Funding Source(s)	Status or Comments
HIGH PRIORITY					
Install Alert Weather Gages with soil moisture instruments / Establish base station	Drought / Flood	$70,000 and Staff Time Dec 2022	Public Services Director / Mohave Co Flood Control District Engineer	General Fund / Mohave County Flood Control	14 soil moisture gauges are in place now, but none on the reservation yet. Working with contractor to select sites for analyzing Diamond Creek. West Water Aquifer will be studied the first half of 2022. Placement of gages will follow.
MEDIUM PRIORITY					
Obtain chipper and develop burn pit to eliminate fuel	Wildfire	$40,000 and Staff Time June 2022	Public Services Director / Fire Chief (EMS Director)/Tribal Forestry	Grants / General Fund	Public Services will dig the burn pit in May 2022. Still seeking funding for chipper.
Seek other Sources of water. Aquifer Studies to determine future well locations	Drought	$1,000,000 and Staff Time June 2023	Public Services Director	Bureau of Reclamation (BOR)/ USDA Grants	In the West Water Aquifer Two wells failed in 2018. Using data from USGS studies to locate new well. There are three proposed sites with a large quantity of water available. Pipeline portion of project will connect Peach Springs Water System to West Water System. Providing water to both systems.
Seek Other Water Sources. Complete negotiations with the Federal Government to obtain Colorado River Water Rights	Drought	Confidential	Federal Negotiating Team / Hualapai Tribal Council / ADWR	Federal Government	Legislation is now in Congress for a water rights settlement agreement- Awaiting Federal Committee to move agreement forward
Obtain topographic mapping to prepare flood analysis and determine flood hazard areas Determine road alignments and establish roads which will provide all weather access to all parts of the community	Flood	$150,000 and Staff Time/ December 2023	Public Services Director	General Fund / Grants	This project dropped when the Mohave County Flood Control Engineer left. We need to revisit this with the new District Engineer.

Table 5-10: Mitigation Strategy for Hualapai Tribe

Project Name Description	Hazard(s) Mitigated	Project Lead Agency	Estimated Cost & Completion Date	Potential Funding Source(s)	Status or Comments
Develop emergency power plan	Power/ Utility Failure	$30,000 and Staff Time Dec 2022	Public Services / Director	Grants / General Fund	In-house assessment of facility power consumption completed in 2015. Preparing plan for other Tribal buildings. Looking into batteries vs. generators.
Install emergency power sources	Power/ Utility Failure	$250,000 and Staff Time/ Partially completed. Other On-going	Public Services / Director	Grants / General Fund	Generators have been installed at Truxton Pumphouse, Clinic Tanks, EMS/Fire, Police, Admin Building and Head Start. New sites include, Elderly Center and Daycare
LOW PRIORITY					
Tables, chairs and canopies for emergency immunization station	Biological	$2000 and Staff Time Completed	IHS (Senior Officer)/ EMS (Fire Chief) / Public Services Director)/ERT	General Fund/ARPA	Completed Project in 2018

Table 5-11: Mitigation Strategy for Bullhead City

Description	Hazard(s) Mitigated	Project Lead Agency	Estimated Cost & Completion Date	Potential Funding Source(s)	Describe progress
HIGH PRIORITY					
Buena Vista Area Drainage Improvements - The project consists of the design and construction of a variety of localized drainage improvements, such as shoulder hardening/widening, curbs, grading and retention basin construction in the Buena Vista area to prevent erosion, sedimentation and localized flooding.	Flood	Public Works/ Engineering	$800,000 / 2026	Flood Control Funding	In progress - An evaluation of the area has been conducted and a series of improvements identified, and design is underway. Upon completion, the work will be contracted out.
Subdivision Drainage – Review new subdivision or housing track plans to ensure that drainage and flood control issues are addressed.	Flood	Development Services	$5,000 / 2026	Budgeted	In progress - Development has picked up in Bullhead City, and new subdivisions are being submitted. Review is conducted to confirm compliance with the City's Flood Plain Ordinance, and subdivision requirements.
Lakeside Drive Flood Control – Help control flooding in the Lakeside Drive area through improved storm water management systems (curb, gutter and storm sewers).	Flood	Public Works/ Engineering	$2.5 million / 2026	Federal Grant Funding	In progress - Improvements to the east side of Rotary Park are ongoing, as a part of the Rotary Park Drainage Improvements, and when complete, will provide areas for drainage on Lakeside to flow off the roadway and be mitigated in retention areas in the Park.
Develop a public information project to educate residents on ways to mitigate water use in the event of water shortages.	Drought	Emergency Management	$5,000 / 2023	General Fund	Develop a public information program to inform the general public on a water conservation plan.
City has adopted the International Building Codes. These call for standards for design and construction to meet wind loads anticipated for the area.	High Wind	Development Services	$5,000 / 2023	General Fund	Ongoing- Enforcement of these codes is a standard daily practice of the Development Services Division.
Abatement and Code Inspections	Wildfire	Development Services	$150,000 / 2023	General Fund	The city has an aggressive code enforcement and abatement program designed to enforce codes and remove hazards associated with wildfire risk. Weed removal is a key ingredient to this program.

Table 5-11: Mitigation Strategy for Bullhead City

Description	Hazard(s) Mitigated	Project Lead Agency	Estimated Cost & Completion Date	Potential Funding Source(s)	Describe progress
MEDIUM PRIORITY					
Miracle Mile Area Drainage Improvements – Evaluate the Havasupai and Chaparral Drainage tributaries east of State Route 95 and then design and construct retention basins, channels/berms, and erosion protection and/or storm sewer improvements along the southern portion of the Miracle Mile corridor.	Flood	Public Works/ Engineering	$400,000 / 2025	Flood Control Funding/ HURF	In progress - Using LiDAR topographical mapping, hydraulic/hydrologic evaluation of the area is underway, and a report of recommendations will be provided. Improvements will then be designed and contracted out.
Rotary Park Drainage Improvements - Design and construction of flood control channels, retention basins, erosion protection and re-grading of areas that carry and mitigate flood waters and other related drainage improvements.	Flood	Public Works/ Engineering	$200,000 / 2023	Flood Control Funding	In progress - In conjunction with Lakeside Drive Improvements, retention basin, channelization and erosion protection on the east side of Rotary Park are ongoing, and when complete, will provide flood protection for Rotary park as well as a place for drainage on Lakeside to flow off the roadway and be mitigated in these retention areas in the Park.
Flood Mitigation Projects Prioritization- Prioritize flood mitigation projects that can be funded through existing federal and state grant programs, with an emphasis on protecting the city's infrastructure in proximity to washes and other known flood areas.	Flood	Public Works/ Engineering	$80,000 / 2023	Flood Control Funding/ CTP / FEMA	In progress - We are currently working on a project with FEMA and Mohave Co to obtain LiDAR survey topography for the entire City, and to conduct some evaluation of certain drainage basins. We propose to continue this work, and as planning is complete, transition to constructing the improvements.
Provide back - up generators at schools/community centers to be used as cooling centers and shelters	Extreme Heat/Power Outage	Emergency Management	$500,000 2025	Federal Grant Funding	One school has received a back-up generator through Homeland Security Funding
Miscellaneous Drainage Improvements – Construct miscellaneous drainage improvements to existing facilities throughout the city as determined through flood control planning	Flood	Public Works/ Engineering	$400,000 On-going / 2023	Flood Control Funding	In progress - Significant progress has been made designing and constructing small drainage improvements throughout the City to mitigate and protect properties from flooding and erosion. Drainage complaints are recorded in a master list and as resources and time become available, projects are initiated and completed.

Table 5-11: Mitigation Strategy for Bullhead City

Description	Hazard(s) Mitigated	Project Lead Agency	Estimated Cost & Completion Date	Potential Funding Source(s)	Describe progress
					This is an ongoing program
LOW PRIORITY					
Work with Mohave County Emergency Management to identify locations of bank sections within the Bullhead City limits that are vulnerable to overtopping based on historical flood event data and current bank conditions. Identify potential remedial mitigation measures and estimate costs.	Dam Failure Flooding	Bullhead City Public Works and Emergency Management	$20,000 On-going	Flood Control/Budget	Yet to begin
Identify at risk communities and work appropriate government, non-government and non-profit organizations to provide information on how to prepare for and withstand an extreme heat event.	Extreme Heat	Bullhead City Emergency Management	$5,000 On-going	BHCPD Budget/Grants	Yet to begin
Early Warning and Siren System – This could be used in the event that any type of incident causes the implementation of Evacuation or Shelter in place and would be used as a component of the public outreach program to promote citizen mitigation actions..	Flood, Fire, Dam Failure, Biological Incident/Haz Mat	Police Dept/ Emergency Management	$250,000 On-going	Federal / State Funding	No progress - No Funding for Project

Table 5-12: Mitigation Strategy for Colorado City

Description	Hazard(s) Mitigated	Estimated Cost & Completion Date	Project Lead Agency	Funding Source(s)	Status or Comments
HIGH PRIORITY					
Willow Street Storm Drainage –Upgrade Academy Avenue/Willow Street intersection to handle storm water flow by building a diversion structure to take storm water from inverted street into existing drainage channel.	Flooding	$3 Mil 2025	Public Works	CDBG/FEMA/General Funds/ Flood Control Funds	Preliminary engineering in progress.
Crossing Traffic Safety Gates –Replace and upgrade flood crossing gates at four main crossing locations to assist with traffic safety during flooding.	Flooding	$200 K 2017-2023	Public Works	FEMA/General Funds/ Flood Control Funds	Actively seeking funding sources.
Develop Culinary Well – Secure land, engineer and permit, drill and establish a deep well to access ground water suitable for culinary grade water.	Drought	$500 K 2024	Water Dept.	CDBG/Utility Enterprise Funds/Water Development Fund	Planning stage and actively seeking funding sources.
MEDIUM PRIORITY					
East Watershed Flood Control Upgrade – Exploring drainage easement options preparatory to improving drainage channel.	Flooding	$1.5 Mil 2024	Public Works	CDBG/ FEMA/ General Funds/ Flood Control Funds	Initial engineering studies In progress.
Strengthen Communications System – Strengthen and secure critical communications, specifically antennas against potential disruption by wind events.	Severe Wind	$50 K 2023	Fire Dept.	General Funds/AFG or HSGP Grants	Planning stage and conducting vulnerability study.
Vulnerability Assessment – Assess critical infrastructure for wind damage potential, including Town Hall, Police Station, Fire Stations, Water and Sewer Treatment Plants, Electric Utilities, Communications Towers, etc. Assessment to include need to strengthen,	Severe Wind	$50 K 2025	Fire Dept.	General Funds/AFG or HSGP Grants	Planning stage and conducting vulnerability study.

Table 5-12: Mitigation Strategy for Colorado City

Description	Hazard(s) Mitigated	Estimated Cost & Completion Date	Project Lead Agency	Funding Source(s)	Status or Comments
secure or modify buildings, need for backup power and IT systems, additional stabilizing guy lines, etc. (Medium)					
Improve Safety in Wildland Urban Interface Zones. Increase public education efforts in WUI Zones and conduct fuels management projects. Enforce nuisance weed and debris cleanup to prevent spread of wildfire	Fire	$500,000 2026	Colorado City Fire District	Fuels Mitigation Grants/General Funds	Ongoing with need to update Wildfire Plan. Three-year plan.
LOW PRIORITY					
Warren Ave Flood Control – Conduct a Stormwater Master Plan and include in the city Capital Improvements Plan.	Flooding	$1 mil 2023	Public Works	CDBG/ FEMA/ General Funds/ Flood Control Funds	Seeking funding sources/ LIDAR for the Colorado City has been obtained and a FLO-2D study is underway

Table 5-13: Mitigation Strategy for Kingman

Description	Hazard(s) Mitigated	Estimated Cost & Completion Date	Project Lead Agency	Funding Source(s)	Status or Comments
HIGH PRIORITY					
Construct Fire Station Five in east Kingman.	All Hazard	$4.5M 2025	Fire Chief, Fire Marshall	General Fund	In progress – Land Acquired (Prospector/Airway). Funding assigned in Capital Improvement Plan. Costs identified are facilities only. Other costs Include; staff, apparatus and equipment.
Automated Telephone Notification System	All Hazards	Staff time $3K annually - ongoing	COK(Fire & Police),Mohave County Emergency Services	Grants	County Notification system encompassing Kingman is in place. Public outreach on registering and monitoring system can be augmented to include education on the all hazards threatening city and recommended resident mitigation actions
Coordinate with County Emergency Management for public education on mitigation measures as City expands at City/County interface	Wildfire	Staff time $5K FY23/24	Fire Chief/ Fire Staff	State Forestry Grants/ General Fund	New city developments will place more residents at wildfire risk at City/County jurisdictional boundaries.
Identify cooling station facilities and obtain backup generators for these facilities for mitigation of health risk to vulnerable populations in extreme heat events	Extreme Heat	$200,000 FY24/25	Fire Staff/ Community Partnerships	Homeland Security grants	In progress - Sheltering management plans continuously reviewed and revised. City of Kingman provided cooling stations at various park facilities during extreme heat in 2021.
Improve storm water retention and channelization for Railroad Channel, Lousie/Andy Devine Detention Basin, Mohave Channel, and Riata Valley Drainage Project.	Flood	$500,000 est. FY25/26	City Engineer	CDBG grant/ General Fund	In progress - Several projects have been completed, additional identified.
Improve Interoperable Communications (9-1-1 equipment)	All Hazard	$300,000 FY23/24	Public Safety Staff	Grants general fund	In progress - Known technology driven. Replace outdated equipment.
MEDIUM PRIORITY					
Maintain and enforce city code that limits private property owners to dead vegetation of 6 inches or less on their property.	Wildfire	Staff time $10K annually - On-going	Fire Dept & Code Enforcemen	General Fund	

Table 5-13: Mitigation Strategy for Kingman

Description	Hazard(s) Mitigated	Estimated Cost & Completion Date	Project Lead Agency	Funding Source(s)	Status or Comments
			t		
Conduct outreach and education about power failure, extreme heat and water conservation through messages in the water bills to the city water customers.	Drought, Extreme Heat	Staff Completed FY21/22	City Clerk's Office	General Fund	Project Complete
Develop and implement a mobile application to provide hazard education and outreach to the public.	All Hazards	Staff time -$2K FY22	Information Technology Dept.	General Fund	Completed 2016 – under review and update FY21/22.
Provide outreach and education via social media. This effort is made via Twitter and Facebook.	All Hazards	Staff Completed FY18 Revision est. FY21/22	Police & Fire Depts., Info Technology	General Fund	Completed 2018 – under review and update FY21/22
Develop Community Flood Hazard Awareness Outreach to increase public awareness of current and future vulnerability to flooding and benefits of flood insurance.	Flood	Staff time $3K Completed 2018 – under revision FY21/22	City Engineer Partnerships	General Fund/ Mitigation Grants	Completed FY18 – under review FY21/22. Using social media platforms
LOW PRIORITY					
Implement NWS Storm Ready Program provisions, including public awareness campaigns	Severe Wind	Staff time S2K FY21/22	Fire Chief/ Fire Staff	General Fund	In progress - Known technology driven.

Table 5-14: Mitigation Strategy for Lake Havasu City

Description	Hazard(s) Mitigated	Estimated Cost & Completion Date	Project Lead Agency	Potential Funding Source(s)	Status or Comments
HIGH PRIORITY					
Extreme Heat Public Education. The City has an Emergency Preparedness Guide which includes information on coping and dealing with extreme heat situations. The plan is to reach out to the public via PSA's, attending service clubs, and making presentations to community groups starting in April and continue through the summer months ending in October.	Extreme Heat	Staff Time Start Date: October 2016-Annual Program	Fire Department	General Fund	The outreach began in October 2016 and will continue annually during the hot summer months.
Power/Utility Failure Public Education. The City has an Emergency Preparedness Guide which includes information on coping with the possibility of losing power or services. The plan is to reach out to the public via PSA's, attending service clubs, and making presentations to community groups starting in June, July and August when power outages are most common.	Power / Utility Failure	Staff Time Start Date: August 2016-Annual Program	Fire Department	General Fund	The outreach began in August 2016 and will continue annually during the Monsoon Season, when the most power outages occur.
Enforce Building Codes: Enforce 2018 Int'l Building & Fire codes as they relate to these elements. In conjunction with enforcing these codes, the public & contractors will be educated on the reasons why they need to be enforced & supported.	Flood, Severe Wind, Earthquake	Staff Time Start Date September 2021-On going	Development Services, Building Officials, and Fire Dept	General Fund	This is an ongoing program with no completion date identified.
MEDIUM PRIORITY					
Erosion and Channelization Repairs. Repair major erosion and channelization issues that are occurring in the El Dorado Wash between the high school and the parking area. Project Number ST3050	Flood	$500,000 Start Date: June 2015 Completion: June 2016	Operations Dept	Flood Control	The project was completed in June 2016 after multiple phases.

Table 5-14: Mitigation Strategy for Lake Havasu City

Description	Hazard(s) Mitigated	Estimated Cost & Completion Date	Project Lead Agency	Potential Funding Source(s)	Status or Comments
Wash / Bank stabilization & City-Wide Drainage Improvements. Wash / Bank stabilization of washes within the incorporated boundaries of the City to protect against heavy rains and erosion. In addition, there will be a citywide construction of drainage improvements in washes and drains as defined by Project #ST2930 and ST3070 within the Drainage Master Plan.	Flood	$3,500,000+ Start Date July 2021 Completion March 2022	Public Works Dept / Engineering	Federal Grants & Flood Control	This will be an on-going project for many years as LHC has over 70 miles of washes, many in need of repair/ stabilization.
Roadway Drainage Improvements ST2790. This will be an ongoing project to stabilize the road edges from storm erosion to provide safe travel ways and minimize storm cleanup.	Flood	$313,000/yr Start Date: June 2016-Ongoing program	Operations Dept / Engineering	Federal & State Grants / Flood Control	This is an ongoing program with no completion date identified.

SECTION 6: PLAN MAINTENANCE PROCEDURES

6.1 Section Changes

- 'Monitoring Mitigation Activities' was added to accommodate the tribal requirements for Ft. Mojave Indian Tribe and Hualapai Tribe.

This section defines the processes to be used for maintenance and updating of this Plan. Elements of this section include:

Monitoring, Evaluating and Updating

Monitoring Mitigation Activities

Incorporation into Other Planning Mechanisms

Continued Public and Stakeholder Involvement

6.2 Monitoring, Evaluating and Updating

The Planning Team has established the following monitoring, evaluation and update procedures for this Plan:

- **Schedule** – The Plan shall be reviewed on at least an annual basis or following a major disaster. Mohave County Emergency Management will take the lead to reconvene the Planning Team by meeting, conference call or email around the yearly anniversary of the plan approval.
- **Review Content** – The Planning Team will be sent a questionnaire addressing the following questions relative to the current Plan:
    - **Hazard Identification:** Have the risks or hazards changed?
    - **Goals and objectives:** Are the goals and objectives still able to address current and expected conditions?
    - **Mitigation Projects and Actions:** What is the status of the Plan's mitigation measures?

During the plan evaluation process, each jurisdiction/tribe will have the opportunity to provide a report to the group summarizing its review of the Plan. The report will include their responses to the above questions and any other items specific to their community or the Plan in general. Documentation of the Plan evaluation may include notes on any findings as well as specific information to support proposed changes to the Plan.

This Plan requires updating and approval from FEMA every five years. This Plan is the second revision to the original Plan and the first time updating it without using a contractor although the process followed was basically the same as previously used. The plan updates will adhere to that set schedule using the following procedure:

- One year prior to the plan expiration date, the Planning Team will re-convene to review and assess the Plan and update process.
- The Planning Team will change or revise the appropriate or affected portions of the plan and produce an updated plan.
- The updated plan will be submitted to ADEM and FEMA for review, comment and approval.
- The updated plan will be presented before the respective councils and boards for an official concurrence and adoption.

The process of the Tribal Planning Team monitoring implementation and completion of actions/projects has worked well for the previous plan cycle, no significant changes will be made at this time.

6.3 Monitoring Mitigation Activities

The Fort Mojave Indian Tribe's (FMIT) Hazard Mitigation Planning Team will discuss, on at least an annual basis, the Mitigation Strategy progress. The FMIT Department of Emergency Response is the lead agency to track progress and send out meeting requests. Representatives of the FMIT Planning Team will report on the progress made by their respective departments or entities. Other FMIT departments, programs and entities will be invited, as necessary to report or present data relative to the Plan or mitigation measures implemented by their departments. The implementation of mitigation measures will be monitored by the FMIT Planning Team on an on-going basis until implementation is complete.

Progress and updates will be made to the Fort Mojave Tribal Council on an annual basis or upon project completion. Progress updates will also be made to the Directors of the FMIT Departments during the monthly Director's meetings.

The update information will be compiled by the FMIT Department of Emergency Response to be used for the next Hazard Mitigation Plan update.

This process of the Tribal Planning Team coordinating with other agencies, departments, etc., identified as lead on actions/projects to access the implementation has worked well during the previous plan period. This process will continue as previously coordinated and will not change at this time.

Close Out Process for Hazard Mitigation Projects

The appropriate tribal department(s) will monitor project closeouts and include information in a report to the FMIT Department of Emergency Response, Tribal Council, Tribal Manager and Tribal Accountant.

For FEMA-funded projects, the closeout report criteria will be determined by FEMA but at the very least should include project completion details such as date, final cost and documentation of expenditures and challenges or issues.

Monitoring and evaluation processes were followed as identified in the previous plan and will be continued on a yearly basis and re-evaluated as appropriate.

The process of the Tribal Planning Team monitoring implementation and completion of actions/projects has worked well for the previous plan period; no changes were made at this time.

Potential Challenges to Mitigation Projects

- Financial – Although every effort will be made to fund or seek funding for various mitigation projects, funding is always an obstacle to the implementation of larger mitigation projects.
- Cultural – Cultural considerations will have to be weighed upon the start of all mitigation projects. The FMIT Department of Emergency Response will work closely with the FMIT Cultural Department to ensure each mitigation project is carried forward with cultural sensitivity.
- Social – Community outreach and education are essential to any successful mitigation effort. Social discontent is always a possibility during the implementation of a mitigation effort.

The Hualapai Tribe Public Services Director will review this Plan annually as part of determining the status of the implementation of the Tribe's mitigation measures. Representatives of departments responsible for implementation will also report on the progress made by their respective departments. The implementation of mitigation measures will be monitored on an on-going basis until complete.

For FEMA supported projects, progress reports will be submitted as required and may vary. At a minimum, the quarterly report shall address project progress status, documentation of expenditures and issues/challenges.

Upon completion of projects, the Public Services Director or designee will visit the project location to view and confirm final results. FEMA supported project closeouts will include an audit of the project financials as well as other guidelines/requirements set forth under the funding or grant rules, and tribal administrative plans.

Projects will undergo a closeout process in which the project's schedule and budget will be evaluated and results may be utilized to improve future projects/processes. Completed projects will also be monitored for effectiveness in the intended area of mitigation.

6.4 Incorporation into Other Planning Mechanisms

Incorporation of the Plan into other planning mechanisms, either by content or reference, enhances a community's ability to perform natural hazard mitigation by expanding the scope of the Plan's influence. Below is a discussion of how the participating jurisdictions/tribes incorporated the 2011 Plan elements over its planning cycle into other planning programs:

Mohave County

- The Plan has been used for evaluating risk in updates of the County Emergency Response and Recovery Plan, wildland fire and flooding mitigation and response plans, local fire district planning, county government facility emergency plans, and emergency planning for new facilities.
- The mitigation measures identified in the Plan have served as the basis for project planning/scheduling and grant assistance searches.
- The mitigation plan has been available to them for use in revisions of the County General Plan.

Ft. Mojave Indian Tribe

- Functioned as a resource for the development of the five-year Tribal Environmental Plan (TEP)
- The hazard analysis and identification of the top Fort Mojave Indian Tribe's hazards was used as a basis for the starting point of THIRA planning.
- Functioned as a resource for the updating of the FMIT All Hazards Emergency Plan and development of the Standard Operating Procedures.
- Served as a resource for the Development of the Continuity of Government and Continuity of Operations Plans.
- Quoted as a resource for applying for Tribal Homeland Security Grant funding.
- Functioned as a resource for the Fort Mojave Indian Tribe Public Health Preparedness Plan and its annexes.

Hualapai Tribe

The Tribe's previous plan was developed in 2004. Due to the age of the plan and the lack of personnel from that time period, it is nearly impossible to know how it may have been incorporated into other planning efforts. Research has determined that the Interdisciplinary Team (IDT) was replaced by the Tribal Environmental Review Commission (TERC). This body has review responsibility for all master planning on the reservation. The plan review and maintenance functions of the IDT will now be incorporated into the functions of the TERC. The schedule for reviews and updates of the plan will remain the same.

Many of the tasks in the 2004 plan were incorporated into the planning efforts of several departments, including:

- Construction of four fire stations by the Hualapai Fire and EMS Department.
- Installation of several water tanks by the Natural Resources Department.
- Forest management efforts to thin fuel from Tribal lands by the Forestry Department.

Bullhead City

- The Plan was used to develop the city's Emergency Operations Plan, including the development of a mitigation annex to the EOP.

Colorado City

- The Plan has been made available for use and incorporation by all jurisdictions' departments and agencies.

Kingman

- The Risk Assessment has been used in updates of the Emergency Operation Plan, Fire/Police communication planning, government facility emergency plans, and emergency planning for new facilities such as hospitals.
- The Plan has been available for use in revisions of the General Plan and is available for use by all city departments and elected officials.

Lake Havasu City

- An Emergency Preparedness Guide (EPG) for citizens of Lake Havasu City was developed and published on the City's website. The plan was announced to all citizens during City Council meetings and to service clubs over the past years.
- The Emergency Operations Plan is referred to when updates to the response plans are made within the City's EOC.
- The Emergency Operations Plan helped the Fire Department to preplan and discuss the most potential hazards within the community.
- The Emergency Operations Plan along with subsequent weather issues helped point out the need to install emergency access roads to areas within the city that were islands when flooding occurred. These access roads now allow safe and reliable access to areas once inaccessible during flooding conditions.
- A water conservation plan was adopted by the City and annual reports are presented to the Council.

The Plan will continue to function as a standalone document subject to its own review and revision schedule presented in this section. The Plan will also serve as a reference for other mitigation and land planning needs of the participating jurisdictions/tribes. Whenever possible, the jurisdictions/tribes will endeavor to incorporate the risk assessment results and mitigation actions and projects identified in the Plan, into existing and future efforts and planning mechanisms. Incorporation of the Plan's risk assessment elements into the natural resources and safety elements of jurisdictional/tribal general plans (county comprehensive plan) and development review processes, adding or revising building codes, adding or changing zoning and subdivision ordinances, and incorporating mitigation goals and strategies into general and/or comprehensive plans, may help to ensure hazard mitigated future development.

Below is a discussion of how the participating jurisdictions/tribes intend to incorporate this Plan's data, information and goal and objectives into other planning mechanisms/programs:

Mohave County

- The Plan will be used for assessing risk in biannual updates of the County Emergency Response and Recovery Plan, local fire district planning, county government facility emergency plans, and emergency planning for new facilities.
- The mitigation measures identified in the Plan will be used for project planning and prioritization, development of grant project applications, and in supporting documentation for floodplain management and other hazard specific plans.
- The Plan will be used as a tool to aid in upcoming revision of the Mohave County Community Wildfire Protection Plan and in detailed planning for wildfire mitigation measures in the Hualapai Mountains and other areas.

- The mitigation plan will be available to county departments for use in revisions of the County General Plan.
- The Plan will be available to government officials and the public as an educational tool in the importance of mitigation planning and the comprehensive assessment of jurisdictional hazards.

Ft. Mojave Indian Tribe

- The plan will be used as a resource for the updating the five-year Tribal Environmental Plan (TEP)
- The plan will be used as a resource for the updating of the FMIT All Hazards Emergency Plan and Standard Operating Procedures.
- The plan will be used as a resource document in support of mitigation and Tribal Homeland Security Grant funding applications.
- The plan will be used as a resource for updates of the Fort Mojave Indian Tribe Public Health Preparedness Plan and its annexes.
- The Plan will be available for use by Tribal departments in emergency and community planning activities.

Hualapai Tribe

- The Plan will be utilized in planning, prioritizing, and scheduling mitigation projects.
- The Plan will be used as a resource document in support of grant funding applications for mitigation projects.
- The Plan will be available for use by Tribal departments in emergency and community planning activities, including the community's master development plan.

Bullhead City

- The Plan will be used to update the City Emergency Operations Plan (EOP), including revisions to the EOP's mitigation annex.
- The Plan will be available to other city departments for use in risk assessments and planning activities.
- The identified risks and mitigation measures will be used to drive project planning and prioritization, develop grant project applications, and educate the public and government officials on jurisdictional hazards.

Colorado City

- The Plan will be available for use and incorporation by all the jurisdiction's departments and officials.
- The mitigation measures identified in the Plan will serve as the basis for project planning, prioritization, and scheduling, as well as in preparing grant project applications.

Kingman

- The Risk Assessment will be used in updates of the Emergency Operation Plan, Fire/Police communication plans and SOP's, government facility emergency plans, and emergency planning for new facilities.
- The Plan will be available as a resource document for revisions of the General Plan and for use by all city departments and officials.
- The mitigation measures identified in the Plan will serve as the basis for project planning, prioritization, and scheduling, as well as in preparing grant project applications.

Lake Havasu City

- The Plan will be available as a resource for updates to the City's Emergency Operations Plan and Emergency Operations Center SOP's.
- The Plan will be available for use in risk assessments and preplan updates for various potential hazards within the community.
- The Plan will be available to other departments and city officials for use in planning.
- The mitigation measures identified in the Plan will serve as the basis for project planning, prioritization, and scheduling, as well as in preparing grant project applications.

6.5 Continued Public and Stakeholder Outreach

The participating jurisdictions/tribes are committed to keeping the public informed about their communities' risks, hazard mitigation planning efforts and implementation progress of actions and projects. In order to accomplish this, the Planning Team will pursue the following opportunities for public involvement and dissemination of information whenever possible and appropriate:

- Conduct increased public outreach on wildfire preparedness and mitigation in cooperation with BLM and State Forestry.
- Encourage the public to register on the County's emergency notification system to receive emergency alerts and information.
- Expand multi-jurisdictional planning for cross-jurisdictional emergencies, including identification of hazard specific mitigation measures that can be identified in joint public education campaigns.
- Continue to post the Plan and seasonal emergency preparedness information on the County's website as well as the department's Facebook page.
- Continue to use various forms of social media including newsletters to inform the public of seasonal weather hazards and forecasts.
- Continue to offer presentations about local hazards were made to small groups, clubs and other organizations as well as handouts provided at community events.
- Continue to provide Community Emergency Response Team (CERT) Training.
- Continue to notify the Board of Supervisors about the progress and intentions of Emergency Management particularly regarding wildfire mitigation measures.
- Continue to participate in Tri-State Public Information Officer Group to jointly provide common emergency preparedness and mitigation information across multiple jurisdictions

Lake Havasu City specifically

- Pre mitigation planning:
  - Continue to conduct annual reviews and updates to the City's Emergency Operation Plan which is within the City's Emergency Operation Center.
  - Continue to conduct annual reviews and updates to the City's emergency resource manual.
  - Continue to conduct annual reviews and updates to the EPG on the City's website.
  - Continue to provide updated information on projected hazards such as extreme weather conditions, flooding, etc. prior to their arrival or existence via news releases and the City's social media websites
  - As projects, such as flood control measures are completed, the City Manager will be informed of the progress who then will inform the City Council either in person or during a City Council meeting.

- Continue to inform the City Council on drought conditions and water conservation efforts being made within the City Water Division.

- Mitigation planning during an event:
  - Utilize both traditional news releases as well as social media during a disaster to keep the public informed and up to date on what is taking place within the City and County to mitigate the incident.
  - The County Emergency Manager will be kept informed as to the progress of mitigating an incident.
- Post mitigation plan:
  - A news release about the incident or event will be sent out describing the actions the City taken to mitigate the incident.
  - A post incident report will be provided to the City Manager's office.
  - After a large scale incidents, a Post Incident Analysis (PIA) will be conducted to address safety issues, where we can improve, what went well, communications, who was contacted and who should have been, what resources worked and what were needed and future needs.

Fort Mojave specifically

- Pre-mitigation planning:
  - Continue to conduct annual reviews and updates to the Tribe's Emergency Operations plan which is implemented by the established FMIT Emergency Operations Center
  - Continue to conduct annual reviews and updates to the Tribe's Emergency Communications platform.
  - Continue to conduct stakeholder meetings with Tribal Leadership, Department Heads, & Entity Managers whom integrate with Emergency Operations Center Response.
- Mitigation planning during an event:
  - Utilize Tribal and traditional/social news releases during a disaster to keep FMIT informed and up-to-date on what is taking place within the Tribe to mitigate the incident.
  - The Tribal Administrator will be kept informed as to the progress of mitigating an incident.
- Post-mitigation planning:
  - Utilize Tribal and traditional/social news releases after an incident or event describing actions taken by the Tribe to mitigate the incident or event.
  - Complete a post-incident event and provide that to the FMIT Tribal Council to review the actions and response outcomes during intervention.
  - Complete a Post-Incident Analysis that addresses key safety issues, where we can improve, what we did well, who was contacted, and the use of resources to identify response outcomes, where we are strong and what needs additional support.

Hualapai Tribe specifically

- Public Participation and Planning
  - Continue public outreach through our Tribal agencies such as: Forestry, Natural Resources, EMS, our local radio station KWLP and IT with media releases, community meetings, online postings, etc.
  - Public messages in bi-weekly newsletter (500 per edition).

APPENDIX A: PLAN TOOLS

Acronyms

ADEM .....Arizona Division of Emergency Management
ADEQ .....Arizona Department of Environmental Quality
ADWR .....Arizona Department of Water Resources
AGFD .....Arizona Game and Fish Department
ARS .....Arizona Revised Statutes
ASCE .....American Society of Civil Engineers
ASERC .....Arizona State Emergency Response Commission
ASLD .....Arizona State Land Department
ASU .....Arizona State University
AZGS .....Arizona Geological Survey
BLM .....Bureau of Land Management
CAP .....Central Arizona Project
CAP .....Community Assistance Program
CFR .....Code of Federal Regulations
CRS .....Community Rating System
CWPP .....Community Wildfire Protection Plan
DEMA .....Arizona Department of Emergency and Military Affairs
DFIRM .....Digital Flood Insurance Rate
DMA 2000 .....Disaster Mitigation Act of 2000
DOT .....Department of Transportation
EHS .....Extremely Hazardous Substance
EPA .....Environmental Protection Agency
EPCRA .....Emergency Planning and Community Right to Know Act
FCDMC.....Flood Control District of Mohave County
FEMA .....Federal Emergency Management Agency
FMA .....Flood Mitigation Assistance Grant Program
GIS .....Geographic Information System
HAZMAT .....Hazardous Material
HAZUS-99 .....Hazards United States1999
HAZUS-MH .....Hazards United States Multi-Hazard
IFCI .....International Fire Code Institute
LEPC .....Local Emergency Planning Committee
MMI .....Modified Mercalli Intensity
NCDC .....National Climate Data Center
NDMC .....National Drought Mitigation Center
NESDIS .....National Environmental Satellite, Data and Information Service
NFIP .....National Flood Insurance Program
NFPA .....National Fire Protection Association
NHC .....National Hurricane Center
NIBS .....National Institute of Building Services
NID .....National Inventory of Dams
NIST .....National Institute of Standards and Technology
NSF .....National Science Foundation
NOAA .....National Oceanic and Atmospheric Administration
NRC .....National Response Center
NWCG.....National Wildfire Coordination Group
NWS .....National Weather Service
PSDI .....Palmer Drought Severity Index
RL .....Repetitive Loss
SARA .....Superfund Amendments and Reauthorization Act
SRLP .....Severe Repetitive Loss Properties

SRL .....Severe Repetitive Loss
SRP .....Salt River Project
UBC .....Uniform Building Code
USACE .....United States Army Corps of Engineers
USDA .....United States Department of Agriculture
USFS .....United States Forest Service
USGS .....United States Geological Survey
VA .....Vulnerability Analysis
WUI .....Wildland Urban Interface

Definitions

Dam Failure
A dam failure is a catastrophic type of failure characterized by the sudden, rapid, and uncontrolled release of impounded water. Dam failures are typically due to either overtopping or piping and can result from a variety of causes including natural events such as floods, landslides or earthquakes, deterioration of foundation or compositional materials, penetration by vegetative roots or animal burrows, fissures or improper design and construction. Such a failure presents a significant potential for a disaster as significant loss of life and property would be expected in addition to the possible loss of power and water resources.

Drought
A drought is a deficiency of precipitation over on extended period, resulting in water shortage for some activity, group, or environmental sector. "Severe" to "extreme" drought conditions endanger livestock and crops, significantly reduce surface and ground water supplies, increase the potential risk for wildland fires, increase the potential for dust storms, and cause significant economic loss. Humid areas are more vulnerable than arid areas. Drought may not be constant or predictable and does not begin or end on any schedule. Short term droughts are less impacting due to the reliance on irrigation and groundwater in arid environments.

Earthquake
An earthquake is a naturally induced shaking of the ground, caused by the fracture and sliding of rock within the Earth's crust. The magnitude is determined by the dimensions of the rupturing fracture (fault) and the amount of displacement that takes place. The larger the fault surface and displacement, the greater the energy. In addition to deforming the rock near the fault, this energy produces the shaking and a variety of seismic waves that radiate throughout the Earth. Earthquake magnitude is measured using the Richter Scale and earthquake intensity is measured using the Modified Mercalli Intensity Scale.

Fissure
Earth fissures are tension cracks that open as the result of subsidence due to severe overdrafts (i.e., pumping) of groundwater, and occur about the margins of alluvial basins, near exposed or shallow buried bedrock, or over zones of differential land subsidence. As the ground slowly settles, cracks form at depth and propagate towards the surface, hundreds of feet above. Individual fissures range in length from hundreds of feet to several miles, and from less than an inch to several feet wide. Rainstorms can erode fissure walls rapidly causing them to widen and lengthen suddenly and dangerously, forming gullies five to 15 feet wide and tens of feet deep.

Flooding
Flooding is an overflowing of water onto normally dry land and is one of the most significant and costly of natural disasters. Flooding tends to occur in Arizona during anomalous years of prolonged, regional rainfall (typical of an El Nino year), and is typified by increased humidity and high summer temperatures.

Flash flooding is caused excessive rain falling in a small area in a short time and is a critical hazard in Arizona. Flash floods are usually associated with summer monsoon thunderstorms or the remnants of a tropical storm. Several factors contribute to flash flooding: rainfall intensity and duration, topography, soil conditions, and ground cover. Most flash flooding is caused by slow-moving thunderstorms or thunderstorms repeatedly moving over the same area and can occur within a few minutes or hours of excessive rainfall, or a quick release from a dam or levee failure. Thunderstorms produce flash flooding, often far from the actual storm and at night when natural warnings may not be noticed.

Landslide / Mudslide
Landslides like avalanches are massive downward and outward movements of slope-forming materials. The term landslide is restricted to movement of rock and soil and includes a broad range of velocities. Slow movements, although rarely a threat to life, can destroy buildings or break buried utility lines. A landslide occurs when a portion of a hill slope becomes too weak to support its own weight. The weakness is generally initiated when rainfall or some other source of water increases the water content of the slope, reducing the shear strength of the materials. A mud slide is a type of landslide referred to as a flow. Flows are landslides that behave like fluids: mud flows involve wet mud and debris.

Levee Failure / Breach

Levee failures are typically due to either overtopping or erosive piping and can result from a variety of causes including natural events such as floods, hurricane/tropical storms, or earthquakes, deterioration of foundation or compositional materials, penetration by vegetative roots or animal burrows, fissures, or improper design, construction and maintenance. A levee breach is the opening formed by the erosion of levee material and can form suddenly or gradually depending on the hydraulic conditions at the time of failure and the type of material comprising the levee.

Severe Wind

Thunderstorms are characterized as violent storms that typically are associated with high winds, dust storms, heavy rainfall, hail, lightning strikes, and/or tornadoes. The unpredictability of thunderstorms, particularly their formation and rapid movement to new locations heightens the possibility of floods. Thunderstorms, dust/sandstorms, and the like are most prevalent in Arizona during the monsoon season, which is a seasonal shift in the winds that causes an increase in humidity capable of fueling thunderstorms. The monsoon season in Arizona typically is from late-June or early-July through mid-September.

Tornadoes are violently rotating columns of air extending from a thunderstorm to the ground. The most violent tornadoes are capable of tremendous destruction with wind speeds more than 250 mph. Damage paths can exceed a mile wide and 50 miles long. The damage from tornadoes is due to high winds. The Fujita Scale of Tornado Intensity measures tornado / high wind intensity and damage.

Tropical Storms are storms in which the maximum sustained surface wind ranges from 39-73 mph. Tropical storms are associated with heavy rain and high winds. High intensity rainfall in short periods is typical. A tropical storm is classified as a hurricane when its sustained winds reach or exceed 74 mph. These storms are medium to large and can produce dangerous winds, torrential rains, and flooding, all of which may result in tremendous property damage and loss of life, primarily in coastal populated areas. The effects are typically most dangerous before a hurricane makes landfall when most damage occurs. However, Arizona has experienced several tropical storms that caused extensive flooding and wind damage.

Subsidence

Land subsidence in Arizona is primarily attributed to substantial groundwater withdrawal from aquifers in sedimentary basins. As the water is removed, the sedimentary layers consolidate resulting in a general lowering of the corresponding ground surface. Subsidence frequently results in regional bowl-shaped depressions, with loss of elevation greatest in the center and decreasing towards the perimeter. Subsidence can measurably change or reverse basin gradients causing expensive localized flooding and adverse impacts or even rupture to long-baseline infrastructure such as canals, sewer systems, gas lines and roads. Earth fissures are the most spectacular and destructive manifestation of subsidence-related phenomena.

Wildfire

Wildfire is a rapid, persistent chemical reaction that releases heat and light, especially the exothermic combination of a combustible substance with oxygen. Wildfires present a significant potential for disaster in the southwest, a region of relatively high temperatures, low humidity, low precipitation, and during the spring moderately strong daytime winds. Combine these severe burning conditions with people or lightning and the stage is set for the occurrence of large, destructive wildfires.

Winter Storm

Winter storms bring heavy snowfall and frequently have freezing rain and sleet. Sleet is defined as pellets of ice composed of frozen or mostly frozen raindrops or refrozen partially melted snowflakes. These pellets of ice usually bounce after hitting the ground or other hard surfaces. Freezing rain begins as snow at higher altitudes and melts completely on its way down while passing through a layer of air above freezing temperature, then encounters a layer below freezing at lower level to become supercooled, freezing upon impact of any object it then encounters. Because freeing rain hits the ground as a rain droplet, it conforms to the shape of the ground, making one thick layer of ice. Snow is generally formed directly from the freezing of airborne water vapor into ice crystals that often agglomerates into snowflakes. Average annual snowfall in Arizona varies with geographic location and elevation and can range from trace amounts to hundreds of inches. Severe

snowstorms can affect transportation, emergency services, utilities, agriculture, and basic subsistence supply to isolated communities. In extreme cases, can cause significant structural damage to under-designed buildings.

General Plan Terms

Asset
Any natural or human-caused feature that has value, including, but not limited to people; buildings; infrastructure like bridges, roads, and sewer and water systems; lifelines like electricity and communication resources; or environmental, cultural, or recreational features like parks, dunes, wetlands, or landmarks.

Critical Facilities and Infrastructure
Systems or facilities whose incapacity or destruction would have a debilitating impact on the defense or economic security of the nation. These systems and infrastructure fall into the following categories: Telecommunications infrastructure, Electrical power systems, Gas and oil facilities, Banking and finance institutions, Transportation networks, Water supply systems, Government services and Emergency services.

Disaster Mitigation Act of 2000 (DMA2K)
A law signed by the President on October 30, 2000 that encourages and rewards local and state pre-disaster planning, promotes sustainability as a strategy for disaster resistance, and is intended to integrate state and local planning with the aim of strengthening statewide mitigation planning.

Emergency Preparedness and Response (EPR) Directorate
One of five major Department of Homeland Security Directorates which builds upon the formerly independent Federal Emergency Management Agency (FEMA). EPR is responsible for preparing for natural and human-caused disasters through a comprehensive, risk-based emergency management program of preparedness, prevention, response, and recovery. This work incorporates the concept of disaster-resistant communities, including providing federal support for local governments that promote structures and communities that reduce the chances of being hit by disasters.

Emergency Response Plan
A document that contains information on the actions that may be taken by a governmental jurisdiction to protect people and property before, during, and after a disaster.

Federal Emergency Management Agency (FEMA)
Formerly independent agency created in 1978 to provide a single point of accountability for all Federal activities related to disaster mitigation and emergency preparedness, response and recovery. As of March 2003, FEMA is a part of the Department of Homeland Security's Emergency Preparedness and Response Directorate.

Flood Insurance Rate Map (FIRM)
Official maps effective March 15, 1982 and all subsequent changes or revisions on which FEMA designated and/or delineated both the areas of flooding potential and/or Special Flood Hazards and the Risk Premium Zones applicable to the community and any amended and/or successor maps there to

Frequency
A measure of how often events of a particular magnitude are expected to occur. Frequency describes how often a hazard of a specific magnitude, duration, and/or extent typically occurs, on average. Statistically, a hazard with a 100-year recurrence interval is expected to occur once every 100 years on average, and would have a 1% chance – its probability – of happening in any given year. The reliability of this information varies depending on the kind of hazard being considered.

Fujita Scale of Tornado Intensity
Rates tornadoes with numeric values from F0 to F5 based on tornado winds peed and damage sustained. An F0 indicates minimal damage such as broken tree limbs or signs, while an F5 indicates severe damage sustained.

Geographic Information Systems (GIS)

A computer software application that relates physical features on the earth to a database to be used for mapping and analysis.

Hazard
A source of potential danger or adverse condition. Hazards include both natural and human-caused events. A natural event is a hazard when it has the potential to harm people or property and may include events such as floods, earthquakes, tornadoes, tsunami, coastal storms, landslides, and wildfires that strike populated areas. Human-caused hazard events originate from human activity and may include technological hazards and terrorism. Technological hazards arise from human activities and are assumed to be accidental and/or have unintended consequences (e.g., manufacture, storage and use of hazardous materials).

Hazard Mitigation
Cost effective measures taken to reduce or eliminate long-term risk associated with hazards and their effects.

HAZUS
A GIS-based nationally standardized earthquake, flood and high wind event loss estimation tool developed by FEMA.

Liquefaction
The phenomenon that occurs when ground shaking (earthquake) causes loose soils to lose strength and act like viscous fluid. Liquefaction causes two types of ground failure: lateral spread and loss of bearing strength.

Mitigate
To cause to become less harsh or hostile; to make less severe or painful. Mitigation activities are actions taken to eliminate or reduce the probability of the event, or reduce its severity of consequences, either prior to or following a disaster/emergency.

Modified Mercalli Intensity Scale
The Modified Mercalli Intensity Scale is commonly used in the United States by seismologists seeking information on the severity of earthquake effects. Intensity ratings are expressed as Roman numerals between I at the low end and XII at the high end. The Intensity Scale differs from the Richter Magnitude Scale in that the effects of any one earthquake vary greatly from place to place, so there may be many Intensity values (e.g.: IV, VII) measured from one earthquake. Each earthquake, on the other hand, should have just one Magnitude, although the several methods of estimating it will yield slightly different values (e.g.: 6.1, 6.3).

Monsoon
A monsoon is any wind that reverses its direction seasonally. In the Southwestern U.S., for most of the year the winds blow from the west/northwest. Arizona is located on the fringe of the Mexican Monsoon which during the summer months turns the winds to a more south/southeast direction and brings moisture from the Pacific Ocean, Gulf of California, and Gulf of Mexico. This moisture often leads to thunderstorms in the higher mountains and Mogollon Rim, with air cooled from these storms often moving from the high country to the deserts, leading to further thunderstorm activity in the desert. A common misuse of the term monsoon is to refer to individual thunderstorms as monsoons.

100-Hundred Year Floodplain
Also referred to as the Base Flood Elevation (BFE) and Special Flood Hazard Area (SFHA). An area within a floodplain having a 1% or greater chance of flood occurrence in any given year.

Probability
A statistical measure of the likelihood that a hazard event will occur.

Q3 Data
The Q3 Flood Data product is a digital representation of certain features of FEMA's Flood Insurance Rate Map (FIRM) product, intended for use with desktop mapping and Geographic Information Systems technology. The digital Q3 Flood Data are created by scanning the effective FIRM paper maps and digitizing selected features and lines. The digital Q3 Flood Data are designed to serve FEMA's needs for disaster response activities, National Flood Insurance Program activities, risk assessment, and floodplain management.

Repetitive Loss Property

An NFIP-insured structure that has had at least two paid flood losses of more than $1,000 each in any 10-year period since 1978.

Richter Magnitude Scale
A logarithmic scale devised by seismologist C.F. Richter in 1935 to express the total amount of energy released by an earthquake. While the scale has no upper limit, values are typically between 1 and 9, and each increase of 1 represents a 32-fold increase in released energy.

Risk
The estimated impact that a hazard would have on people, services, facilities, and structures in a community; the likelihood of a hazard event resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate, or low likelihood of sustaining damage beyond a particular threshold due to a specific type of hazard event. It also can be expressed in terms of potential monetary losses associated with the intensity of the hazard.

Substantial Damage
Damage of any origin sustained by a structure in a Special Flood Hazard Area whereby the cost of restoring the structure to its before-damaged condition would equal or exceeds 50% of the market value of the structure before the damage.

Vulnerability
Describes how exposed or susceptible to damage an asset is. Vulnerability depends on an asset's construction, contents, and the economic value of its functions. Like indirect damages, the vulnerability of one element of the community is often related to the vulnerability of another. For example, many businesses depend on uninterrupted electrical power–if an electric substation is flooded, it will affect not only the substation itself, but several businesses as well. Often, indirect effects can be much more widespread and damaging than direct effects.

Vulnerability Analysis
The extent of injury and damage that may result from a hazard event of a given intensity in each area. The vulnerability analysis should address impacts of hazard events on the existing and future built environment.

Vulnerable Populations
Any segment of the population that is more vulnerable to the effects of hazards because of things such as lack of mobility, sensitivity to environmental factors, or physical abilities. These populations can include, but are not limited to, senior citizens and school children.

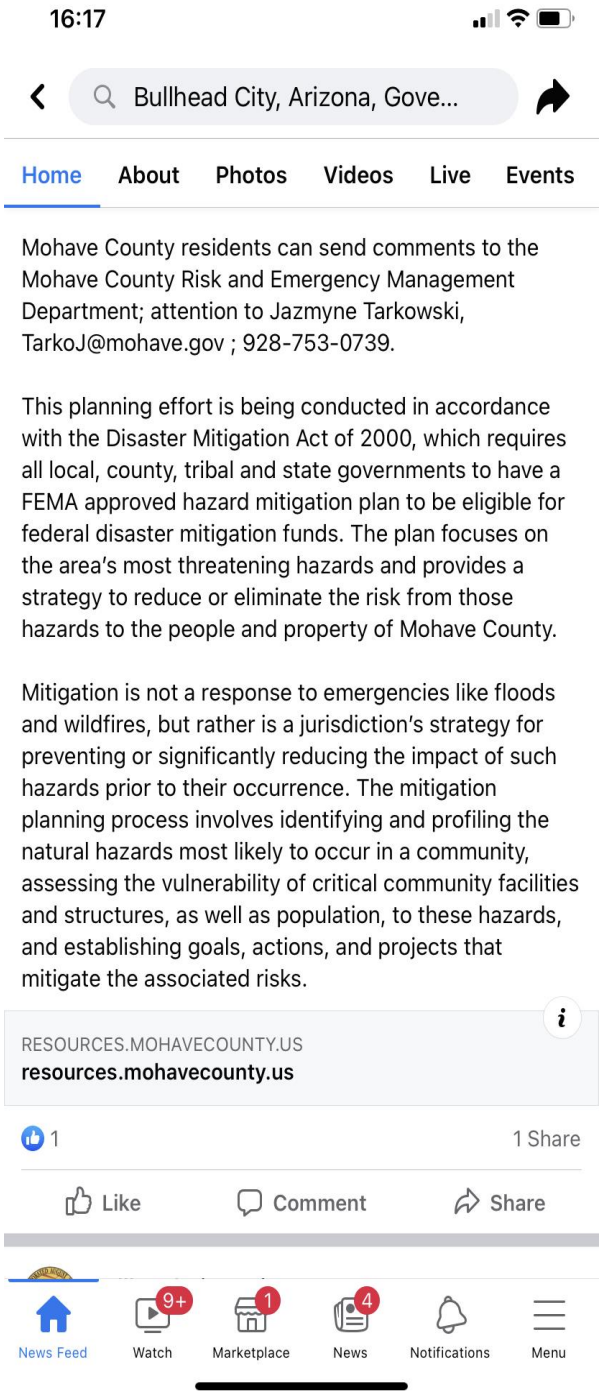
APPENDIX B: PLANNING DOCUMENTATION

Mohave County All-Hazards Mitigation Plan, Community Outreach Activities

Date	Agency	Location
2020		
October 05	State of Arizona GEO Survey	virtual meeting
October 13	Lake Havasu City	Lake Havasu City Hall
October 15	City of Kingman Fire Department	Kingman
October 19	Bullhead City	Bullhead City Police Dept
October 20	Fort Mojave Indian Tribe	Mohave Valley
October 21	Hualapai Indian Tribe	Kingman
November 05	Mohave County Departments	Kingman
November 16	Colorado City	virtual meeting
2021		
April 6	City of Kingman	Kingman
September 17	Mohave County Flood Control	Kingman
September 23	Fort Mojave Indian Tribe	virtual meeting
September 23	Mohave County Building Department	virtual meeting
September 30	City of Kingman	Kingman
September 27	State of Arizona GEO Survey	virtual meeting
September 29	Lake Havasu City Fire Department	virtual meeting
September 29	Bullhead City	virtual meeting
September 30	City of Kingman Fire Department	Kingman
September 30	Colorado City	Kingman
October 01	Hualapai Indian Tribe	virtual meeting
October 19	Fort Mojave Indian Tribe	virtual meeting

APPENDIX C: PUBLIC & STAKEHOLDER INVOLVEMENT DOCUMENTATION

Mohave County received one public comment from Kingman Regional Medical Center. The suggestion was included in table 5-6.



Mohave County Multi-Jurisdictional Hazard Mitigation Plan Review and Update Public Comment Requested

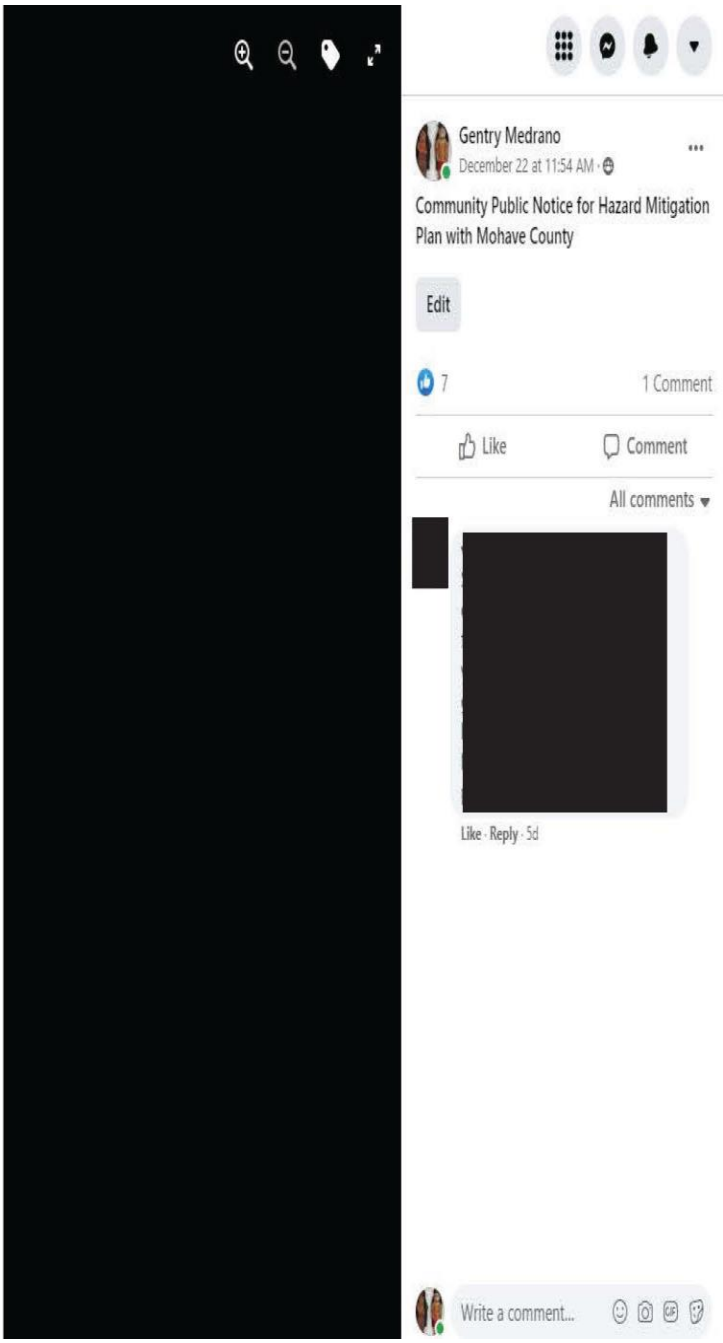
MOHAVE COUNTY, AZ (December 15, 2021) -- A planning team comprised of representatives from Mohave County, City of Kingman, Bullhead City, Lake Havasu City, Colorado City, the Fort Mojave Indian Tribe, and the Hualapai Tribe have developed a draft 2022 Mohave County Multi-Jurisdictional Hazard Mitigation Plan. This is an update of the 2016 Mohave County Multi-Jurisdictional Hazard Mitigation Plan, which has been available on the Mohave County Risk and Emergency Management website for public review since 2016.

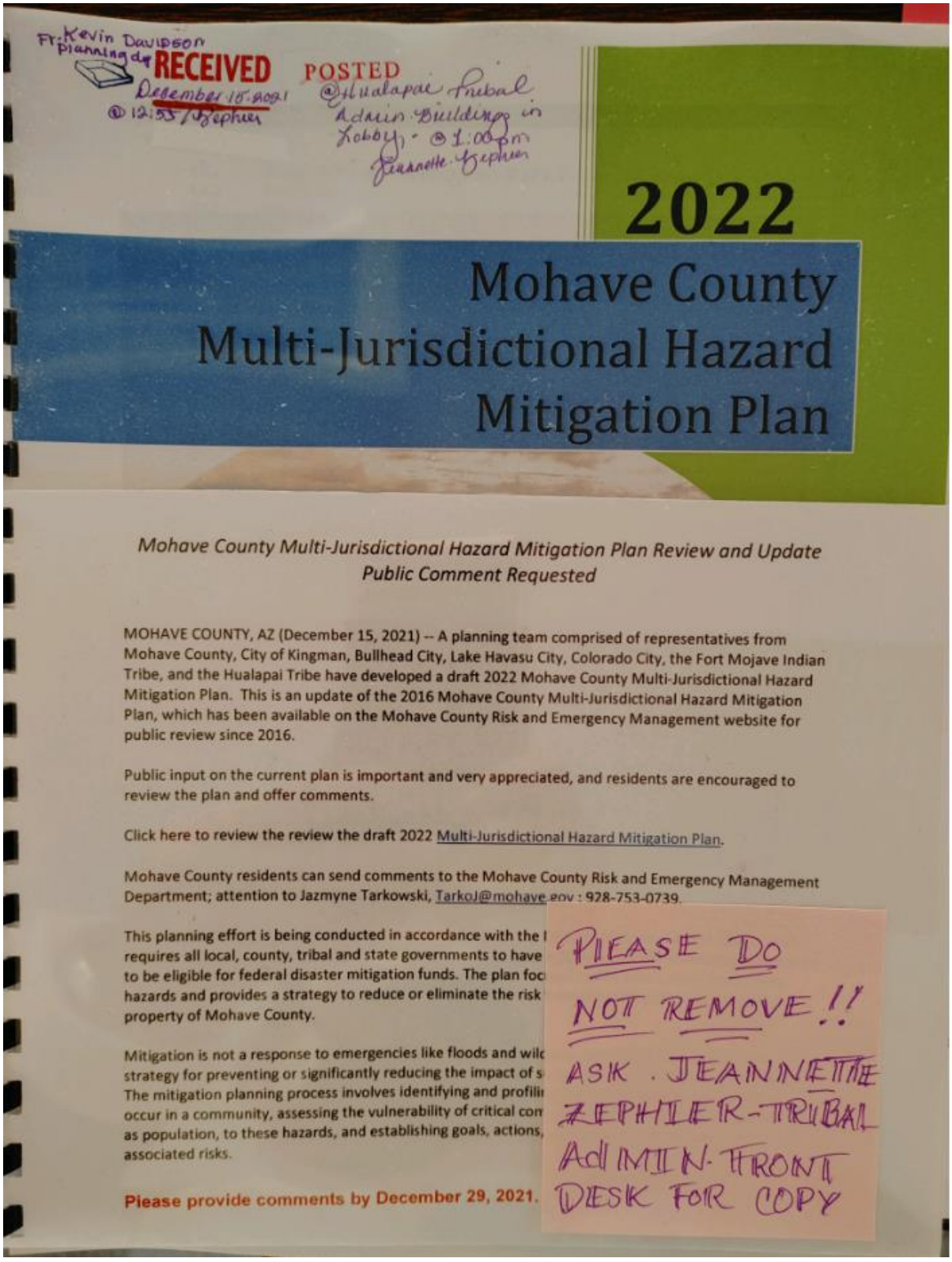
Public input on the current plan is important and very appreciated, and residents are encouraged to review the plan and offer comments.

Click here to review the review the draft 2022 Multi-Jurisdictional Hazard Mitigation Plan.
Mohave County residents can send comments to the Mohave County Risk and Emergency Management Department; attention to Jazmyne Tarkowski, TarkoJ@mohave.gov ; 928-753-0739.

This planning effort is being conducted in accordance with the Disaster Mitigation Act of 2000, which requires all local, county, tribal and state governments to have a FEMA approved hazard mitigation plan to be eligible for federal disaster mitigation funds. The plan focuses on the area's most threatening hazards and provides a strategy to reduce or eliminate the risk from those hazards to the people and property of Mohave County.

Mitigation is not a response to emergencies like floods and wildfires, but rather is a jurisdiction's strategy for preventing or significantly reducing the impact of such hazards prior to their occurrence. The mitigation planning process involves identifying and profiling the natural hazards most likely to occur in a community, assessing the vulnerability of critical community facilities and structures, as well as population, to these hazards, and establishing goals, actions, and projects that mitigate the associated risks.





Fr: Kevin Davidson Planning dept RECEIVED December 15, 2021 @ 12:55 Zephier

POSTED @ Hualapai Tribal Admin Buildings in Lobby - @ 1:00 pm Jeannette Zephier

2022

Mohave County Multi-Jurisdictional Hazard Mitigation Plan

Mohave County Multi-Jurisdictional Hazard Mitigation Plan Review and Update
Public Comment Requested

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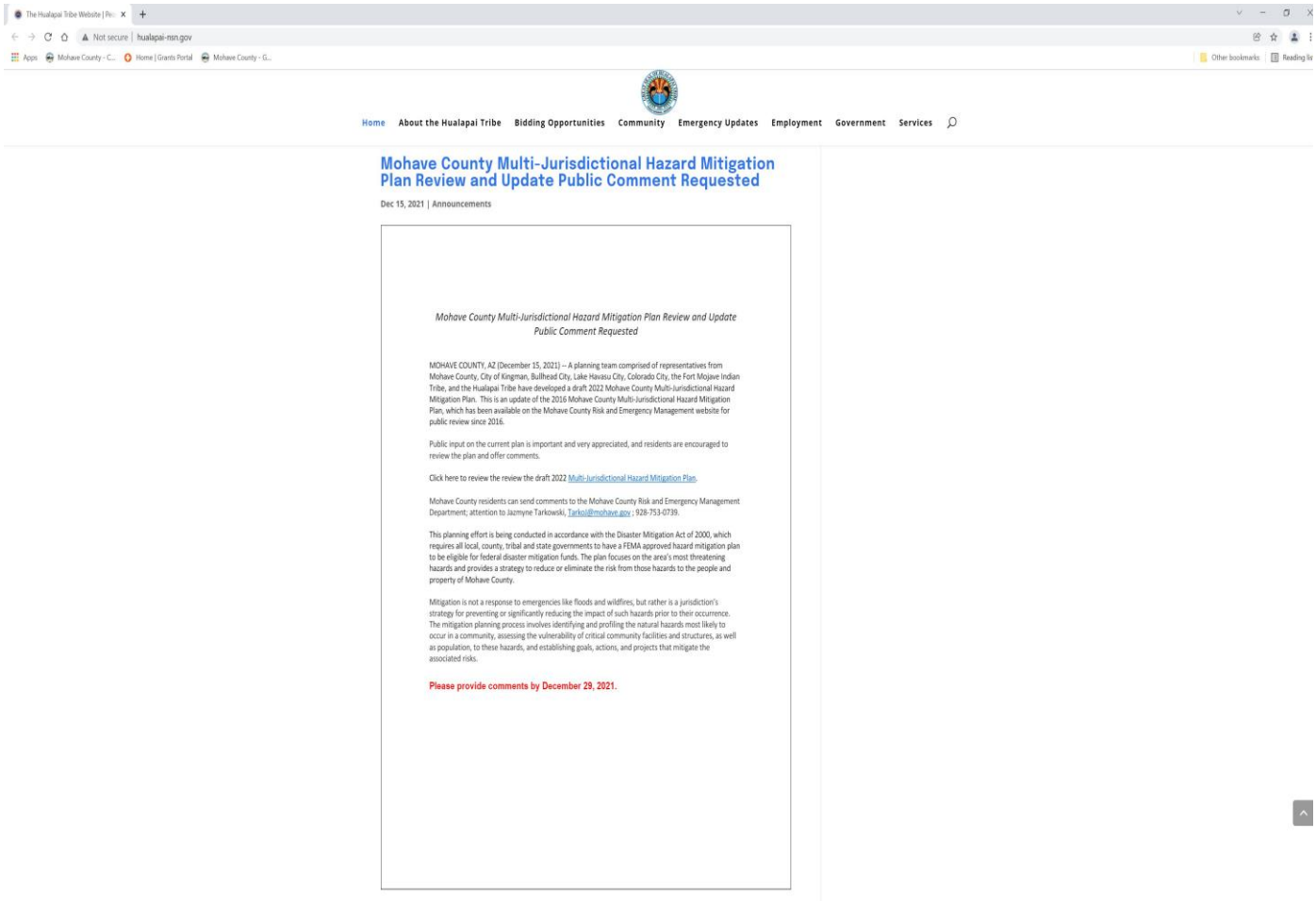
associated risks.

Please provide comments by December 29, 2021.

PLEASE DO NOT REMOVE!! ASK. JEANNETTE ZEPHIER-TRIBAL ADMIN-FRONT DESK FOR COPY



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Mohave County Multi-Jurisdictional Hazard Mitigation Plan Review and Update Public Comment Requested

Dec 15, 2021 | Announcements

Mohave County Multi-Jurisdictional Hazard Mitigation Plan Review and Update Public Comment Requested

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Please provide comments by December 29, 2021.


City of Kingman
Published by Haines Coleen · Just now ·
Mohave County Multi-Jurisdictional Hazard
Mitigation Plan Review and Update
Public Comment Requested
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News

FOR IMMEDIATE RELEASE
Date: December 28, 2021

Mohave County Multi-Jurisdictional Hazard Mitigation Plan Review and Update

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Mitigation is not a response to emergencies like floods and wildfires, but rather is a jurisdiction's strategy for preventing or significantly reducing the impact of such hazards prior to their occurrence. The mitigation planning process involves identifying and profiling

MOHAVE COUNTY

PRESS RELEASE

ROGER GALLOWAY, Communications Director
(928) 757-0940 Ext 5940

Mohave County Multi-Jurisdictional Hazard Mitigation Plan Review and Update Public Comment Requested

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###

APPENDIX D: PREVIOUS MITIGATION STRATEGY ASSESSMENT

Previous Plan's Actions & Projects Assessment for Mohave County					
Project Name **Description**	**Hazard(s) Mitigated**	**Estimated Cost & Completion Date**	**Project Lead Agency**	**Potential Funding Source(s)**	**Status or Comments**
HIGH PRIORITY					
Develop Community Flood Hazard Awareness Outreach to increase public awareness of current and future vulnerability to flooding and benefits of flood insurance.	Flood	$75,000 2015-2020	Flood Control	Hazard Mitigation Grants	In progress - Awareness Outreach is being coordinated between Flood Control and MCEM with public input.
Continue to ensure that Mohave Co residents are safe from flooding by meeting the NFIP requirements for development within a Special Flood Hazard Area through enforcement of the Floodplain Ordinance	Flood	Staff Time Ongoing	Mohave Co Flood Control District / District Engineer	Special Tax District	In progress -
Finalize telephone notification system to enhance public warning of emergencies	ALL	$40,000 Annually	Sheriff's Office / EM Coordinator	Grants	In progress - Existing notification system is no longer supported by vendor; Emergency Management has received grant funding to acquire a new system, and the procurement process for the system is underway.
Continue to enhance radio communications interoperability and coverage for the highly populated areas of the county as a first priority, followed by extension of the capability throughout the county.	All	$100,000 Ongoing	Emergency Management / Coordinator	Homeland Security Grants	In progress - Developed County Tactical Interoperability Plan and established coordinating interagency committee for procedures and training. Trained several Communications Leaders and obtained HS grant funding for equipment. Excellent progress in establishing and maintaining interoperable communications among first responders. Process will be an ongoing one for equipment maintenance, training, and updated planning.
Obtain aerial topographic and photogrammetric data to provide current topographic information and base mapping data for watershed studies, watershed master plans, FEMA map updates, permit administration, and other critical Flood Control functions.	Flood	$1.5M 2010-2018	Flood Control / Project Manager	Flood Control	Ongoing

Previous Plan's Actions & Projects Assessment for Mohave County					
Project Name **Description**	**Hazard(s) Mitigated**	**Estimated Cost & Completion Date**	**Project Lead Agency**	**Potential Funding Source(s)**	**Status or Comments**
Continue to develop/expand the County's flood detection (flood warning) system. This includes the installation of new ALERT precipitation and stage gages, repeaters, and possibly additional base station(s) and software. The system would add a county-wide benefit (incorporated and unincorporated) in the areas of public safety and emergency response.	Flood	$250,000 Ongoing	Flood Control / Flood Warning System Supervisor	Flood Control	In progress - Adding approximately 10 gauges per year
Floodplain Risk Mapping to continue to accurately evaluate risks associated with flooding in Mohave County	Flood	$500,000 Ongoing	Flood Control/ Programs Manager	FEMA CTP Grant/Local	Ongoing
Obtain chipper/shredder, grinders, or other equipment for treatment and processing of vegetative slash for wildland fuel mitigation throughout county.	Wildfire	$50,000 2016-2017	Emergency Management / Coordinator	Grants (BLM, others)	In progress - BLM is working with Pinion Pine Fire District to provide burn pit for homeowner slash disposal.
Railroad Channel Project. Limited protection (10 year) interim project with smaller area of mitigation to alleviate flooding and maintain access to critical facilities.	Flood	$550,000 2018	Flood Control / Project Engine	FEMA Grant/Local	In progress - Pending grant funding
Public Outreach Program -To continue to inform and educate the public regarding flood risks and mitigation strategies that will improve the community overall.	Flood, Erosion, Stormwater	$100,000 Ongoing	Flood Control/ Programs Manager	FEMA Grant/Local	In progress - Developing Risk MAP non regulatory products, continue to develop web viewers for public awareness and education, updating web site
Sunrise Vistas Flood Mitigation Project (Provide explanation of project)	Flood	$750,000	Flood Control	FEMA Grant/Local	In progress – Pending grant funding

Previous Plan's Actions & Projects Assessment for Mohave County					
Project Name **Description**	**Hazard(s) Mitigated**	**Estimated Cost & Completion Date**	**Project Lead Agency**	**Potential Funding Source(s)**	**Status or Comments**
Jagerson-Suffock Flood Mitigation Project (Provide explanation of project)	Flood	$2,000,000	Flood Control	FEMA Grant/Local	In Progress – Pending Grant funding
Update the County Hazardous Materials Emergency Response and Recovery Plan and coordinate Hazmat response training and exercises	Hazardous Materials Incidents	Staff Time Ongoing	Emergency Management, Fire Depts	Emergency Management, Fire Depts	Ongoing – Emergency Management facilitates annual reviews of the Hazardous Materials Emergency Response and Recovery Plan by the Mohave Co Local Emergency Planning Committee and coordinates Hazardous Materials Incident training and exercises. The cities, tribes, and fire departments participate in the plan reviews, training, and exercises.
Continue to identify, conduct, and maintain wildland fuel reduction and fuel break projects in the Hualapai Mountains in or near the Wildland Urban Interface	Wildfire	$10,000 annually	Emergency Management	Grants/Local	Ongoing – Emergency Management has partnered with the BLM, State Forestry, and Fire Districts to conduct extensive wildland fuel modification work in the Hualapai Mountains over the last few years.
MEDIUM PRIORITY					
Install water storage tanks (5,000-20,000 gal. capacities) for fire suppression in selected areas of the county, including the Pinion Pine, Grapevine Mesa, Northern Arizona Consolidated, Oatman, and Beaver Dam / Littlefield Fire Districts	Wildfire	$90,000 2016-2018	Fire Districts / Fire Chief	Grants (BLM, others)	In progress - Several tanks have been installed in the Hualapai Mountain Park, and Pinion Pines FD has installed numerous tanks. Additional tanks can be installed in other areas if funding becomes available.
Obtain Wildland firefighter personal protective equipment and training for personnel of multiple fire districts	Wildfire	$100,000 2016-2020	Fire Districts / Fire Chief	Grants (BLM, others)	In progress - State Forestry has supplied personnel training on ongoing basis.
Conduct fuel modification and vegetative hazard removal in Willow Valley and Topock Lake Ranchero Subdivisions, Mohave Valley	Wildfire	$100,000 Ongoing	Fire Districts / Fire Chief	Grants (BLM, others)	In progress - Mohave Valley FD does ongoing evaluation of hazardous properties, but funding and personnel shortages have slowed implementation.

Previous Plan's Actions & Projects Assessment for Mohave County					
Project Name **Description**	**Hazard(s) Mitigated**	**Estimated Cost & Completion Date**	**Project Lead Agency**	**Potential Funding Source(s)**	**Status or Comments**
Identify cooling station facilities and obtain backup generators for these facilities for mitigation of health risk to vulnerable populations in extreme heat events	Extreme Heat	$500,000, Staff Time 2016-2018	Emergency Management / Coordinator	Grants; Homeland Security, others	In progress - Cooling and shelter facility survey was done a few years ago and will be updated in 2015-2016; a backup generator survey was completed for county facilities in 2014.
Implement Nat'l Weather Service Storm Ready Program provisions, including public awareness campaigns	Severe Wind	Staff time 2015-2020	Emergency Management / Coordinator	General Fund	In progress - Mohave Co has received a Storm Ready designation and will continue to implement measures for future Storm Ready compliance.
Develop a county-wide drought emergency plan, including specific water management and restriction measures for implementation upon declaration of a drought emergency by the Board of Supervisors.	Drought	Staff Time Ongoing	Emergency Management / Coordinator	Emergency Mgmt	In progress - County Local Drought Impact Group has defined drought zones, drought severity stages, and specific mitigation measures and is developing trigger points for activation of stages.
Actively encourage through county development services review and permitting procedures, the development of fire services for new residential housing and commercial developments. Encourage formation of new fire districts or annexation into existing districts. Encourage communities to follow the recommended mitigation measures in the Community Wildfire Protection Plan for higher threat areas within the Wildland Urban Interface.	Wildfire	$40,000 Ongoing	Emergency Management / Coordinator	Emergency Mgmt	In progress - County Development Services (Planning and Zoning) has established procedures to encourage this and includes MCEM in process. Public outreach for defensible space planning within WUI is scheduled for 2016.
Develop an overall county government continuity plan, with site-specific plans for each critical facility. Upgrade facilities where necessary with emergency power, communication and security systems.	All	$100,000 2016-2018	Emergency Management / Coordinator	Emergency Mgmt / General Fund	In progress - County department continuity plans and integration into overall county government plan are largely completed, with final completion anticipated in 2016. Some generators have been installed, and an overall backup power needs assessment was completed in 2014.

Previous Plan's Actions & Projects Assessment for Mohave County					
Project Name **Description**	**Hazard(s) Mitigated**	**Estimated Cost & Completion Date**	**Project Lead Agency**	**Potential Funding Source(s)**	**Status or Comments**
Preparation and distribution to the public of a county emergency preparedness booklet listing potential emergencies, preparedness, and mitigation measures.	All	$30,000 Ongoing	Emergency Management / Coordinator	Emergency Mgmt / Grants	In progress - Information is being supplied through MCEM website, Facebook, and Twitter rather than booklet. This will be ongoing.
Develop a list of school and public health facilities in higher risk areas, particularly those in flood zones or proximate to HazMat, and conduct joint planning to mitigate threats though early notification, evacuation or shelter-in-place, and structural protection measures.	Flood, Wildfire	$10,000 2016-2018	Emergency Management / Coordinator	Emergency Mgmt	In progress - Facility Planning has occurred with several school districts and hospitals, and County Emergency Management is coordinating a 2015-2016 program funded by the state Department of Education to review and coordinate school emergency planning countywide.
Update the Pandemic Response Plan and coordinate training and exercises with the Public Health and Medical Sectors	Biological	Staff Time Ongoing	Public Health	Public Health	Ongoing - The County Public Health Dept maintains a Pandemic Response Plan that includes preparedness and response measures for the health and medical sectors in a biological event. The 2014 Ebola scare prompted the addition of revised response measures and updated training of Public Health and medical personnel.
Develop and implement a Colorado River Emergency Plan, including identification of specific mitigation measures, in coordination with Bullhead City, Lake Havasu City and the Mohave Valley Fire District.	Flood, Severe Wind, Extreme Heat	Staff Time 2016-2017	Emergency Management / Coordinator	Emergency Mgmt / HS Grants	In progress - A Multi-jurisdictional flood exercise with the Bureau of Reclamation for Colorado River flooding was conducted on 4/10/2014; the County developed an After Action Report and Corrective Action Plan from the exercise and is implementing improvement actions.
Railroad Channel Project - Multi jurisdictional project to alleviate flooding and access problems to critical facilities.	Flood	$34M 2018	Flood Control / Project Engineer	Misc. Grants	In progress - Pending grant funding

Previous Plan's Actions & Projects Assessment for Mohave County					
Project Name **Description**	**Hazard(s) Mitigated**	**Estimated Cost & Completion Date**	**Project Lead Agency**	**Potential Funding Source(s)**	**Status or Comments**
Colorado River Bank Vulnerability Survey – Identify locations of bank sections that are vulnerable to overtopping based on historical flood event data and current bank condition; identify responsible jurisdiction (Federal – BOR or COE, County, Tribal, City, Private) and potential remedial mitigation measures and estimated costs.	Dam Failure/ Emergency Release	35,000 / 2016-2018	Flood Control	Staff Time/ Grant Funding	Preliminary review of prior bank overtopping events has been initiated
LOW PRIORITY					
Explore the feasibility of adoption of a Wildland Urban Interface code or ordinance in areas not covered by a Fire District.	Wildfire	Staff time 2015-2020	Development Services / Building Official	General Fund	In progress - MCEM and FD's developed an Open Fire and Consumer Fireworks Ordinance that was adopted by Co BOS in 2013. Open Fire/Fireworks ban imposed through Ordinance in June, 2013, and June, 2014. MCEM, BLM, State Forestry, and FD's will monitor wildfire hazard annually; MCEM will issue determination of fire emergency based on agency consultation and recommend imposition of bans to BOS when necessary.
Retrofit existing wells or water supply sites for local Fire District use and immediate fire protection use in multiple locations in county	Wildfire	$50,000 2016-2017	Fire Districts / Fire Chief	Grants (BLM, others)	In progress - MCEM has utilized county funding to install fire service connections on fire protection tanks inside the Hualapai Mountain Park; retrofitting in other areas has not been completed.
Obtain additional water tenders (3-4) and Type 6 engines (3-4) for wildland fire suppression for selected fire districts	Wildfire	$560,000 2016-2018	Fire Districts / Fire Chief	Grants (BLM, others)	In progress - Some additional equipment has been obtained by individual FD's.
Continue Review and enforcement of building code provisions regarding earthquake mitigation	Earthquake	Staff time Ongoing	Development Services / Building Officials	General Fund	In progress - Mohave Co has adopted the 2012 International Building, Fire and Property Maintenance Codes and will continue enforcement.

Previous Plan's Actions & Projects Assessment for Mohave County					
Project Name **Description**	**Hazard(s) Mitigated**	**Estimated Cost & Completion Date**	**Project Lead Agency**	**Potential Funding Source(s)**	**Status or Comments**
Develop more detailed procedures and perform training on the Debris Management section of the Mohave Co Public Works Emergency Response Manual.	Flood, Severe Wind	Staff Time Ongoing	Public Works / EM Coordinator	Public Works	In progress - Procedures have been evaluated and updated, but additional reviews and updates are planned.

Previous Plan's Actions & Projects Assessment for Ft. Mojave Indian Tribe					
Project Name **Description**	**Hazard(s) Mitigated**	**Project Lead Agency**	**Estimated Cost &** **Completion Date**	**Potential Funding Source(s)**	**Status or Comments**
HIGH PRIORITY					
Continue to work toward the long-term goal of having a comprehensive Climate Change Adaptation Plan that will identify hazards, risks and vulnerabilities and contain long term mitigation strategies to protect human health, cultural resources, critical infrastructures and economic resources.	Drought, Extreme Heat, Flooding & Severe Wind all related to climate change	Fort Mojave EPA	$100,000 Ongoing expected to be completed by October 2018	EPA General Assistance Fund	New mitigation project
Community Siren Warning System.	All	Mohave Valley Fire Dept/Fort	$750,000	FEMA Mitigation Grant	No progress - This project was researched but there was

Previous Plan's Actions & Projects Assessment for Ft. Mojave Indian Tribe					
Project Name **Description**	**Hazard(s) Mitigated**	**Project Lead Agency**	**Estimated Cost &** **Completion Date**	**Potential Funding Source(s)**	**Status or Comments**
Install community siren warning system in lower Mohave Valley areas.		Mojave Tribal Police/EM	September 30, 2020	Programs	inadequate funding sources to proceed
Public Awareness and Education System. Increase awareness and public education on all hazards through communications media(s). Community Awareness will also address personal emergency preparedness, updating the Tribal Public on current Emergency Plans, wild fire safety information, the Emergency Alert and Warning System and potential weather pattern changes due to climate change.	All	FMIT/PIO	Staff time On-going	FEMA, USDA-NRCS, Nat'l Science Foundation, Dept of Commerce-Disaster Mitigation Planning & Technical Assistance, Public Health Preparedness Program	In progress - Ongoing project of continuous Public awareness and education. Information sent in weekly Tribal news packet sent out by Tribal Administration, new FMIT Department of Emergency Response Facebook page will be an ongoing source of emergency information, warnings and public education.
Valley-Wide Emergency Alert and Evacuation Plan. Develop a Valley-wide emergency alert and evacuation plan for dam failure in coordination with Mohave County.	Dam Failure	Fort Mojave Emergency Management and Mohave Co	$80,000 September 30, 2020	FEMA Mitigation Grants, Dept of Commerce-Automated Flood Warning Systems, Safety of Dams on Indian Lands Public Health Preparedness Funding	Emergency Alert and Warning system to be purchased in 2016 through Public Health Preparedness Funding that will include the ability to send warnings through landline phone, text messages, email, fax, face book and twitter. Continue to work with local LEPC and Mohave County on a region wide evacuation plan.
Topock Lakes Rancheros Subdivision. Propose the removal of brush, vegetation and other wildfire hazard fuels from the south side of Topock Lake Rancheros subdivision.	Wildfire	Mohave Valley Fire District/Fort Mojave Tribe	$50,000 December 15, 2017	FEMA Mitigation Grants, Fire Management Assistance Grant; Dept of Interior-Wildland Urban Interface Community & Rural Fire Assistance	No progress due to lack of funding

Previous Plan's Actions & Projects Assessment for Ft. Mojave Indian Tribe					
Project Name **Description**	**Hazard(s) Mitigated**	**Project Lead Agency**	**Estimated Cost &** **Completion Date**	**Potential Funding Source(s)**	**Status or Comments**
Willow Valley Subdivision. Remove brush, vegetation and other wildfire hazard fuels from the north side of Willow Valley subdivision.	Wildfire	Mohave Valley Fire District/Fort Mojave Tribe	$50,000 December 15, 2017	FEMA Mitigation Grants, Fire Management Assistance Grant; Dept of Interior-Wildland Urban Interface Community & Rural Fire Assistance	No progress due to lack of funding
MEDIUM PRIORITY					
Coordinate annually with federal, state and local dam owners to get updates on any changes in dam safety conditions and emergency action plan information.	Dam failure and flooding	FMIT Dept of Emergency Response	Staff time + $1,000 Annual ongoing	Tribal General fund	New mitigation project
Inform and educate residents about dam safety through the FMIT website, Facebook page, Dept of Emergency Response Facebook page and provide links to local flood control agencies.	Dam failure and flooding	FMIT Dept of Emergency Response	Staff time + $1,000 Ongoing	Tribal General Fund	New mitigation project
Educate the community on actions and resources to protect residents that do not have adequate ways to cool their homes in the event of an extreme heat event through the FMIT Website, Facebook page and the Dept of Emergency Response Facebook page.	Extreme Heat	Public Health Preparedness Coordinator	Staff time $1000 Ongoing yearly	CDC – PHEP pass through grant	New mitigation project
Perform a public information campaign at the onset of the extreme heat season to help educate the general public on ways to remain safe during periods of extreme heat.	Extreme Heat	Public Health Preparedness Coordinator	Staff time $3,000 Ongoing yearly	CDC – PHEP pass through grant	New mitigation project

Previous Plan's Actions & Projects Assessment for Ft. Mojave Indian Tribe					
Project Name **Description**	**Hazard(s) Mitigated**	**Project Lead Agency**	**Estimated Cost &** **Completion Date**	**Potential Funding Source(s)**	**Status or Comments**
Perform a public information campaign on the different forms of severe wind events, the difference between advisories and warnings and how to better protect their homes and property in severe wind events.	Severe wind	Public Health Preparedness Coordinator	Staff time $3,000 Ongoing yearly	CDC – PHEP pass through grant	New mitigation project
Yearly update to Tribal Emergency Operations Plan.	All	Fort Mojave Emergency Management	Staff time By October 1 of each year	Dept of Homeland Security – State and Local All Hazards Emergency Operation Planning; EMPG	The Tribal Planning team completed the first Tribal Emergency Operations Plan on 10/17/2013. Ongoing work includes updating the plan each year as new information, planning considerations and partnerships are identified.
Upgrade Utility Infrastructure. Provide major utility upgrades for wind and seismic hazard occurrences.	Power/ Utility failure	FMTUA/AMPS/ FMTI	$6M On-going	Rural Development Assistance, USDA-Rural Utilities Service	In progress - Continuing to upgrade Utility Infrastructure as funding becomes available.
Back-up Generators. Obtain back-up generators for Tribal critical systems. Generators are needed for Tribal Administration, EOC facilities, Fort Mojave Tribal Clinic and 2 shelter locations.	All	Fort Mojave Tribal Building Dept	$1M April 30, 2020	FEMA Mitigation Grant Programs	No progress - Inadequate funding

Previous Plan's Actions & Projects Assessment for Hualapai Tribe					
Project Name **Description**	**Hazard(s) Mitigated**	**Project Lead Agency**	**Estimated Cost & Completion Date**	**Potential Funding Source(s)**	**Status or Comments**
HIGH PRIORITY					
Install Alert Weather Gages with soil moisture instruments / Establish base station	Drought / Flood	$40,000 and Staff Time 2016-2018	Public Services Director / Mohave Co Flood Control District Engineer	General Fund / Mohave County Flood Control	Discussing IGA with Mohave County Flood Control to place Alert gages on the Hualapai Reservation.
MEDIUM PRIORITY					
Obtain chipper and develop burn pit to eliminate fuel	Wildfire	$40,000 and Staff Time 2016-2017	Public Services Director / Fire Chief (EMS Director)	Grants / General Fund	In progress - BLM is working with Pinion Pine Fire District to provide burn pit for homeowner slash disposal.
Seek other Sources of water. Aquifer Studies to determine future well locations	Drought	$700,000 and Staff Time 2016-2018	Public Services Director	Bureau of Reclamation (BOR)	USGS is currently assisting with aquifer studies in the Peach Springs area to locate potential well sites.
Seek Other Water Sources. Complete negotiations with the Federal Government to obtain Colorado River Water Rights	Drought	Confidential	Federal Negotiating Team / Hualapai Tribal Council / ADWR	Federal Government	Awaiting Federal Committee to move agreement forward
Obtain topographic mapping to prepare flood analysis and determine flood hazard areas Determine road alignments and establish roads which will provide all weather access to all parts of the community	Flood	$150,000 and Staff Time 2016 -2020	Public Services Director / Dave West (Mohave Co)	General Fund / Grants	Working with Mohave County Flood Control to obtain LIDAR mapping

Previous Plan's Actions & Projects Assessment for Hualapai Tribe					
Project Name **Description**	**Hazard(s) Mitigated**	**Project Lead Agency**	**Estimated Cost & Completion Date**	**Potential Funding Source(s)**	**Status or Comments**
Develop emergency power plan and construction drawings	Power/ Utility Failure	$30,000 and Staff Time 2016	Public Services / Director	Grants / General Fund	In-house assessment of facility power consumption completed in 2015. Budget approved for Electrical Engineer to prepare plan and construction drawings.
Install emergency generators	Power/ Utility Failure	$250,000 and Staff Time 2016 -2020	Public Services / Director	Grants / General Fund	General fund budget approved for 2016 emergency generator at the Truxton pumphouse.
LOW PRIORITY					
Tables, chairs and canopies for emergency immunization station	Biological	$2000 and Staff Time 2016-2017	IHS (Senior Officer)/ EMS (Fire Chief) / Public Services Director)	IHS Funding/ Grants / General Fund	Looking into grants options

Previous Plan's Actions & Projects Assessment for Bullhead City					
Description	**Hazard(s) Mitigated**	**Project Lead Agency**	**Estimated Cost & Completion Date**	**Potential Funding Source(s)**	**Describe progress**
HIGH PRIORITY					
Buena Vista Area Drainage Improvements - The project consists of the design and construction of a variety of localized drainage improvements, such as shoulder hardening/widening, curbs, grading and retention basin construction in the Buena Vista area to prevent erosion, sedimentation and localized flooding.	Flood	Public Works/ Engineering	280,000 2017	Flood Control Funding/ Grants	In progress - An evaluation of the area has been conducted and a series of improvements identified, and design is underway. Upon completion, the work will be contracted out.
Subdivision Drainage – Review new subdivision or housing track plans to ensure that drainage and flood control issues are addressed.	Flood	Development Services	N/A On-going	Budgeted	In progress - Development has picked up in Bullhead City, and new subdivisions are being submitted. Review is conducted to confirm compliance with the City's Flood Plain Ordinance, and subdivision requirements.
Lakeside Drive Flood Control – Help control flooding in the Lakeside Drive area through improved storm water management systems (curb, gutter and storm sewers).	Flood	Public Works/ Engineering	2017	Grant Funding	In progress - Improvements to the east side of Rotary Park are ongoing, as a part of the Rotary Park Drainage Improvements, and when complete, will provide areas for drainage on Lakeside to flow off the roadway and be mitigated in retention areas in the Park.
Place injection wells in the ground to pump affluent in the ground. This allows the Bureau of reclamation to hold back an equal amount of water in Lake Mead	Drought	Public Works/ Engineering	$520,000 2018	Grant – Bureau of Reclamation	Planning stage. Waiting on a funding agreement with the Bureau of Reclamation.
City has adopted the International Building Codes. These call for standards for design and construction to meet wind loads anticipated	High Wind	Development Services	Ongoing	General Fund	Ongoing- Enforcement of these codes is a standard daily practice of the Development Services Division.

Previous Plan's Actions & Projects Assessment for Bullhead City					
Description	**Hazard(s) Mitigated**	**Project Lead Agency**	**Estimated Cost & Completion Date**	**Potential Funding Source(s)**	**Describe progress**
for the area.					
Abatement and Code Inspections	Wildfire	Public Works/ Engineering	Ongoing $150,000	General Fund	The city has an aggressive code enforcement and abatement program designed to enforce codes and remove hazards associated with wildfire risk. Weed removal is a key ingredient to this program.
MEDIUM PRIORITY					
Miracle Mile Area Drainage Improvements – Evaluate the Havasupai and Chaparral Drainage tributaries east of State Route 95 and then design and construct retention basins, channels/berms, and erosion protection and/or storm sewer improvements along the southern portion of the Miracle Mile corridor.	Flood	Public Works/ Engineering	400,000 2017	Flood Control Funding/ Grants	In progress - Using LiDAR topographical mapping, hydraulic/hydrologic evaluation of the area is underway, and a report of recommendations will be provided. Improvements will then be designed and contracted out.
Rotary Park Drainage Improvements - Design and construction of flood control channels, retention basins, erosion protection and re-grading of areas that carry and mitigate flood waters and other related drainage improvements.	Flood	Public Works/ Engineering	200,000 2017	Flood Control Funding/ Grants	In progress - In conjunction with Lakeside Drive Improvements, retention basin, channelization and erosion protection on the east side of Rotary Park are ongoing, and when complete, will provide flood protection for Rotary park as well as a place for drainage on Lakeside to flow off the roadway and be mitigated in these retention areas in the Park.
Flood Mitigation Projects Prioritization- Prioritize flood mitigation projects that can be funded through existing federal and state grant programs, with an emphasis on	Flood	Public Works/ Engineering	N/A On-going	Flood Control Funding/ Grants	In progress - We are currently working on a project with FEMA and Mohave Co to obtain LiDAR survey topography for the entire City, and to conduct some evaluation of certain drainage basins. We propose to

Previous Plan's Actions & Projects Assessment for Bullhead City					
Description	**Hazard(s) Mitigated**	**Project Lead Agency**	**Estimated Cost & Completion Date**	**Potential Funding Source(s)**	**Describe progress**
protecting the city's infrastructure in proximity to washes and other known flood areas.					continue this work, and as planning is complete, transition to constructing the improvements.
Alternate Colorado River Bridge-Design and build an alternative (redundant) Colorado River Bridge between Laughlin and Needles, in the event the bridge at 163 is closed due to transportation incident.	Transportation Incident/Biological/Hazmat	Public Works/ Engineering	$39.6M 2018	Federal Approp/ Local Funding	In progress - Clark Co, Nevada has included the project on their Surface Transportation Plan list, and budgeted funding, as has WACOG and Bullhead City. Preliminary approval has been received from FHWA, and design hopefully will commence in 2015.
Provide back - up generators at schools/community centers to be used as cooling centers and shelters	Extreme Heat/Power Outage	Emergency Management	$500,000 2025	Grant Funding	One school has received a back-up generator through Homeland Security Funding
Miscellaneous Drainage Improvements – Construct miscellaneous drainage improvements to existing facilities throughout the city as determined through flood control planning	Flood	Public Works/ Engineering	$400,000 On-going	Flood Control Funding	In progress - Significant progress has been made designing and constructing small drainage improvements throughout the City to mitigate and protect properties from flooding and erosion. Drainage complaints are recorded in a master list and as resources and time become available, projects are initiated and completed. This is an ongoing program
LOW PRIORITY					
Work with Mohave County Emergency Management to identify locations of bank sections within the Bullhead City limits that are vulnerable to overtopping based on historical flood event data and current bank conditions. Identify potential remedial mitigation measures and estimate costs.	Dam Failure Flooding	Bullhead City Public Works and Emergency Management	$20,000 2018	Flood Control/Budget	Yet to begin

Previous Plan's Actions & Projects Assessment for Bullhead City					
Description	**Hazard(s) Mitigated**	**Project Lead Agency**	**Estimated Cost & Completion Date**	**Potential Funding Source(s)**	**Describe progress**
Identify at risk communities and work appropriate government, non-government and non-profit organizations to provide information on how to prepare for and withstand an extreme heat event.	Extreme Heat	Bullhead City Emergency Management	$5,000 2018	BHCPD Budget/Grants	Yet to begin
Early Warning and Siren System – This could be used in the event that any type of incident causes the implementation of Evacuation or Shelter in place.	Flood, Fire, Dam Failure, Biological Incident/Haz Mat	Police Dept/ Emergency Management	$250,000 2020	Grant Funding	No progress - No Funding For Project

Previous Plan's Actions & Projects Assessment for Colorado City					
Description	**Hazard(s) Mitigated**	**Estimated Cost & Completion Date**	**Project Lead Agency**	**Funding Source(s)**	**Status or Comments**
HIGH PRIORITY					
Willow Street Storm Drainage – Upgrade Academy Avenue/Willow Street intersection to handle storm water flow.	Flooding	$3 Mil 2016	Public Works	CDBG/FEMA/General Funds/ Flood Control Funds	Preliminary engineering in progress.
Crossing Traffic Safety Gates –Replace and upgrade flood crossing gates at four main crossing locations to assist with traffic safety during flooding.	Flooding	$200 K 2017-18	Public Works	FEMA/General Funds/ Flood Control Funds	Actively seeking funding sources.
Develop Culinary Well – Secure land, engineer and permit, drill and establish a deep well to access ground water suitable for culinary grade water.	Drought	$500 K 2017	Water Dept.	CDBG/Utility Enterprise Funds/Water Development Fund	Planning stage and actively seeking funding sources.
MEDIUM PRIORITY					
East Watershed Flood Control Upgrade – Exploring drainage easement options preparatory to improving drainage channel.	Flooding	$1.5 Mil 2018	Public Works	CDBG/ FEMA/ General Funds/ Flood Control Funds	Initial engineering studies In progress.
Strengthen Communications System – Strengthen and secure critical communications, specifically antennas against potential disruption by wind events.	Severe Wind	$50 K 2017	Fire Dept.	General Funds/AFG or HSGP Grants	Planning stage and conducting vulnerability study.
Vulnerability Assessment – Assess critical infrastructure for wind damage potential, including Town Hall, Police Station, Fire Stations, Water and Sewer Treatment Plants, Electric Utilities, Communications Towers, etc. Assessment to include need to strengthen, secure or modify buildings, need for backup	Severe Wind	$50 K 2017	Fire Dept.	General Funds/AFG or HSGP Grants	Planning stage and conducting vulnerability study.

Previous Plan's Actions & Projects Assessment for Colorado City					
Description	**Hazard(s) Mitigated**	**Estimated Cost & Completion Date**	**Project Lead Agency**	**Funding Source(s)**	**Status or Comments**
power and IT systems, additional stabilizing guy lines, etc. (Medium)					
Debris Management Procedures – Develop detailed Debris Removal and Disposal procedures for fire and public works, including training.	Flood, Severe Wind	$5 K 2017	Public Works	General Funds	Planning stage.
LOW PRIORITY					
Warren Ave Flood Control – Conduct a Stormwater Master Plan and include in the city Capital Improvements Plan.	Flooding	$1 mil 2023	Public Works	CDBG/ FEMA/ General Funds/ Flood Control Funds	Seeking funding sources.

Previous Plan's Actions & Projects Assessment for Kingman					
Description	**Hazard(s) Mitigated**	**Estimated Cost & Completion Date**	**Project Lead Agency**	**Funding Source(s)**	**Status or Comments**
HIGH PRIORITY					
Construct Fire Station Five in east Kingman.	All Hazard	$1.75M Aug 2016	Fire Chief, Fire Marshall	General Fund, grants	In progress - Architectural fees approved. Funding sources TBD. Costs include staff, equipment.
Construct Fire Station Two	All Hazard	$1.75M Aug 2016	Fire Chief/Fire Marshall	General Fund, Grants	In progress - Architectural fees approved, funding sources TBD.
Automated Telephone Notification System (Reverse 9-1-1)	All Hazards	$200,000 2015-2020	COK(Fire & Police),Mohave County Emergency Services	Grants	No progress - Mohave Co Emergency Services revising project, known technology driven. Funding sources a reason for no progress.
Continue to provide training and personal protective equipment for firefighter personnel.	Wildfire	Staff time On-going	Fire Chief/ Fire Staff	Grants General Fund	In progress - Known technology driven, ongoing replacement of equipment, ETC.
Public Warning Siren Systems	All Hazards	$500,000 2020	Fire Chief Information Systems Director	Grants General Fund	No progress - Known technology driven, funding sources a reason for no progress.
Identify cooling station facilities and obtain backup generators for these facilities for mitigation of health risk to vulnerable populations in extreme heat events	Extreme Heat	TBD / Staff time 2015-2020	Fire Staff/ Community Partnerships	Homeland Security grants	In progress - Sheltering management plans continuously reviewed and revised.
Improve storm water retention and channelization for Railroad Channel, Lousie/Andy Devine Detention Basin, Mohave	Flood	N/A 2015-2020	City Engineer	Grants General Fund	In progress - Several projects have been completed, additional identified.

Previous Plan's Actions & Projects Assessment for Kingman					
Description	**Hazard(s) Mitigated**	**Estimated Cost & Completion Date**	**Project Lead Agency**	**Funding Source(s)**	**Status or Comments**
Channel, and Riata Valley Drainage Project.					
Improve Interoperable Communications (9-1-1 equipment)	All Hazard	$300,000 Jan 2018	Public Safety Staff	Grants general fund	In progress - Known technology driven. Replace outdated equipment.
MEDIUM PRIORITY					
Maintain and enforce city code that limits private property owners to dead vegetation of 6 inches or less on their property.	Wildfire	Staff On-going	Fire Dept & Code Enforcement	N/A	
Conduct outreach and education about power failure, extreme heat and water conservation through messages in the water bills to the city water customers.	Drought, Extreme Heat	Staff On-going	City Clerk's Office	N/A	
Develop and implement a mobile application to provide hazard education and outreach to the public.	All Hazards	Staff 2016	Information Technology Dept.	N/A	In progress – application has been developed and will be disseminated for use in 2016.
Provide outreach and education via social media. This effort is made via Twitter and Facebook.	All Hazards	Staff On-going	Police & Fire Depts., Info Technology	N/A	In progress – currently using Twitter and Facebook, will explore extending reach to other sites.
Develop Community Flood Hazard Awareness Outreach to increase public awareness of current and future vulnerability to flooding and benefits of flood insurance.	Flood	Staff time 2015-2020	City Engineer Partnerships	General Fund/ Mitigation Grants	In progress - Continuous project which is known technology driven.
LOW PRIORITY					

Previous Plan's Actions & Projects Assessment for Kingman					
Description	**Hazard(s) Mitigated**	**Estimated Cost & Completion Date**	**Project Lead Agency**	**Funding Source(s)**	**Status or Comments**
Implement NWS Storm Ready Program provisions, including public awareness campaigns	Severe Wind	Staff time 2015-2020	Fire Chief/ Fire Staff	General Fund	In progress - Known technology driven.

Previous Plan's Actions & Projects Assessment for Lake Havasu City					
Description	**Hazard(s) Mitigated**	**Estimated Cost & Completion Date**	**Project Lead Agency**	**Potential Funding Source(s)**	**Status or Comments**
HIGH PRIORITY					
Extreme Heat Public Education. The City has an Emergency Preparedness Guide which includes information on coping and dealing with extreme heat situations. The plan is to reach out to the general public via PSA's, attending service clubs, and making presentations to community groups starting in April and continue through the summer months ending in October.	Extreme Heat	Staff time October 2016	Fire Department	General Fund	The outreach would not actually end in October of 2016 but would be an ongoing outreach program every year prior to and during the hot summer months.
Power/Utility Failure Public Education. The City has an Emergency Preparedness Guide which includes information on coping with the possibility of losing power or services. The plan is to reach out to the public via PSA's, attending service clubs, and making presentations to community groups starting in June, July and August when power outages are most common.	Power / Utility Failure	Staff Time August 2016	Fire Department	General Fund	The outreach would not actually end in August of 2016 but would be an ongoing outreach program every year prior to and during the Monsoon Season when power outages occur the most.
Enforce Building Codes: Enforce 2012 Int'l Building & Fire codes as they relate to these elements. In conjunction with enforcing these codes, the general public & contractors will be educated on the reasons why they need to be enforced & supported.	Flood, Severe Wind, Earthquake	Staff Time On going	Community Services, Building Officials, and Fire Dept	General Fund	This is an ongoing program with no completion date identified.
MEDIUM PRIORITY					
Erosion and Channelization Repairs. Repair major erosion and channelization issues that are occurring in the El Dorado Wash between the high school and the parking area. Project Number ST3050	Flood	$500,000 June 2016	Operations Dept	Flood Control	Phase I is complete with Phase II to be completed in the FY15/16 budget year

Previous Plan's Actions & Projects Assessment for Lake Havasu City					
Description	**Hazard(s) Mitigated**	**Estimated Cost & Completion Date**	**Project Lead Agency**	**Potential Funding Source(s)**	**Status or Comments**
Wash / Bank stabilization & City-Wide Drainage Improvements. Wash / Bank stabilization of washes within the incorporated boundaries of the City to protect against heavy rains and erosion. In addition, there will be a citywide construction of drainage improvements in washes and drains as defined by Project #ST2930 and ST3070 within the Drainage Master Plan.	Flood	$1,600,000+ FY15/16 Completion FY16/17	Operations Dept / Engineering	Flood Control	This will be an on-going project for many years as LHC has over 70 miles of washes, many in need of repair/ stabilization.
Roadway Drainage Improvements ST2790. This will be an ongoing project to stabilize the road edges from storm erosion in order to provide safe travel ways and minimize storm cleanup.	Flood	$313,000/yr Ongoing program	Operations Dept / Engineering	Flood Control	This is an ongoing program with no completion date identified.
Drainage Improvements at Chesapeake Blvd DR1000. Project is to control storm runoff from intersecting streets in order to prevent storm erosion and unsafe road conditions due to flooding and erosion.	Flood	$1,000,000+ Spring 2016	Operations Dept/ Engineering	Flood Control	Construction Starts 11/9/15
LOW PRIORITY					
Water Conservation Plan. Update water conservation plan and inform the public of ways to conserve water to avoid rationing. As part of the plan, develop a water rationing plan in case reserves become dangerously low.	Drought	Staff Time 12/31/15	Operations Dept	General Fund	The plan goes before Council for approval in December, then to the Bureau of Reclamation before year end for their records. The City unaffected by a local drought due to the Colorado River running through the community. However, if the BOR places restrictions on a regional basis, the allocated amount of water LHC is allotted could be affected. This is why LHC has established a water conservation plan to

Previous Plan's Actions & Projects Assessment for Lake Havasu City					
Description	**Hazard(s) Mitigated**	**Estimated Cost & Completion Date**	**Project Lead Agency**	**Potential Funding Source(s)**	**Status or Comments**
					support the region.
HazMat Commodity Flow Report. The goal is to conduct a study of HazMat being transported by ground via State Route 95. Hwy 95 is the only means in and out of Lake Havasu City by ground.	HazMat	$10,000 Spring of 2017	Fire Department	General Fund	This is a new item being introduced in the upcoming FY16/17 budget year process.

APPENDIX E: FEMA HAZUS EARTHQUAKE GLOBAL REPORT

HAZUS
EARTHQUAKE · WIND · FLOOD · TSUNAMI

FEMA

RiskMAP
Increasing Resilience Together

Hazus: Earthquake Global Risk Report

Region Name: GoldenShores

Earthquake Scenario: West_interMtn_Normal

Print Date: October 19, 2020

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

Table of Contents

General Description of the Region

Hazus-MH is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Arizona

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 159.66 square miles and contains 2 census tracts. There are over 5 thousand households in the region which has a total population of 12,725 people (2010 Census Bureau data). The distribution of population by Total Region and County is provided in Appendix B.

There are an estimated 7 thousand buildings in the region with a total building replacement value (excluding contents) of 1,088 (millions of dollars). Approximately 97.00 % of the buildings (and 90.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 554 and 1,212 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 7 thousand buildings in the region which have an aggregate total replacement value of 1,088 (millions of dollars) . Appendix B provides a general distribution of the building value by Total Region and County.

In terms of building construction types found in the region, wood frame construction makes up 35% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 66 beds. There are 8 schools, 3 fire stations, 1 police stations and 0 emergency operation facilities. With respect to high potential loss facilities (HPL), there are no dams identified within the inventory. The inventory also includes no hazardous material sites, no military installations and no nuclear power plants.

Transportation and Utility Lifeline Inventory

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 1,766.00 (millions of dollars). This inventory includes over 49.71 miles of highways, 3 bridges, 1,136.49 miles of pipes.

Table 1: Transportation System Lifeline Inventory

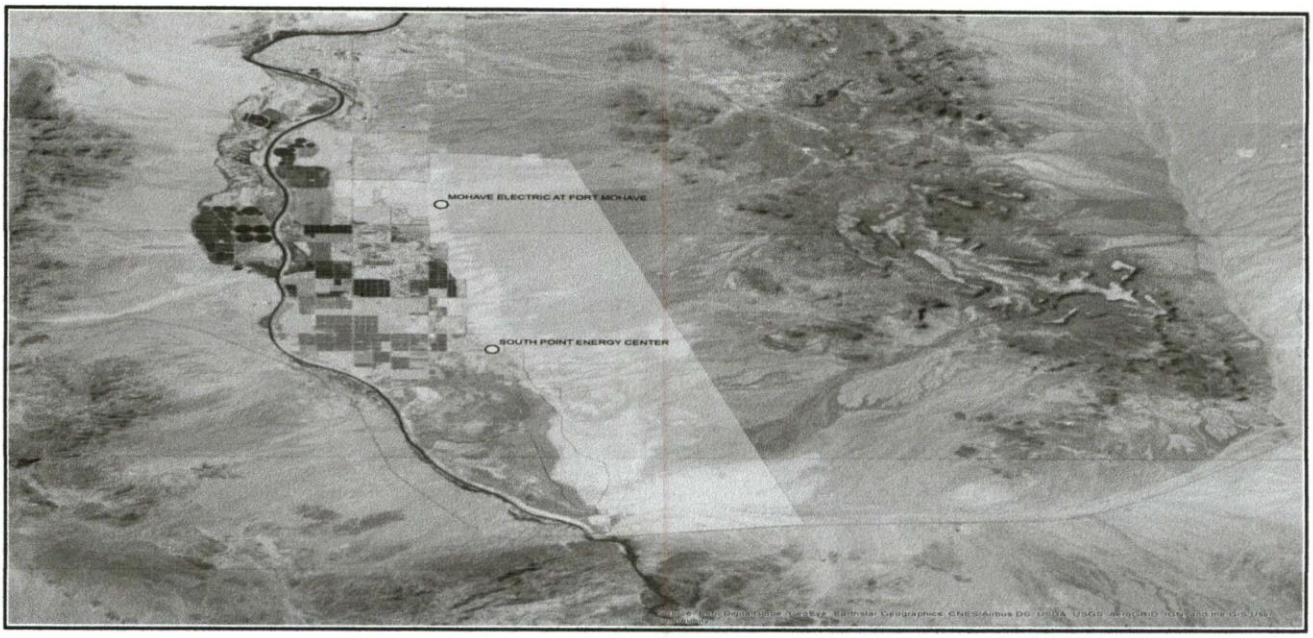
System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	3	9.3852
	Segments	10	477.1154
	Tunnels	0	0.0000
		Subtotal	**486.5006**
Railways	Bridges	4	17.4800
	Facilities	0	0.0000
	Segments	9	30.3834
	Tunnels	0	0.0000
		Subtotal	**47.8634**
Light Rail	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	0	0.0000
	Tunnels	0	0.0000
		Subtotal	**0.0000**
Bus	Facilities	0	0.0000
		Subtotal	**0.0000**
Ferry	Facilities	0	0.0000
		Subtotal	**0.0000**
Port	Facilities	0	0.0000
		Subtotal	**0.0000**
Airport	Facilities	0	0.0000
	Runways	1	19.9272
		Subtotal	**19.9272**
		Total	**554.30**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	17.4417
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**17.4417**
Waste Water	Distribution Lines	NA	10.4650
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**10.4650**
Natural Gas	Distribution Lines	NA	6.9767
	Facilities	1	1.5295
	Pipelines	15	259.1870
		Subtotal	**267.6932**
Oil Systems	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**0.0000**
Electrical Power	Facilities	2	916.8260
		Subtotal	**916.8260**
Communication	Facilities	0	0.0000
		Subtotal	**0.0000**
		Total	**1,212.40**

Earthquake Scenario

Hazus uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.



Scenario Name	West_interMtn_Normal
Type of Earthquake	Arbitrary
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	NA
Longitude of Epicenter	-114.47
Latitude of Epicenter	34.84
Earthquake Magnitude	6.70
Depth (km)	10.00
Rupture Length (Km)	25.59
Rupture Orientation (degrees)	143.00
Attenuation Function	West US, inter-Mountain West - Normal

Direct Earthquake Damage

Building Damage

Hazus estimates that about 5,238 buildings will be at least moderately damaged. This is over 71.00 % of the buildings in the region. There are an estimated 1,569 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Damage Categories by General Occupancy Type

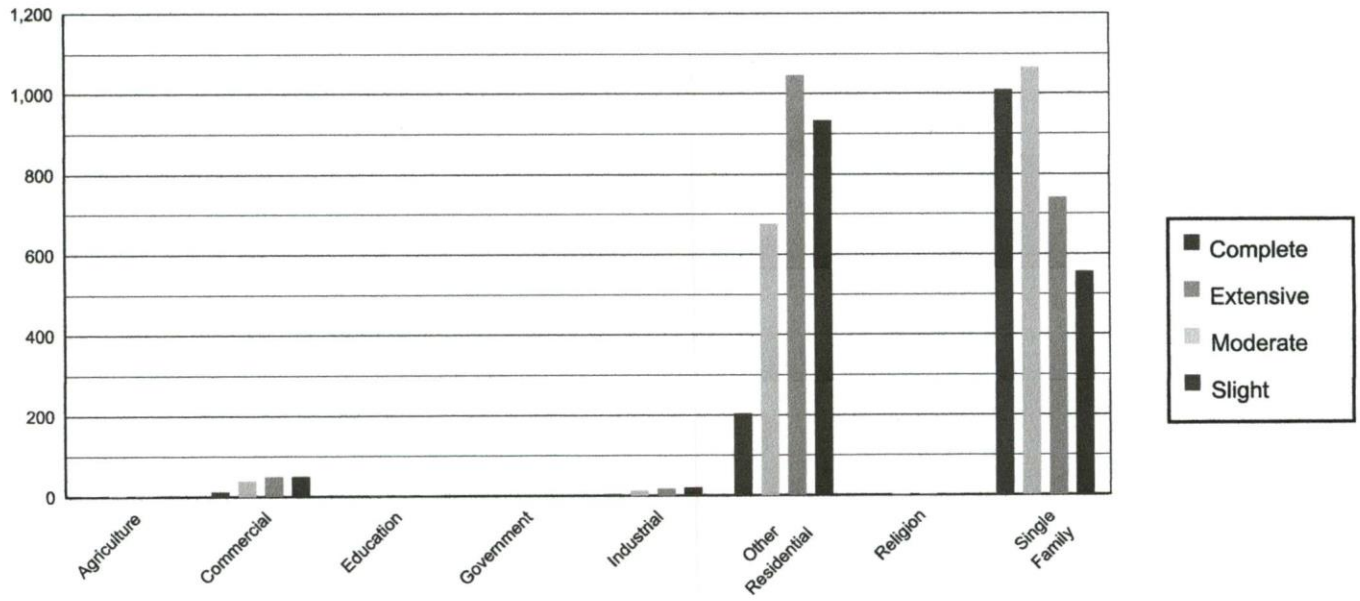


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	2.18	0.24	2.45	0.20	3.12	0.17	3.11	0.17	3.14	0.20
Commercial	7.54	0.83	12.25	0.99	39.66	2.20	49.56	2.66	49.99	3.18
Education	0.64	0.07	0.84	0.07	1.44	0.08	1.85	0.10	2.23	0.14
Government	0.32	0.04	0.46	0.04	1.09	0.06	1.23	0.07	0.90	0.06
Industrial	2.18	0.24	3.92	0.32	13.42	0.74	17.80	0.95	20.68	1.32
Other Residential	60.35	6.67	203.53	16.48	676.26	37.49	1047.11	56.15	933.75	59.49
Religion	1.07	0.12	1.28	0.10	2.24	0.12	2.72	0.15	2.69	0.17
Single Family	830.14	91.79	1010.44	81.81	1066.66	59.13	741.50	39.76	556.27	35.44
Total	**904**		**1,235**		**1,804**		**1,865**		**1,570**	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	731.22	80.85	922.92	74.72	720.42	39.94	184.09	9.87	29.79	1.90
Steel	1.23	0.14	1.73	0.14	8.00	0.44	15.56	0.83	20.01	1.27
Concrete	1.56	0.17	2.54	0.21	8.68	0.48	12.46	0.67	12.60	0.80
Precast	1.63	0.18	2.14	0.17	9.04	0.50	15.77	0.85	20.58	1.31
RM	106.72	11.80	95.02	7.69	358.06	19.85	557.21	29.88	496.72	31.65
URM	4.04	0.45	9.69	0.78	25.17	1.40	33.21	1.78	56.50	3.60
MH	58.01	6.41	201.14	16.28	674.50	37.39	1046.58	56.12	933.45	59.47
Total	**904**		**1,235**		**1,804**		**1,865**		**1,570**	

*Note:

RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 66 hospital beds available for use. On the day of the earthquake, the model estimates that only 14 hospital beds (22.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 56.00% of the beds will be back in service. By 30 days, 93.00% will be operational.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	1	0	0	0
Schools	8	5	0	0
EOCs	0	0	0	0
PoliceStations	1	0	0	0
FireStations	3	0	0	0

Transportation Lifeline Damage

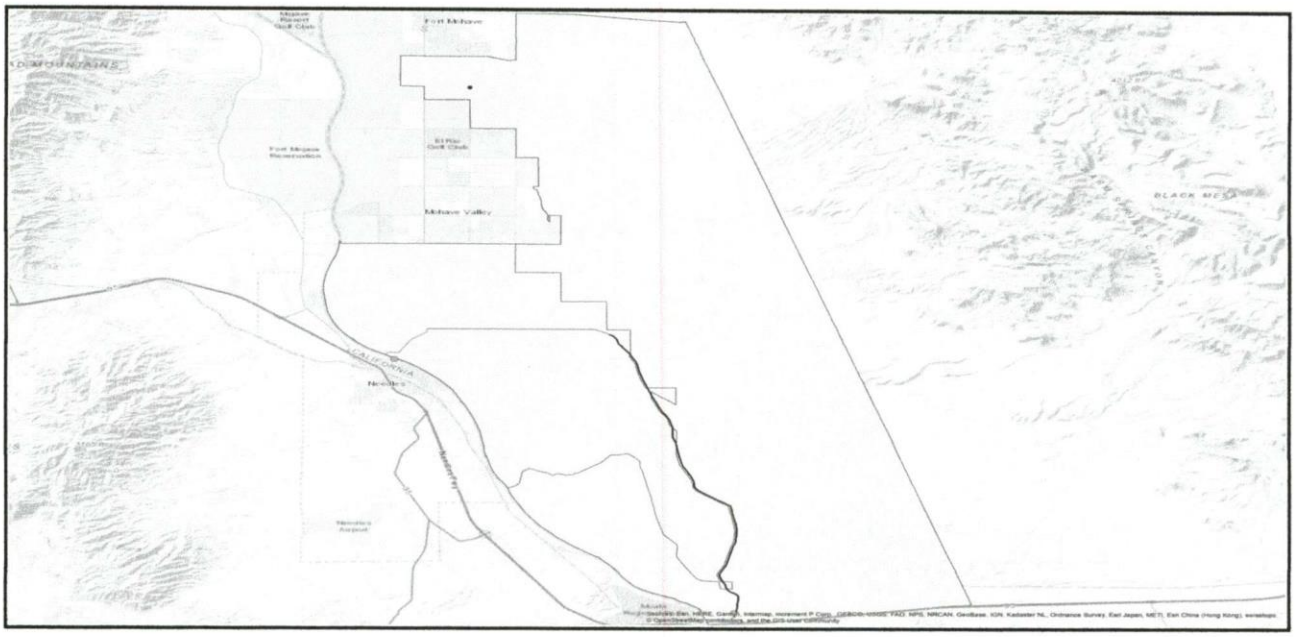


Table 6: Expected Damage to the Transportation Systems

System	Component		Number of Locations			
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	10	0	0	10	10
	Bridges	3	0	0	3	3
	Tunnels	0	0	0	0	0
Railways	Segments	9	0	0	9	9
	Bridges	4	0	0	4	4
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	0	0	0	0	0
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	0	0	0	0	0
	Runways	1	0	0	1	1

Table 6 provides damage estimates for the transportation system.

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	0	0	0	0	0
Natural Gas	1	1	0	0	1
Oil Systems	0	0	0	0	0
Electrical Power	2	2	0	1	2
Communication	0	0	0	0	0

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	542	326	81
Waste Water	325	164	41
Natural Gas	270	32	8
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	5,169	1,571	6	0	0	0
Electric Power		2,121	1,266	490	88	3

Induced Earthquake Damage

Fire Following Earthquake

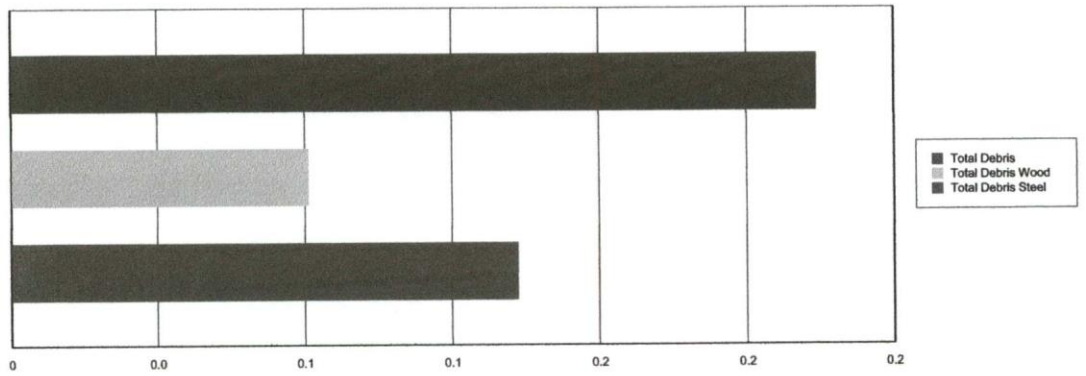
Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 219,000 tons of debris will be generated. Of the total amount, Brick/Wood comprises 37.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 8,760 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Earthquake Debris (millions of tons)



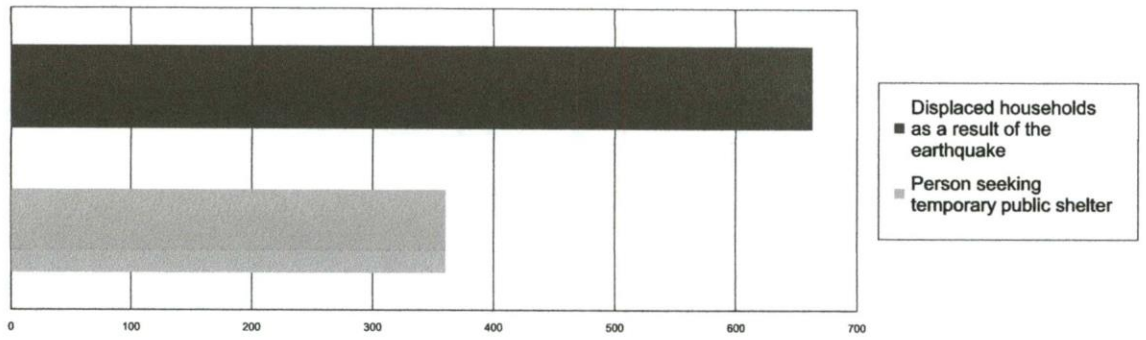
Brick/ Wood	Reinforced Concrete/Steel	Total Debris	Truck Load
0.08	0.14	0.22	8,760 (@25 tons/truck)

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 663 households to be displaced due to the earthquake. Of these, 360 people (out of a total population of 12,725) will seek temporary shelter in public shelters.

Displaced Households/ Persons Seeking Short Term Public Shelter



Displaced households as a result of the earthquake	Persons seeking temporary public shelter
663	360

Casualties

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	3.17	1.02	0.18	0.35
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	2.02	0.63	0.10	0.20
	Other-Residential	87.17	20.26	1.24	2.00
	Single Family	125.36	39.36	6.89	13.65
	Total	**218**	**61**	**8**	**16**
2 PM	Commercial	191.08	61.18	10.61	20.88
	Commuting	0.00	0.01	0.01	0.00
	Educational	38.53	12.27	2.15	4.22
	Hotels	0.00	0.00	0.00	0.00
	Industrial	14.87	4.61	0.76	1.47
	Other-Residential	21.70	5.05	0.31	0.51
	Single Family	34.67	10.71	1.89	3.61
	Total	**301**	**94**	**16**	**31**
5 PM	Commercial	127.00	40.45	7.02	13.70
	Commuting	0.08	0.11	0.17	0.03
	Educational	1.52	0.50	0.09	0.17
	Hotels	0.00	0.00	0.00	0.00
	Industrial	9.29	2.88	0.47	0.92
	Other-Residential	30.91	7.18	0.44	0.73
	Single Family	48.70	15.03	2.65	5.06
	Total	**218**	**66**	**11**	**21**

Economic Loss

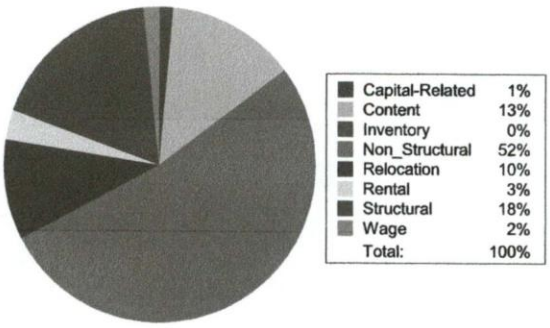
The total economic loss estimated for the earthquake is 692.25 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 438.54 (millions of dollars); 16 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 82 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

Earthquake Losses by Loss Type ($ millions)



Earthquake Losses by Occupancy Type ($ millions)

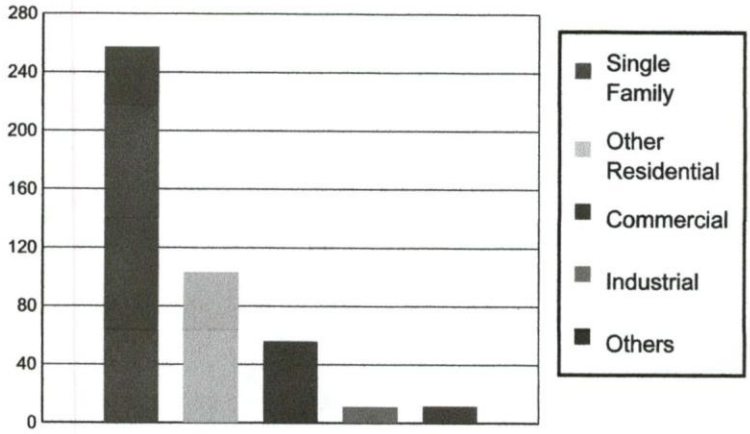


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	0.0914	6.8313	0.2542	0.3787	7.5556
	Capital-Related	0.0000	0.0390	5.8065	0.1440	0.0953	6.0848
	Rental	9.1038	1.3862	2.6777	0.0609	0.1231	13.3517
	Relocation	30.6840	8.9034	3.9112	0.3840	1.2715	45.1541
	Subtotal	**39.7878**	**10.4200**	**19.2267**	**0.8431**	**1.8686**	**72.1462**
Capital Stock Losses							
	Structural	46.6677	20.7409	6.7768	1.4548	1.9789	77.6191
	Non_Structural	138.5356	60.6780	20.1486	5.3256	5.1568	229.8446
	Content	32.1699	11.4853	9.0549	2.9199	2.3877	58.0177
	Inventory	0.0000	0.0000	0.2695	0.5802	0.0606	0.9103
	Subtotal	**217.3732**	**92.9042**	**36.2498**	**10.2805**	**9.5840**	**366.3917**
	Total	**257.16**	**103.32**	**55.48**	**11.12**	**11.45**	**438.54**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Table 12: Transportation System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	477.1154	0.0000	0.00
	Bridges	9.3852	0.0994	1.06
	Tunnels	0.0000	0.0000	0.00
	Subtotal	**486.5006**	**0.0994**	
Railways	Segments	30.3834	0.0000	0.00
	Bridges	17.4800	0.9419	5.39
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**47.8634**	**0.9419**	
Light Rail	Segments	0.0000	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Bus	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Ferry	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Port	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Airport	Facilities	0.0000	0.0000	0.00
	Runways	19.9272	0.0000	0.00
	Subtotal	**19.9272**	**0.0000**	
	Total	**554.29**	**1.04**	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	17.4417	1.4649	8.40
	Subtotal	**17.4417**	**1.4649**	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	10.4650	0.7358	7.03
	Subtotal	**10.4650**	**0.7358**	
Natural Gas	Pipelines	259.1870	0.0000	0.00
	Facilities	1.5295	0.2563	16.76
	Distribution Lines	6.9767	0.2521	3.61
	Subtotal	**267.6932**	**0.5084**	
Oil Systems	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Electrical Power	Facilities	916.8260	249.9650	27.26
	Subtotal	**916.8260**	**249.9650**	
Communication	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
	Total	**1,212.43**	**252.67**	

Appendix A: County Listing for the Region

Mohave,AZ

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Arizona					
	Mohave	12,725	985	103	1,088
Total Region		**12,725**	**985**	**103**	**1,088**