

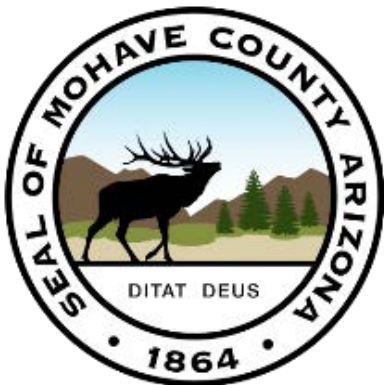
# Mohave County Flood Risk Management Plan

Version 2022



March  
2022

prepared for  
Mohave County Flood Control District



Prepared by:



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### SPECIAL ACKNOWLEDGMENTS

The Mohave County Flood Control District would like to take this opportunity to express appreciation to the members of the Advisory Committee who provided invaluable knowledge, personal experience, support, and advice in preparation of this Flood Risk Management Plan. The success of this planning effort and the potential for increased flood risk reduction benefits to the citizens of Mohave County are in large part a direct reflection of the committee's good ideas, suggestions and guidance shared with the District staff during several lengthy meetings. In particular, the District would like recognize and thank the following committee members for their assistance.

|                  |                                      |
|------------------|--------------------------------------|
| Phillip Allred   | City of Kingman                      |
| Katherine Fish   | Mohave County Flood Control District |
| Roger Galloway   | Mohave County Public Information     |
| Randall Gremlich | Mohave County Flood Control District |
| Sergio Gudino    | Mohave County Public Works           |
| Scott Holtry     | Mohave County Planning/Zoning        |
| David Martin     | Fire Chief                           |
| Jon Ortman       | Mohave County Flood Control District |
| Kathy Ortman     | Realtor                              |
| Cullin Patillo   | Mohave County Environmental Quality  |
| Pete Proffit     | Engineer                             |
| Gilbert Smaby    | Mohave County Building Department    |
| Michael Smith    | Mohave County Community Services     |
| Byron Steward    | Mohave County Emergency Management   |
| Kathy Zach       | Title Company                        |
| Mike Kellogg     | JE Fuller, Inc. (Project Consultant) |
| Cole Cooper      | JE Fuller, Inc. (Project Consultant) |

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## **EXECUTIVE SUMMARY**

The impacts of flooding in Mohave County are far ranging and pose significant threats to public safety and regional economic viability. Longtime Mohave County residents are aware of flooding hazards in the desert, and many have personally seen the area's normally dry creek beds (also called washes) suddenly transform into raging torrents during storm events. When flooding occurs, desert watercourses can quickly overflow their banks and inundate surrounding areas. Major flows in area watercourses can also severely erode unprotected channel banks causing significant damage to infrastructure and buildings located within the path of damage. Flooding impacts private properties, businesses, commercial activities, transportation corridors, and can directly or indirectly result in the loss of life.

Mohave County has undertaken significant mitigation and response actions throughout the years to reduce both existing and future flood related risks to citizens, property, and infrastructure. This has been accomplished through a carefully selected combination of mitigation actions that involve structural, regulatory, flood warning, and public education means and methods. The county also recognizes that flood risk does not respect political boundaries and has taken a very proactive approach to intergovernmental cooperation, support, and corroboration with local, state, tribal, and federal agencies, and authorities to pursue regional flood risk reduction solutions.

Mohave County's commitment to continuing active and effective flood risk reduction activities and projects is demonstrated in the preparation of this Flood Risk Management Plan (FRMP) for the unincorporated areas of Mohave County. The FRMP summarizes current county programs, assesses the flood hazard, describes potential mitigation strategies, and presents a plan for future action. The FRMP was prepared with input from an Advisory Committee comprised of a cross section of county residents, responsible county officials, and consultants. The FRMP planning process, content and scope are generally arranged to comply with Section 510 of the latest Community Rating System (CRS) guidelines.

The current Mohave County Multi-Jurisdiction Hazard Mitigation Plan (MJHMP), which was completed in accordance with the Disaster Mitigation Act of 2000 is a companion document to this FRMP. The MJHMP contains comprehensive hazard identification, risk assessments and mitigation strategies for multiple natural and human-caused hazards for all of Unincorporated Mohave County, all incorporated jurisdictions within the county, and two Indian tribes.





## **SECTION 1: INTRODUCTION**

### **1.1 Purpose and Scope**

This Flood Risk Management Plan (FRMP) for Mohave County (County) assesses the flooding hazards within the unincorporated areas of the County, summarizes previous and current County programs, describes potential mitigation strategies, and presents a plan for future actions of the County to build resilience to flood related risks. It was prepared with input from County residents, responsible officials, and consultants. The FRMP planning process, content and scope are generally arranged to comply with Section 510 of the latest Community Rating System (CRS) guidelines.

The current Mohave County Multi-Jurisdiction Hazard Mitigation Plan (MJHMP), which was completed in accordance with the Disaster Mitigation Act of 2000 is a companion document to this FRMP. The MJHMP contains comprehensive hazard identification, risk assessments and mitigation strategies for multiple natural and human-caused hazards for all of Unincorporated Mohave County, all incorporated jurisdictions within the county, and two Indian tribes.

The FRMP is intended to be a living document. It will be reviewed by the County on an annual basis and updated to reflect progress with programs and projects identified within the FRMP, as well as relevant changes in County policy, or state and federal regulations enacted after the adoption of the plan. In addition, it will be updated, as required, to ensure accuracy of data and to meet the requirements of the Community Rating System.

### **1.2 The FRMP and the Community Rating System (CRS)**

Mohave County has developed this FRMP in accordance with the latest Section 510 guidelines of the Community Rating System (CRS) guidance document (FEMA, 2017). The CRS is administered by FEMA through the National Flood Insurance Program (NFIP) using Insurance Services Office, Inc. (FEMA's CRS management contractor). The CRS program was developed and implemented to recognize, encourage and reward community floodplain management activities that exceed minimum NFIP standards by establishing a credit system that correlates to flood insurance premium reductions for NFIP policy holding residents of the County.

CRS communities are benefiting not only from the flood insurance rate premium reductions, but, more importantly, from the floodplain, storm water, and watershed management improvements that are encouraged by CRS membership and helping to protect property, the environment, and lives.

### **1.3 Organization of the Plan**

The FRMP was generally developed using the 10-Step Planning Process and activities outlined in Section 510 of the CRS guidance document (FEMA, 2017), and is arranged to methodically document each of the Section 510 activities as follows:





## MOHAVE COUNTY FLOOD RISK MANAGEMENT PLAN

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| FRMP Section  | CRS Section 510 Activity   |
|---|--|
| Section 1 – Introduction<br>Section 2 – Planning Area Profile<br>Section 3 – Planning Process | Step 1 – Organize<br>Step 3 – Coordinate   |
| Section 4 – Public Participation  | Step 2 – Involve the Public  |
| Section 5 – Flood Risk Assessment   | Step 4 – Assess the Hazard<br>Step 5 – Assess the Problem                                  |
| Section 6 – Flood Mitigation Strategy   | Step 6 – Set Goals<br>Step 7 – Review Possible Activities<br>Step 8 – Draft an Action Plan |
| Section 7 – Review and Update Strategy  | Step 10 – Implement, Evaluate, Revise  |

Throughout this FRMP, references are made to other planning documents and activities that have been or are currently being conducted by Mohave County to increase resiliency to flood hazards. These documents and activities are discussed further in Section 3.2 and listed in Table 3-4 and Table 3-5 below. These documents are considered to be an integral part of this FRMP and are incorporated as such.





## SECTION 2: PLANNING AREA PROFILE

### 2.1 General

Mohave County is located in northwest corner of Arizona (Figure 2-1), sharing 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. The county also contains over 186 square miles of water and 1,000 miles of shoreline.

The county is generally bounded on the east and west by Longitudes 112.54 and 114.75 degrees West, and on the south and north between Latitudes 34.21 to 37.01 degrees North. Major transportation routes through the area include Interstate Highways 40 and 15, U.S. Highway 93, and State Routes 95, 66, 68 and 389, as illustrated in Figure 2-2.

The terrestrial characteristics of Mohave County are quite diverse. The northern portion of the county is bisected by the Grand Canyon, and topography in other areas varies from flat desert ranges in the eastern portion of the county to the rolling, mountainous terrain, deep canyons and steeply inclined plateaus of the western and northern areas. The geologic floodplain of the Colorado River is composed of wide and flat riparian areas and adjacent agricultural lands. Elevations across the county vary from 500 feet at the Colorado River to over 8,000 feet atop Hualapai Peak. The geographical characteristics of Mohave County have been mapped into four terrestrial ecoregions as indicated on Figure 2-2 and described below:

- *Arizona Mountain Forests* – This ecoregion consists of a mountainous landscape, with moderate to steep slopes. Elevations in this zone range from approximately 4,000 to 13,000 feet, resulting in comparatively cool summers and cold winters. Vegetation in these areas is largely high altitude grasses, shrubs, brush, and conifer forests. Flooding in this region is generally characterized by tributary and riverine flood hazards.
- *Colorado Plateau Shrublands* – Elevations in this zone average around 4,000 to 5,000 feet. Vegetation is comprised mainly of Plains Grassland and Great Basin Desert scrub. Temperatures can vary widely in this zone, with comparatively warm summers and cool winters. Flooding in this region is generally characterized by tributary and riverine flood hazards.
- *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. Flooding in this region is generally characterized by tributary, riverine, and piedmont flood hazards.



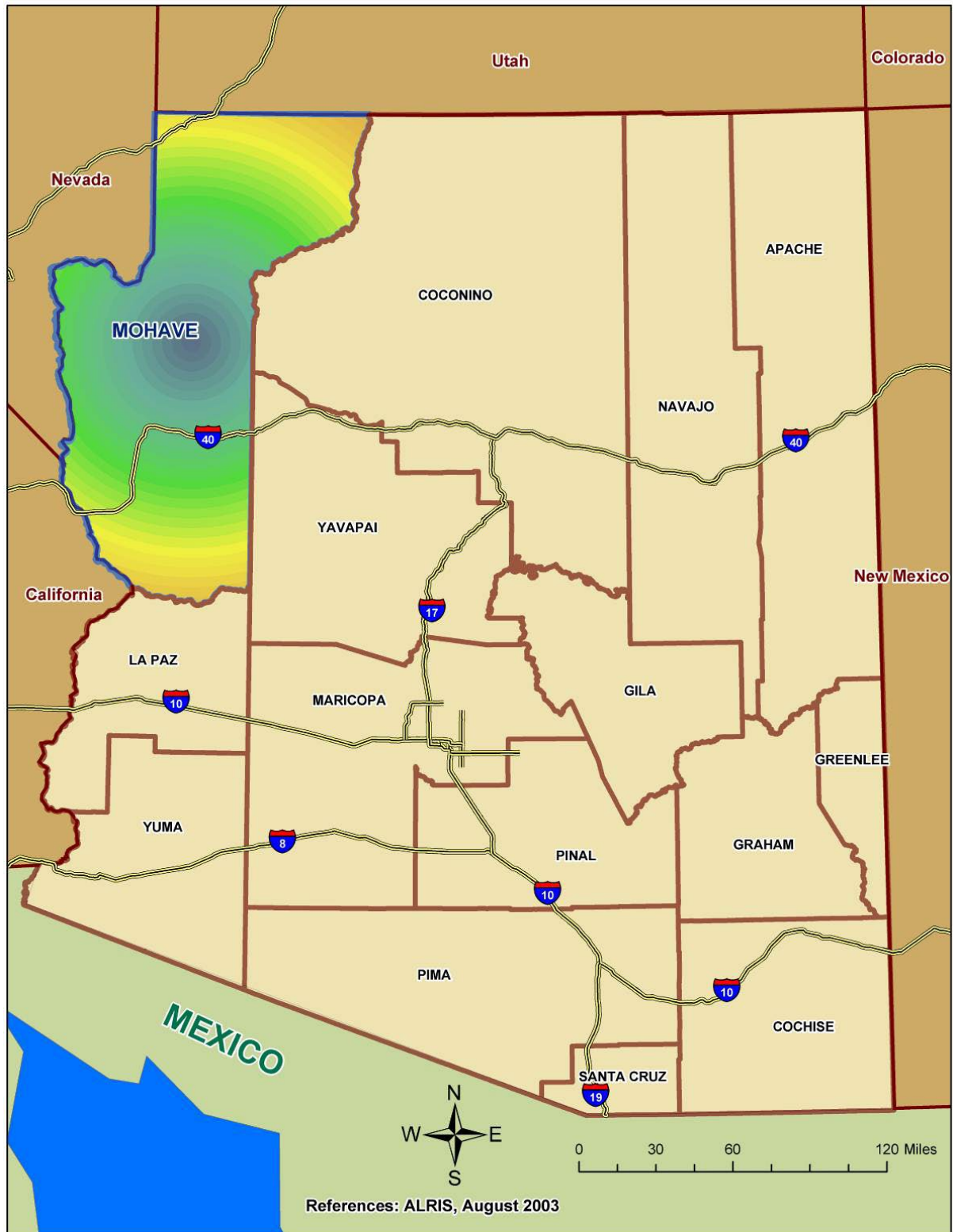


Figure 2-1. Vicinity Map





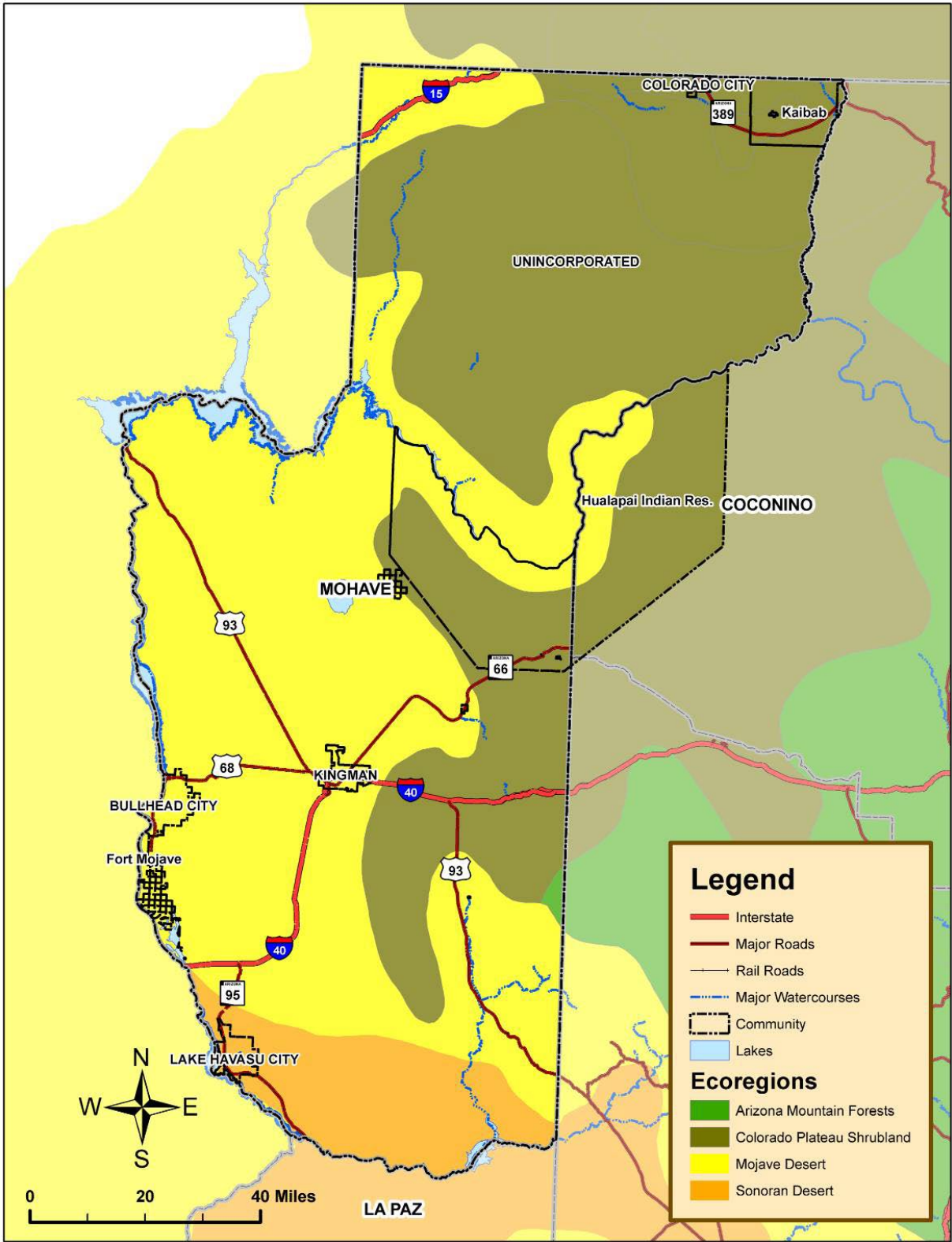


Figure 2-2 - Ecoregions within Mohave County





- *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. Flooding in this region is generally characterized by tributary, riverine, and piedmont flood hazards.

## 2.2 Climate

When compared to other regions in Arizona, the climate for most of Mohave County consists of relatively hot summers and moderate winters. Climatic statistics for weather stations within Mohave County are produced by the Western Region Climate Center and span records dating back to the early 1900's.

Average temperatures within Mohave County range from below freezing during the winter months to over 100 degrees Fahrenheit during the hot summer months. The severity of temperatures in either extreme within the county is highly dependent upon the location and, more importantly, the altitude. For instance, temperature extremes at Kingman are more moderate than those for the Bullhead City area on the Colorado River. In general, ten to fifteen degree variations in temperatures between the upper and lower elevation areas can be expected.

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.

## 2.3 Watersheds

There are 14, eight-digit hydrologic unit code (HUC-8) subbasins that cover Mohave County, as depicted in Figure 2-3 and summarized in Table 2-1. As seen in Figure 2-3, several of the perimeter watershed boundaries extend beyond the county limits, with some extending into other states. In 2013, Mohave County lead a FEMA Discovery project that covered the three most populated watersheds of Havasu-Mohave Lakes, Hualapai Wash (then called Red Lake) and Sacramento Wash. Most of Mohave County eventually drains to the Colorado River except for the Hualapai basin that drains to Red Lake which has no known surface or subsurface outlet.







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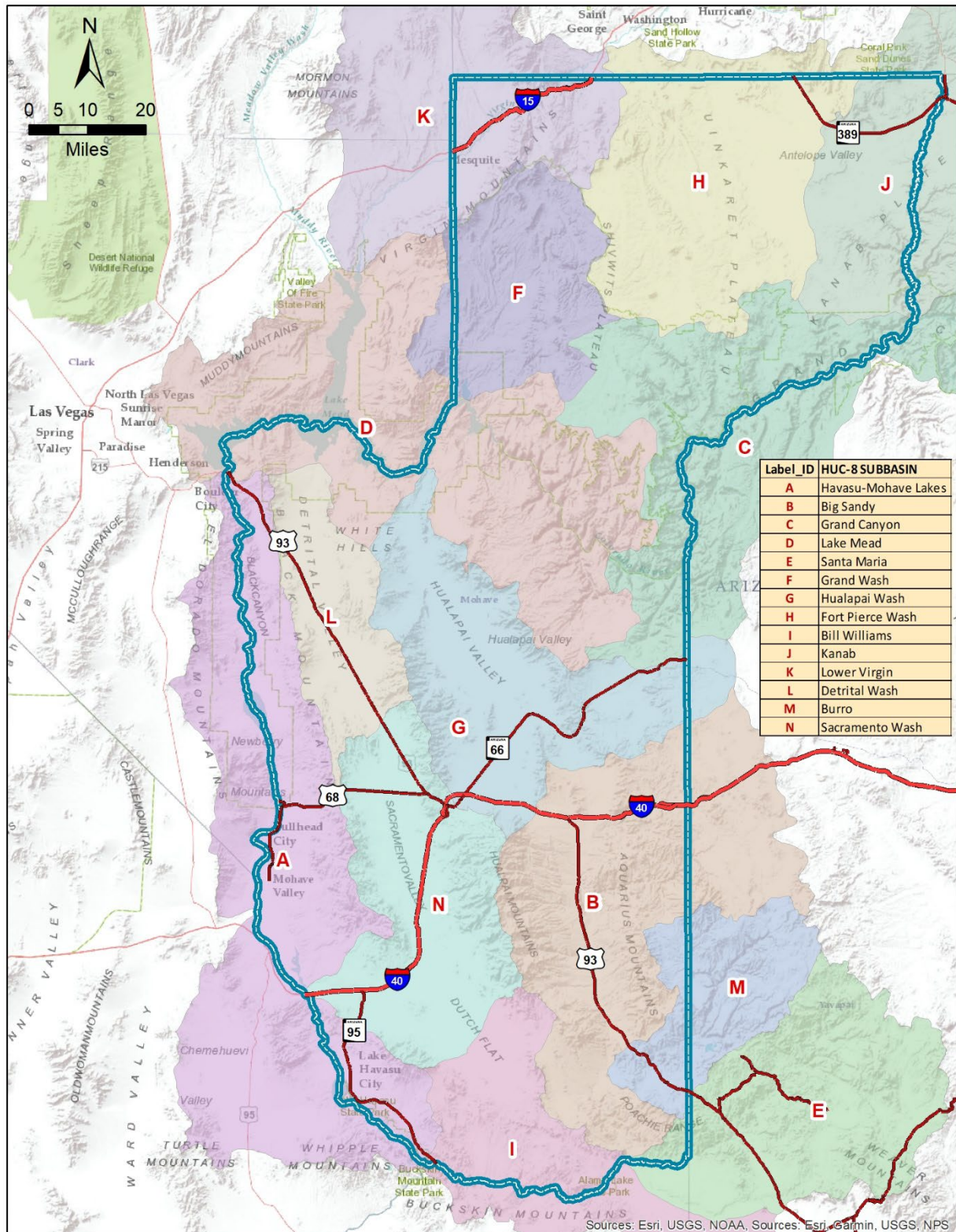


Figure 2-3 - HUC-8 watershed map







*Table 2-1 - List of HUC-8 watersheds within Mohave County*

| Map ID Letter | Subbasin Name       | HUC-8 ID Number | Total Subbasin Area , in square miles | Regional Basin Name      |
|---------------|---------------------|-----------------|---------------------------------------|--------------------------|
| A             | Havasu-Mohave Lakes | 15030101        | 2,770.8                               | Lower Colorado           |
| B             | Big Sandy           | 15030201        | 2,137.6                               | Bill Williams            |
| C             | Grand Canyon        | 15010002        | 2,543.0                               | Lower Colorado-Lake Mead |
| D             | Lake Mead           | 15010005        | 2,769.7                               | Lower Colorado-Lake Mead |
| E             | Santa Maria         | 15030203        | 1,442.3                               | Bill Williams            |
| F             | Grand Wash          | 15010006        | 932.8                                 | Lower Colorado-Lake Mead |
| G             | Hualapai Wash       | 15010007        | 1,545.9                               | Lower Colorado-Lake Mead |
| H             | Fort Pierce Wash    | 15010009        | 1,708.9                               | Lower Colorado-Lake Mead |
| I             | Bill Williams       | 15030204        | 1,108.8                               | Bill Williams            |
| J             | Kanab               | 15010003        | 2,369.4                               | Lower Colorado-Lake Mead |
| K             | Lower Virgin        | 15010010        | 2,093.3                               | Lower Colorado-Lake Mead |
| L             | Detrital Wash       | 15010014        | 661.4                                 | Lower Colorado-Lake Mead |
| M             | Burro               | 15030202        | 712.8                                 | Bill Williams            |
| N             | Sacramento Wash     | 15030103        | 1,317.7                               | Lower Colorado           |

## 2.4 Population

The 2020 Census population estimate for Mohave County was 213,070 people. The majority of the population is located in Unincorporated Mohave County in the 40 or so communities and fringe areas surrounding the incorporated cities and towns. The largest incorporated city is Lake Havasu City. Table 2-2 summarizes jurisdictional population statistics for Mohave County as a whole.

## 2.5 Development Trends

For the unincorporated areas of the county, the 2015 Mohave County General Plan (Mohave County, 2015) recognized high rates of growth in the South Mohave Valley, Golden Valley and areas surrounding Bullhead City, Kingman and Lake Havasu City prior to 2006. That growth steadily declined through 2010 and made a slow but steady recovery through 2021. Annual counts of building permits issued in Mohave County for the period of 2015 to 2021 are shown in Figure 2-4 illustrates this trend and is a good indicator of general growth. It is feasible to expect that the low to moderate growth trends of the last 5-years are likely to continue for Mohave County at much the same pace.





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**Table 2-2 - Summary of population estimates for Mohave County**

| 1990   | 2000    | 2010    | 2020    | 2030    | 2040    | 2050    |
|--------|---------|---------|---------|---------|---------|---------|
| 93,497 | 155,032 | 200,186 | 213,267 | 242,725 | 268,144 | 292,252 |

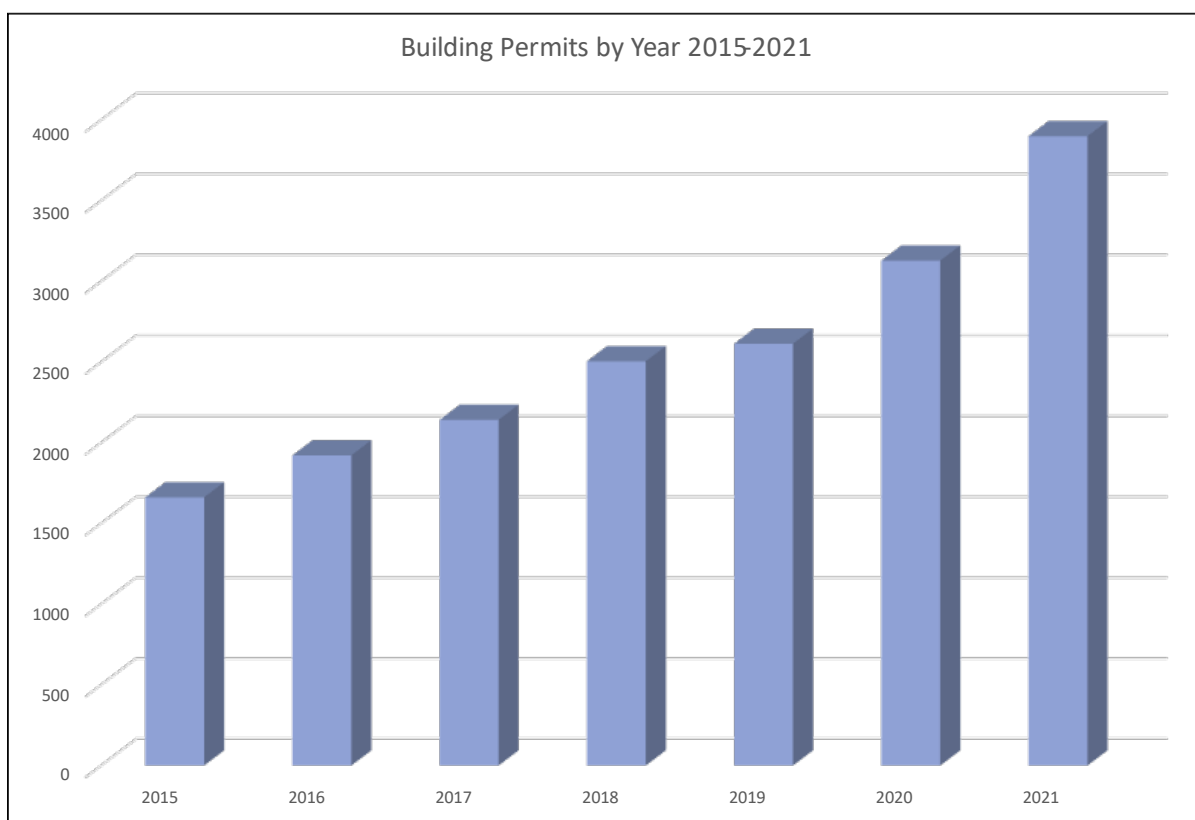
**Sources:**

1990, 2000, and 2010 estimates from US Census Bureau.

2020, 2030, 2040, and 2050 Projections from AZ Office of Economic Opportunity at:

<https://www.azcommerce.com/oeo/population/population-projections/>

<https://www.census.gov/quickfacts/mohavecountyarizona>



Source: Mohave County, 2022

**Figure 2-4 - Building permits issued in Mohave County for 2015 to 2021**





### SECTION 3: PLANNING PROCESS

The planning process used to develop the FRMP generally followed the 10-Step Planning Process outlined in Section 510 of the CRS guidance document (FEMA, 2017):

1. Organize to prepare the plan
2. Involve the public
3. Coordinate
4. Assess the hazard
5. Assess the problem
6. Set goals
7. Review possible activities
8. Draft an action plan
9. Adopt the plan
10. Implement, evaluate, and revise the plan

The sections that follow discuss the efforts undertaken to organize a planning committee, involve the public, and leverage the knowledge of internal county department officials as well as local and regional agencies involved in hazard mitigation activities.

#### 3.1 Planning Team

The planning team responsible for the development of the FRMP is composed of a small Core Team and a larger Advisory Committee. The Core Team included Mohave County Flood Control District staff and the consultant team. The Advisory Committee included the Core Team plus representatives from various other Mohave County departments and members of the public. The planning team membership is listed in Table 3-1. In addition to the planning team, the project consultants reached-out to several incorporated community stakeholders within Mohave County to obtain information on flood risk reduction activities since 2015 that have occurred within their jurisdictions that may provide a mitigation benefit to Unincorporated County areas. The list of stakeholders contacted is included in Table 3-2.

| <i>Table 3-1 - Planning team list</i> |                        |  |
|---------------------------------------|------------------------|--|
| Mohave County Department Staff        |                        |  |
| NAME                                  | DEPARTMENT             | PLANNING TEAM ROLE                               |
| Katherine Fish                        | Flood Control District | Core Team<br>Advisory Committee<br>PPI Committee |
| Roger Galloway                        | Public Information     | Advisory Committee                               |
| Randall Gremlich                      | Flood Control District | Advisory Committee                               |
| Sergio Gudino                         | Public Works           | Advisory Committee                               |
| Scott Holtry                          | Planning/Zoning        | Advisory Committee                               |
| Jon Ortman                            | Flood Control District | Core Team<br>Advisory Committee                  |
| Cullin Patillo                        | Environmental Quality  | Advisory Committee                               |





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| <i>Table 3-1 - Planning team list</i> |                      |  |
|---------------------------------------|----------------------|--|
| Gilbert Smaby                         | Building Department  | Advisory Committee                               |
| Michael Smith                         | Community Services   | Advisory Committee                               |
| Byron Steward                         | Emergency Management | Advisory Committee<br>PPI Committee              |
| Public Members                        |                      |  |
| NAME                                  | OCCUPATION           | PLANNING TEAM ROLE                               |
| David Martin                          | Fire Chief           | Advisory Committee                               |
| Kathy Ortman                          | Realtor              | Advisory Committee                               |
| Peter Proffit                         | Engineer             | Advisory Committee                               |
| Kathy Zach                            | Title Company        | Advisory Committee                               |
| Other Jurisdictions                   |                      |  |
| NAME                                  | JURISDICTION         | PLANNING TEAM ROLE                               |
| Phillip Allred                        | City of Kingman      | Advisory Committee                               |
| Consultant Facilitators               |                      |  |
| NAME                                  | COMPANY              | FACILITATOR ROLE                                 |
| Mike Kellogg                          | JE Fuller, Inc.      | Core Team<br>Advisory Committee<br>PPI Committee |
| Cole Cooper                           | JE Fuller, Inc.      | Core Team<br>Advisory Committee<br>PPI Committee |

| <i>Table 3-2 – Additional stakeholder list</i> |                       |             |
|--|-----------------------|-------------|
| NAME   | COMMUNITY             | ROLE        |
| Angie Johnson                                  | City of Bullhead City | Stakeholder |
| Dan Sloan<br>Kathy Raasch                      | Lake Havasu City      | Stakeholder |
| John Barlow                                    | Colorado City         | Stakeholder |

Stakeholder involvement was key throughout all stages of the planning process. The overall development of the FRMP was managed by the Mohave County Flood Control District. The Advisory Committee collectively had extensive experience in planning, flood control and surface water management engineering, environmental and conservation project management, street and roadway





## MOHAVE COUNTY FLOOD RISK MANAGEMENT PLAN

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transportation planning and design, land development regulation, real estate practices, plan and policy development, code writing, and construction practices in Mohave County.

The Core Team focused efforts over several months on collecting and compiling data, mapping, and information from previous planning efforts to prepare for the advisory team meetings. Several members of the Core Team also participated in the Program for Public Involvement (PPI) committee meetings, which were conducted parallel with the FRMP process to define a detailed public involvement strategy for the county per the CRS Activity 330 guidelines. The PPI and PPI committee activities serve to fulfill a portion of the public involvement process requirements of this FRMP, as will be discussed later in this section. The PPI committee meets annually, with the last meeting held on September 22, 2021. See Section 4.2 below for further discussion.

The Advisory Committee was organized and met three (3) times in an advisory role to discuss and provide input on the various planning elements of the FRMP being updated. The Advisory Committee also provided a review of the draft FRMP update prior to the FRMP being transmitted to the Mohave County Board of Supervisors for official adoption. Table 3-3 summarizes the location details and agendas for each of the three Advisory Committee meetings. Due to the ongoing pandemic, Mohave County elected to hold the meetings virtually to ensure maximum participation. The virtual meetings were recorded and are archived with Mohave County. Meeting notes are provided in Appendix B.





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*Table 3-3 - Advisory Committee meeting details and agendas*

| Meeting Type, Date,<br>and Location  | Meeting Agenda   |
|--|--|
| <p>Advisory Committee<br/>Meeting No. 1</p> <p>November 3, 2021<br/>9:00am-10:00am</p> <p>Virtual (Zoom)</p> | <ol style="list-style-type: none"> <li>1) INTRODUCTIONS</li> <li>2) CRS 510 PLANNING PROCESS OVERVIEW               <ol style="list-style-type: none"> <li>Step 1. Organize</li> <li>Step 2. Involve the public</li> <li>Step 3. Coordinate</li> <li>Step 4. Assess the hazard</li> <li>Step 5. Assess the problem</li> <li>Step 6. Set goals</li> <li>Step 7. Review possible activities</li> <li>Step 8. Draft an action plan</li> <li>Step 9. Adopt the plan</li> <li>Step 10. Implement, evaluate, revise</li> </ol> </li> <li>3) PUBLIC INVOLVEMENT STRATEGY (STEP 2)               <ol style="list-style-type: none"> <li>a) Public Outreach Mechanisms (Digital, Public Notification)                   <ol style="list-style-type: none"> <li>i) “Public” defined by FEMA as: residents, businesses, property owners, tenants, contractors, civic groups, academia, non-profits in the floodplain or involved with activities within the floodplain.</li> </ol> </li> </ol> </li> <li>4) AGENCY COORDINATION (STEP 3)               <ol style="list-style-type: none"> <li>a) Identify Non-Mohave County organizations and agencies                   <ol style="list-style-type: none"> <li>i) Bullhead City, Lake Havasu City, Colorado City</li> <li>ii) Others?</li> </ol> </li> <li>b) Solicit flood information</li> </ol> </li> <li>5) FLOOD HAZARD MANAGEMENT DATA REVIEW / ASSESSMENT (PRE STEP 4)               <ol style="list-style-type: none"> <li>a) Studies / Plans / Hazard Mapping                   <ol style="list-style-type: none"> <li>i) FEMA FIS Studies, Risk MAP Discovery, Watershed Plans, USBR Dam Failure, Mohave County MJHMP, Others?</li> </ol> </li> <li>b) Programs / Regulatory / Outreach                   <ol style="list-style-type: none"> <li>i) MCFCD Website, Development Review / Permitting Process, ALERT / Gage Information, PMR Meetings, Others?</li> </ol> </li> <li>c) Major Flood Control Projects (last 5-years)</li> </ol> </li> <li>6) NEXT MEETING PREPARATION               <ol style="list-style-type: none"> <li>a) GIS tour of Mohave County                   <ol style="list-style-type: none"> <li>i) Incidents that have occurred during the last plan cycle</li> <li>ii) Less frequent flood assessments</li> <li>iii) Assessment of areas most likely to flood</li> <li>iv) Assessment of other natural hazards that have a nexus with flooding such as drought, dam and levee failures, and wildfire</li> </ol> </li> </ol> </li> </ol> |







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***Table 3-3 - Advisory Committee meeting details and agendas***

| <b>Meeting Type, Date,<br/>and Location</b>  | <b>Meeting Agenda</b>   |
|--|---|
| Advisory Committee<br>Meeting No. 2<br><br>December 1, 2021<br>1:00pm-2:00pm<br><br>Virtual (Zoom) | <ul style="list-style-type: none"><li>1) REVIEW STEPS<ul style="list-style-type: none"><li>a) Step 1. Organize</li><li>b) Step 2. Involve the public</li><li>c) Step 3. Coordinate</li><li>d) Step 4. Assess the hazard</li><li>e) Step 5. Assess the problem</li><li>f) Step 6. Set goals</li><li>g) Step 7. Review possible activities</li><li>h) Step 8. Draft an action plan</li><li>i) Step 9. Adopt the plan</li><li>j) Step 10. Implement, evaluate, revise</li></ul></li><li>2) FLOOD HAZARD PROFILE ASSESSMENT (STEP 4)<ul style="list-style-type: none"><li>a) GIS Tour<ul style="list-style-type: none"><li>i) Review previous flood risk areas<ul style="list-style-type: none"><li>(1) Have the risks been mitigated to-date?</li></ul></li><li>ii) Incidents that have occurred during the last plan cycle</li><li>iii) Assessment of areas most likely to flood<ul style="list-style-type: none"><li>(1) SFHAs<ul style="list-style-type: none"><li>(a) FEMA Effective</li><li>(b) Pending Effective</li></ul></li><li>(2) Any others?</li></ul></li><li>iv) Repetitive loss areas</li><li>v) Assessment of other natural hazards that have a nexus with flooding:<ul style="list-style-type: none"><li>(1) Dams</li><li>(2) Levees</li><li>(3) Wildfire</li></ul></li></ul></li></ul></li></ul> |





# MOHAVE COUNTY FLOOD RISK MANAGEMENT PLAN

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|  |  |
|--|--|
| <p>Advisory Committee<br/>Meeting No. 3</p> <p>January 5, 2022<br/>1:00pm-2:00pm</p> <p>Virtual (Zoom)</p> | <ol style="list-style-type: none"> <li>1) REVIEW STEPS               <ol style="list-style-type: none"> <li>a) Step 1. Organize</li> <li>b) Step 2. Involve the public</li> <li>c) Step 3. Coordinate</li> <li>d) Step 4. Assess the hazard</li> <li>e) Step 5. Assess the problem</li> <li>f) Step 6. Set goals</li> <li>g) Step 7. Review possible activities</li> <li>h) Step 8. Draft an action plan</li> <li>i) Step 9. Adopt the plan</li> <li>j) Step 10. Implement, evaluate, revise</li> </ol> </li> <li>2) FLOOD HAZARD PROFILE ASSESSMENT (STEP 4)               <ol style="list-style-type: none"> <li>a) GIS Tour Cont.                   <ol style="list-style-type: none"> <li>i) Incidents that have occurred during the last plan cycle</li> <li>ii) Assessment of areas most likely to flood                       <ol style="list-style-type: none"> <li>(1) SFHAs                           <ol style="list-style-type: none"> <li>(a) FEMA Effective</li> <li>(b) Pending Effective</li> </ol> </li> <li>(2) Any others?</li> </ol> </li> <li>iii) Repetitive loss areas</li> </ol> </li> </ol> </li> <li>3) REVIEW AND REVISE GOALS (STEP 6)               <ol style="list-style-type: none"> <li>a) GOAL 1: Pursue continued coordination and cooperation among agencies and jurisdictions with floodplain management responsibilities and interest in Mohave County.                   <ol style="list-style-type: none"> <li>i) Strong coordination between Mohave County FC and agencies/cities to share and evaluate flood risk since 2015.</li> </ol> </li> <li>b) GOAL 2: Identify and pursue all reasonable avenues of funding for implementing flood risk reduction activities.                   <ol style="list-style-type: none"> <li>i) Funding avenues that have been investigated:                       <ol style="list-style-type: none"> <li>(1) FEMA BRIC grants (design and construction projects)</li> <li>(2) FEMA CTP Program (studies)</li> <li>(3) HMGP (design and construction projects)</li> <li>(4) Disaster Declaration (State or Federal) grants</li> </ol> </li> </ol> </li> <li>c) GOAL 3: Actively identify and implement projects and activities that reduce or eliminate flood risk in Mohave County.                   <ol style="list-style-type: none"> <li>i) Keep as-is</li> </ol> </li> <li>d) GOAL 4: Coordinate with and support emergency management with data and services to aid in effective flood hazard related emergency response.                   <ol style="list-style-type: none"> <li>i) High-level of coordination between FC and DEM. Past examples:                       <ol style="list-style-type: none"> <li>(1) Beaver Dam Wash</li> <li>(2) Golden Valley</li> <li>(3) Flag Fire area</li> </ol> </li> <li>ii) FC continues to maintain and expand the flood warning network to help DEM decision making.</li> <li>iii) Low water crossing real-time warning/road closure.</li> </ol> </li> <li>e) GOAL 5: Perform and strategize public outreach and involvement activities and projects per the CRS Activity 330 Program for Public Information (PPI) Committee recommendations.                   <ol style="list-style-type: none"> <li>i) Keep as-is</li> </ol> </li> </ol> </li> </ol> |
|--|--|





### 3.2 Agency Coordination

#### 3.2.1 *Unincorporated Mohave County*

The process of updating the FRMP included a review of several planning documents, studies, and other flood risk related documents that have been prepared by Mohave County departments and programs, as well as outside agency documents and programs. Coordination with other agencies and entities that are not Mohave County government was also performed. Table 3-4 provides a list and description of the various plans, studies and other flood risk documents that were collected during the initial FRMP development and updated with current document dates. Table 3-5 lists the new documents collected for this plan update.

#### 3.2.2 *Incorporated Communities*

The project consultant team also reached out to the following incorporated communities within Mohave County to assess whether they had conducted any flood risk mitigation projects or studies since 2015 that potentially benefited unincorporated areas of the county.

- City of Bullhead City
- Lake Havasu City
- Colorado City

In discussions with Bullhead City and Lake Havasu City it was determined that neither jurisdiction had any projects or studies that overlapped with unincorporated Mohave County. Colorado City, however, did have a large flood risk study that was completed in 2021 that included unincorporated county areas. Table 3-6 lists the project details.





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**Table 3-4 - Referenced and incorporated planning documents, studies, and activities (2015)**

| Plan or Activity Name  | Owner / Source / Manager                      | Plan Date | Description  |
|--|---|-----------|--|
| Mohave County Multi-Jurisdictional Hazard Mitigation Plan  | Mohave County Emergency Management            | 2022      | A Disaster Mitigation Act of 2000 compliant multi-hazard mitigation plan developed for all of Mohave County including the tribes, incorporated cities and towns, and unincorporated communities.   |
| FEMA Discovery Report - Havasu-Mohave Lakes HUC-8 Watershed No. 15030101                                       | Mohave County and FEMA                        | 2013      | FEMA Risk MAP Discovery reports documenting the results of conducting a Discovery Process for the listed watersheds. The scope of the Discovery was to gather and validate available flood data and discuss activities that relate to reducing flood risk in the context of a multi-jurisdictional partnership between FEMA and local and regional floodplain and emergency managers within a watershed. |
| FEMA Discovery Report - Red lake HUC-8 Watershed No. 15010007 and Sacramento Wash HUC-8 Watershed No. 15030103 | Mohave County and FEMA                        | 2013      |  |
| Program for Public Involvement (PPI)   | Mohave County Flood Control District          | 2022      | A detailed public involvement plan arranged according to CRS Activity 330 that will be used to guide the county's public involvement strategy for communicating flood risk.  |
| Mohave County 2015 General Plan (Draft)  | Mohave County                                 | 2015      | The Mohave County General Plan is a comprehensive, long-range general plan for development of the county and a public tool for the citizens of Mohave County to guide the growth they wish to see to the year 2035   |
| Mohave Valley Risk MAP Study Phase I   | Mohave County Flood Control District and FEMA | 2013      | Seventy two square mile study within Mohave Valley with the purpose of performing a Physical Map Revision (PMR) and generation of Flood Depth and Analysis Grids in preparation of future Risk MAP products.   |





# MOHAVE COUNTY FLOOD RISK MANAGEMENT PLAN

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*Table 3-4 - Referenced and incorporated planning documents, studies, and activities (2015)*

| Plan or Activity Name                                       | Owner / Source / Manager                      | Plan Date  | Description  |
|---|---|--|--|
| Mohave Valley Risk MAP Study Phase II                       | Mohave County Flood Control District and FEMA | 2014   | One hundred, sixty two square mile study within Mohave Valley with the purpose of performing a Physical Map Revision (PMR) and generation of Flood Depth and Analysis Grids in preparation of future Risk MAP products.  |
| North Lake Havasu Detailed Study                            | Mohave County Flood Control District and FEMA | 2013   | FEMA flood hazard areas did not accurately depict the many changes that significant development brought to North Lake Havasu area since 1982. The new mapping resolved the incorrect FIRMs.  |
| Sunrise Vistas Drainage Channels                            | Mohave County                                 | Design completed in 2011. Grant funding pending. Estimate 2016 completion. | Diversion channels on the north and east sides of this development were constructed to provide flood protection for residential homes. Design and ROW acquisition are complete, and funding is nearly in place. Anticipate completion of construction by end of 2016.        |
| FEMA DFIRM offset Corrections                               | Mohave County                                 | Started in 2011 and completed in 2014                                      | Correction of 32 FEMA FIRM Panels to move digital floodplain boundaries back to their correct location.  |
| Flood Rainfall and Engineering Data (FRED) Outreach project | Mohave County                                 | Started in 2012 and completed in 2013                                      | The Flood, Rain and Engineering Data (FRED) project will provide the County with the ability to disseminate large amounts of data from engineering projects in a straight-forward, clear format to the public in a graphic interface that is both intuitive and expeditious. |
| Horizon Six Channel Construction                            | Mohave County                                 | Started in 2011 and completed in 2014                                      | Construction of a 75 acre-foot detention/retention basin system with an access road and diversion channel located north of the subdivision where Mockingbird Wash crosses Window Rock Road is complete.  |





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*Table 3-4 - Referenced and incorporated planning documents, studies, and activities (2015)*

| Plan or Activity Name   | Owner / Source / Manager | Plan Date                             | Description  |
|---|--------------------------|---------------------------------------|--|
| Camp Mohave Elementary School Channel                         | Mohave County            | Started in 2013 and completed in 2014 | During rainstorms, significant depths of ponding occur in the playground area of the elementary school. An unlined channel is under construction as a joint project with the school district to drain the playground to the Calle del Media right-of-way. Water will then cross the right-of-way in a valley gutter to an existing channel.  |
| Quail Run Basin Expansion                                     | Mohave County            | Started in 2012 and completed in 2013 | A project in 2011 provided two small basins for water to collect, relieving some of the flooding potential. The north basin will be expanded to provide additional capacity.   |
| Girard Avenue Detention Basin/County Park                     | Mohave County            | Started in 2013 and completed in 2014 | This detention basin is proposed for construction on land leased from BLM to protect the Mohave Valley Junior High from historic flooding problems originating from rainfall in the mountains around Oatman. The detention basin will also include room for ball fields and a park for school and public use. This project is a joint project with the school district and Mohave Valley Park. |
| Havasupai Wash and Chaparral Wash drainage basin improvements | Bullhead City, AZ        | Started in 2010 and completed in 2014 | Continued improvements to the lower reaches (below SR 95) of the Havasupai and Chaparral Washes drainage basins are occurring. Future projects in these watersheds will include retention basins, reconstruction of roadways to increase flood carrying capabilities, and improved outfall to the Colorado River. (Phases 1-4)   |
| Sacramento Wash Detailed Study                                | Mohave County            | 2014                                  | FEMA floodplain delineation study that included 469 square miles of hydrology and 19 linear miles of detailed study.   |







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| Table 3-4 - Referenced and incorporated planning documents, studies, and activities (2015) |   |           |  |
|--|---|-----------|--|
| Plan or Activity Name  | Owner / Source / Manager  | Plan Date | Description  |
| Avra Detailed Floodplain Study   | Mohave County   | 2015      | This location in Golden Valley was mapped by FEMA with unreasonable elevation data. The purpose of the study is to correct the FEMA map.   |
| Western Avenue Drainage Study  | City of Kingman   | 2014      | Project to evaluate the drainage area west of Western Avenue from I-40 to Sycamore Avenue to help determine some possible improvements to reduce runoff impaction this section of Western Avenue, Sycamore Avenue and Beverly Avenue.  |
| Mohave Valley Watershed Strategic Planning Study   | Mohave County Flood Control District  | 2011      | The purpose of the strategic planning studies was to identify existing and future flood risks within the context of a watershed boundary. Accordingly, the strategic planning studies present a watershed based planning level flood risk analysis and recommend flood hazard management strategies and planning-level solutions to address mitigating flood risk areas. The recommended solutions identify areas that require regional and/or local flood mitigation measures (i.e., basins, channels, etc.), areas where floodplain delineations or re-delineations are needed, and areas of special flood or erosion hazards. |
| North Lake Havasu Watershed Strategic Planning Study                                       | Mohave County Flood Control District  | 2011      |  |
| Golden Valley Watershed Strategic Planning Study   | Mohave County Flood Control District  | 2011      |  |
| North Kingman Watershed Strategic Planning Study   | Mohave County Flood Control District  | 2011      |  |
| Flood Hazard Response Plan for Beaver Dam, Arizona   | Mohave County Flood Control District and Mohave County Emergency Management | 2014      | The purpose of the flood hazard response plan is to provide guidance to Mohave County staff and emergency responders for identifying and responding to a flood emergency resulting from floods on the Beaver Dam Wash at the community of Beaver Dam.  |
| Flood Hazard Response Plan for Golden Valley, Arizona                                      | Mohave County Flood Control District and Mohave County Emergency Management | 2015      | Project is inactivated.  |





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***Table 3-4 - Referenced and incorporated planning documents, studies, and activities (2015)***

| <b>Plan or Activity Name</b>                 | <b>Owner / Source / Manager</b>      | <b>Plan Date</b> | <b>Description</b>   |
|--|--------------------------------------|------------------|--|
| Drainage Design Manual for Mohave County, AZ | Mohave County Flood Control District | 2014             | The purpose of the Drainage Design Manual for Mohave County (DDM) is to supplement the listed regulations and ordinances by providing additional criteria for addressing storm water issues associated with new and existing development. The DDM contains drainage philosophies, policies, and minimum technical standards. It is intended that drainage studies, plans, design reports, construction drawings and accompanying drainage/floodplain use permit applications, prepared in accordance with the DDM, will meet the minimum requirements of the governing ordinances and regulations. The manual provides a convenient source of technical information that is specifically tailored to the unique hydrologic, environmental and social character of Mohave County; and a consistent set of criteria that, when used by the local governing agencies and the land development community, will result in uniform drainage practices throughout the County. |
| Kingman Area Master Drainage Plan            | City of Kingman                      | 1988             | The City of Kingman developed an area master drainage plan for the city limits to define discharges and flood information for key locations drainage structures throughout the city. The plan also identified problem areas and mitigation alternatives.   |





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**Table 3-4 - Referenced and incorporated planning documents, studies, and activities (2015)**

| Plan or Activity Name   | Owner / Source / Manager | Plan Date  | Description  |
|---|--------------------------|--|--|
| Flood Insurance Study for Mohave County, Arizona and Incorporated Areas | FEMA                     | Current Effective date of February 2015<br><br>(Preliminary date of July 2014 with a resulting effective date TBD) | This Flood Insurance Study (FIS) revises and updates information on the existence and severity of flood hazards in the geographic area of Mohave County, Arizona, including the Cities of Bullhead City, Kingman, Lake Havasu, Town of Colorado City, Fort Mojave Indian Reservation, and the unincorporated areas of Mohave County (hereinafter referred to collectively as Mohave County), and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood-risk data for various areas of the community that will be used to establish actuarial flood insurance rates and to assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3. |
| Lake Havasu City Drainage Master Plan                                   | Lake Havasu City         | 2007   | Lake Havasu City developed an area master drainage plan for the city limits to define discharges and flood information for key locations drainage structures throughout the city. The plan also identified problem areas and mitigation alternatives.  |





# MOHAVE COUNTY FLOOD RISK MANAGEMENT PLAN

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*Table 3-5 - Referenced and incorporated planning documents, studies, and activities (2022)*

| Plan or Activity Name                                       | Owner / Source / Manager             | Plan Date | Description  |
|---|--------------------------------------|-----------|--|
| North Lake Havasu Flood Risk Study                          | Mohave County Flood Control District | 2012      | The North Lake Havasu Study re-analyzed washes within the area to reflect flood risk on current conditions. This project begins at the Lake Havasu City limits near Diane Drive, extends north approximately 4 miles and encompasses the area from the Mohave Mountains to the Colorado River.   |
| Bullhead City Colorado River Estates                        | City of Bullhead City                | 2015      | A single 6.5 mi <sup>2</sup> FLO-2D model was prepared to represent the existing flow network of the watersheds through the city. Using the results of this modeling, specific areas of flooding and sedimentation concern were identified. Potential flow splits were identified and quantified. The existing baseline model can be used as a platform for future planning.   |
| Golden Valley Zone A Floodplain Delineation Study – Phase 2 | Mohave County Flood Control District | 2018      | The intent of the Golden Valley Zone A Floodplain Delineation Study was to develop a more accurate determination of approximate A Zone Special Flood Hazard Areas (SFHA) in the Golden Valley area, and to establish gridded flood depth data to help regulate development. This project improved the effective FEMA mapping in an area of Golden Valley located south of US 93 by more accurately locating floodplain boundaries and developing flood depth data. Improved flood hazard mapping was based on multi-frequency flood depth grids generated through 2-dimensional hydraulic modeling (FLO-2D) of the project area. In addition to improved floodplain mapping, the flood depth grids, and velocity grids were provided to FEMA for development of additional Risk MAP Products (i.e. Risk Maps). |





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*Table 3-5 - Referenced and incorporated planning documents, studies, and activities (2022)*

| Plan or Activity Name                                 | Owner / Source / Manager             | Plan Date | Description   |
|---|--------------------------------------|-----------|---|
| Kingman Flood Risk Study & LOMR Project               | City of Kingman                      | 2016      | The Kingman Flood Risk Study and LOMR Project (Kingman Project) were performed for the City of Kingman, in cooperation with the Mohave County Flood Control District, and generally included the development of new topographic mapping for the City boundaries and a portion of Unincorporated Mohave County, preparation of new hydrology and hydraulic analyses (H&H) for the greater Kingman area, prepared a LOMR for the constructed drainage improvements in the Yavapai Drive/Airway Avenue area, and the identification of areas of mitigation interest and potential mitigation strategies for the City of Kingman. |
| North Lake Havasu City Phase I Risk Map Study         | City of Lake Havasu                  | 2017      | Study and mapping of new FEMA floodplains located within the natural desert land-use area located just north of the City's existing residential/commercial development. This natural desert land-use area is the only available (non-developed) area within the City limits that will be able to accommodate the anticipated increase in population – and accompanying residential/commercial development - that is expected to occur over the next five to ten years. Mapping of existing high hazard flood areas within this area will be of significant benefit to City Planners and future land developers.               |
| Mohave Valley Future Condition Analysis Phase I Study | Mohave County Flood Control District | 2017      | A significant increase in population is expected over the next 10 years for the Arizona communities located along the Colorado River – including Mohave Valley. Potential land use changes may change percent of impervious area (increase) and available runoff storage (decrease); therefore, rainfall-runoff response and flow routing may increase. This project modeled a full build out scenario for the area using anticipated land-use changes and evaluated existing vs. future floodplains based on the results.  |







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*Table 3-5 - Referenced and incorporated planning documents, studies, and activities (2022)*

| Plan or Activity Name   | Owner / Source / Manager             | Plan Date | Description  |
|---|--------------------------------------|-----------|--|
| Bullhead City Flood Risk Project                              | City of Bullhead City                | 2018      | Conduct a hydrologic evaluation to determine the best or most applicable methodology for hydrologic analysis within and surrounding the City. Then, conduct new hydrology for all watercourses draining through the City. Prepare a LOMR for Silver Creek Wash remapping Zone AO floodplains as Zone AE (~2.5 mi).<br>Prepare a LOMR for other washes remapping Zone A, AE, or AO floodplains as Zone AE (~5 mi).<br>Prepare DFIRM and Flood Risk Products (e.g. non-regulatory depth and velocity grids). Conduct a detailed hydraulic analysis of Secret Pass Wash and Dump Wash to confirm no breakout from Secret Pass Wash to Dump Wash. Conduct a detailed hydraulic analysis of Soto Wash to identify mitigation solutions for containment and prevention of breakout flows across Bullhead Parkway.            |
| East and North Golden Valley Detailed Risk Analysis & Mapping | Mohave County Flood Control District | 2018      | The intent of the overall Golden Valley flood risk analysis (FY14/FY15/FY16) was to develop a more accurate determination of both approximate and detailed Special Flood Hazard Areas (SFHA) in the Golden Valley area, and to establish gridded flood depth data to help regulate development. When effective, these projects will improve the FEMA mapping in an area of Golden Valley by more accurately locating floodplain boundaries and developing flood depth data. Improved flood hazard mapping was based on multi-frequency flood depth grids generated through 2-dimensional hydraulic modeling (FLO-2D) of the project area. In addition to improved floodplain mapping, the flood depth grids and velocity grids were provided to FEMA for development of additional Risk MAP Products (i.e. Risk Maps). |





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*Table 3-5 - Referenced and incorporated planning documents, studies, and activities (2022)*

| Plan or Activity Name                    | Owner / Source / Manager             | Plan Date | Description  |
|--|--------------------------------------|-----------|--|
| Lake Havasu City Risk Analysis & Mapping | City of Lake Havasu                  | 2018      | Lake Havasu City is significantly impacted by highly unconfined, sediment laden, high velocity flows from the mountains and alluvial-fan-like features located to the east of the City. A series of levee-like structures and large drainage channels provide protection to residents and property while collecting, diverting, and conveying flood flows through the City and eventually outfalling at Lake Havasu (Colorado River). FLO-2D was used to update the outdated hydrologic and hydraulic analyses (HEC-1 and HEC-RAS) used for design and continued evaluation of flood protection structures and large flood control channels.   |
| Bullhead City Flood Risk Study           | City of Bullhead City                | 2017      | The project built upon the Bullhead City Flood Risk Study by refining the city-wide first order approximation (FOA) FLO-2D model into an Area Drainage Master Study model. This model served as the basis for the Area Drainage Master Plan (ADMP) that will address current flood hazards. This effort also served to address the inadequacies of existing floodplain mapping within the City that was identified during the FOA effort.  |
| Detrital Wash Risk Map Phase I           | Mohave County Flood Control District | 2018      | The approximate mapping of Special Flood Hazard Areas within the watershed was significantly dated, impacted the US-93 corridor at several locations, and did not cover a substantial portion of area that is likely to be developed in the near future. The Detrital Wash Risk MAP Phase I Project provided jurisdictions and developers new flood risk products prior to significant development, which will allow incorporation of accurate flood risk information in the planning process. The goal of the Project was to minimize adverse flooding impacts on existing and future developments, while simultaneously preserving the natural role of floodplains within the watershed. Zone A floodplain mapping was provided to FEMA for approximately 31.5 square miles. |





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*Table 3-5 - Referenced and incorporated planning documents, studies, and activities (2022)*

| Plan or Activity Name                               | Owner / Source / Manager | Plan Date | Description   |
|---|--------------------------|-----------|---|
| East Kingman RiskMAP Study                          | City of Kingman          | 2018      | The East Kingman Risk MAP Project (EKRM Project) was performed for the City of Kingman and entailed both new mapping and remapping of Special Flood Hazard Areas (SFHAs) within the project limits. The mapping area encompasses approximately 10 square miles that is primarily within City of Kingman and a small area of Unincorporated Mohave County. The area to be remapped was identified in the Mohave County Flood Control District Watershed Strategic Planning Studies as not agreeing with the current effective FIRM delineations. Most of the high-risk areas in this location are not currently mapped. The EKRM Project leveraged topographic data and modeling from a previous project to identify and delineate the proposed SFHA mapping and remapping. The project included a restudy and remapping of current FEMA Zone A floodplains located within the mapping area, and study and mapping of new FEMA floodplains located within the mostly undeveloped natural desert areas within project study area. |
| Colorado City Flood Risk Study & Floodplain Mapping | Colorado City            | 2020      | The Town of Colorado City, Arizona and Hildale, Utah operate as a single entity and share resources. Mohave County and the Town of Colorado City partnered with FEMA to complete the Colorado City Flood Risk Study and Remapping Project. This project encompasses the TOCC as well as the surrounding unincorporated area, with data from a connected Washington County, Utah project being completed simultaneously. The project also entails a restudy of the area's hydrology and hydraulics as well as new mapping and remapping of Special Flood Hazard Areas (SFHAs) within the project limits  |





# MOHAVE COUNTY FLOOD RISK MANAGEMENT PLAN

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*Table 3-5 - Referenced and incorporated planning documents, studies, and activities (2022)*

| Plan or Activity Name   | Owner / Source / Manager             | Plan Date | Description  |
|---|--------------------------------------|-----------|--|
| Golden Valley Area Drainage Master Plan (ADMP)                | Mohave County Flood Control District | 2020      | The Golden Valley area was studied in four phases and submitted in 2019. Hydrologic and hydraulic modeling was used to more accurately define flood hazards within the Golden Valley area. Zone A and Zone AE mapping was completed for select areas using the FLO-2D model output (maximum water surface elevation and maximum flow depth), existing ground topography and engineering judgement.   |
| White Hills and Dolan Springs Risk Map                        | Mohave County Flood Control District | 2018      | The objective of the Project was to provide Flood Risk Products that support the Communities' overall floodplain management and hazard mitigation strategies and plans.  |
| Lake Havasu City Risk Analysis and Mapping Update             | Lake Havasu City                     | 2019      | In 2016, a Risk MAP project was completed using topographic data from 2005, the best available information at the time. This project acquired new topographic data which was used to update the hydrologic and hydraulic modeling for Lake Havasu City.  |
| Bullhead City ADMP Flood Mitigation Alt. & Floodplain Mapping | Bullhead City                        | 2019      | The City conducted an Automated Engineering Study (AES) for all the watercourses within the City as part of the 2016 CTP project using the City-wide 2014 LiDAR dataset. New hydrology was developed as part of this study to improve upon the existing FIS hydrologic models. The results of the FOA inundation areas were compared with the effective FEMA floodplains, and some of the 140 miles of watercourses with FEMA floodplains were identified that would benefit from updated floodplain delineations based on the most recent topographic data and hydrology. Up to 6 miles of floodplain mapping-remapping was performed to best represent and manage flood risk in the area, and this task reflected a continuation of the floodplain mapping effort from the 2016 and 2017 CTP projects. |





# MOHAVE COUNTY FLOOD RISK MANAGEMENT PLAN

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**Table 3-5 - Referenced and incorporated planning documents, studies, and activities (2022)**

| Plan or Activity Name  | Owner / Source / Manager             | Plan Date                 | Description  |
|--|--------------------------------------|---------------------------|--|
| Fox Wash, Soto Wash, and Bojorquez Wash Floodplain Delineation Study | City of Bullhead Study               | 2021                      | Flooding in the area is predominantly characterized as riverine concentrated flow to the east that transitions to shallow, distributary flow as it is conveyed to the Colorado River. The intent of this FDS Project was to develop better regulatory hazard mapping and prepare a Letter of Map Revision (LOMR) for these three washes.   |
| Lake Havasu City LID Master Plan & Modeling Update                   | Lake Havasu City                     | Scheduled completion 2022 | Building upon the previous work completed by Mohave County and Lake Havasu City under previous Risk MAP projects, the Low Impact Development Master Plan will be developed to identify and qualitatively measure flood reduction, water conservation, and water quality benefits through an effective LID program. In addition, new hydrologic and hydraulic modeling will be completed for approximately 7 square miles within the City that was not previously slated for development. |
| Stockton Hill Rd Flood Risk Study & Mapping                          | Mohave County Flood Control District | Scheduled completion 2022 | Hydrologic and Hydraulic modeling for the SHR Project was completed using FLO-2D. Detailed Floodplain mapping was completed for selected streamlines using the FLO-2D model output (maximum water surface elevation and maximum flow depth), existing ground topography and engineering judgement.   |
| Scenic/Littlefield Floodplain Delineation Study                      | Mohave County Flood Control District | Scheduled Completion 2022 | The Scenic/Littlefield study is located in the northwest corner of Mohave County, near the Nevada border. This area experiences flooding from both active and inactive alluvial fans located upstream of increasing development. Detailed Floodplain mapping was completed for selected streamlines using FLO-2D hydrologic and hydraulic modeled data (maximum water surface elevation and maximum flow depth), existing ground topography and engineering judgement.                   |







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*Table 3-5 - Referenced and incorporated planning documents, studies, and activities (2022)*

| Plan or Activity Name           | Owner / Source / Manager             | Plan Date                 | Description  |
|---------------------------------|--------------------------------------|---------------------------|--|
| Sawmill Canyon Flood Risk Study | Mohave County Flood Control District | Scheduled completion 2022 | The Sawmill Canyon Flood Risk Study is located directly within the City of Kingman, AZ, and the surrounding drainage areas to the north, southeast, and southwest. Detailed Floodplain mapping was completed selected streamlines using the FLO-2D model output (maximum water surface elevation and maximum flow depth), existing ground topography and engineering judgement.  |
| Valle Vista Risk MAP Project    | Mohave County Flood Control District | 2021                      | The Valle Vista Risk MAP Project (Project) consists primarily of updated Hydrologic and Hydraulic (H&H) analyses. The updated H&H will be used to develop best available flood hazard data and flood risk products for the study area, including a re-delineation of current Federal Emergency Management Agency (FEMA) flood hazard zones located within the study area. The H&H analyses uses updated topographic data that covers most of the study area and the latest precipitation, soils, and land use data. The study area contains areas of distributary and broad, shallow sheet-flow patterns; therefore, the entire watershed was modeled using a two-dimensional modeling approach using FLO-2D software. |





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| <i>Table 3-6 – Incorporated communities planning studies and activities with unincorporated county overlap</i> |                                     |                  |   |
|--|-------------------------------------|------------------|---|
| <b>Plan or Activity Name</b>   | <b>Owner / Source / Manager</b>     | <b>Plan Date</b> | <b>Description</b>  |
| Colorado City Flood Risk Study and Mapping Project   | Town of Colorado City / John Barlow | 2021             | Mohave County and the Town of Colorado City are partners with FEMA under a Cooperating Technical Partnership (CTP) grant under Mapping Activity Statement (MAS) 2018-09. This project encompasses Colorado City as well as the surrounding unincorporated area and entails a restudy of the area's hydrology and hydraulics as well as new mapping and remapping of Special Flood Hazard Areas (SFHAs) within the project limits. |





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Mohave County Flood Control District (MCFCD) officials maintain open communications with the U.S. Bureau of Reclamation (USBR) regarding Colorado River flood flows, and dam and levee failure mapping. The combination of large dams along the reaches of the Colorado River within Mohave County provide ample opportunity for regulating flood events and stage elevations along the river, and especially during low water years when extra reservoir storage capacity is available. The USBR has recently updated its dam failure inundation mapping and has provided that data to MCFCD for its own internal use in emergency management and regulatory considerations. Flood mapping for a 100-year event, however, has not changed since the 1996 delineations were made.

MCFCD conducts quarterly coordination meetings with each of the incorporated jurisdictions to maintain contact and provide floodplain management and technical assistance whenever feasible.

### **3.3 Promulgation**

Promulgation of the FRMP is accomplished by a formal action of the Mohave County Board of Supervisors in approving a resolution of adoption. The FRMP will be valid for a period of five (5) years before requiring a complete update.





## SECTION 4: PUBLIC PARTICIPATION

### 4.1 Public Involvement with the FRMP Advisory Committee

The FRMP Advisory Committee membership includes participation by several people that are not employed or contracted by Mohave County and that represent a cross section of the public. Sectors represented included real estate and title brokerages, engineering consulting, and local non-county municipal agencies. These members were key to discussing the flooding and flood risk management issues and problems by bringing an “outside”, end-user perspective to the conversation. Table 3-1 provides a listing of the Advisory Committee membership, which met three (3) times to discuss and brainstorm public involvement strategies, flood risk data and vulnerabilities, flood problem area identification, FRMP goals, and the development and ranking of mitigation actions and alternatives.

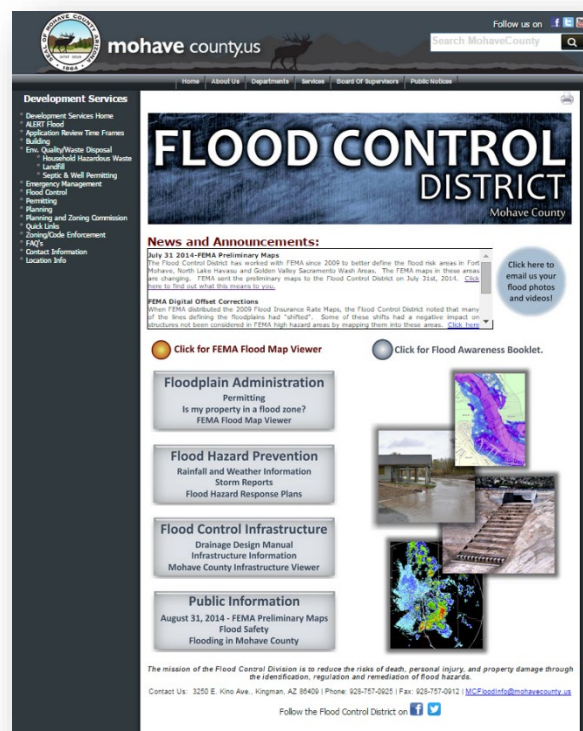
### 4.2 Program for Public Involvement Activities

Several members of the Core Team also participated in the Program for Public Involvement (PPI) committee meetings, which were conducted parallel with the FRMP process to define a detailed public involvement strategy for the county per the CRS Activity 330 guidelines. The PPI committee meets annually to strategize both a short and long-term public involvement strategy. Membership in the PPI Committee also comprised participants from the public including representation from real estate, title companies, and the general public. The FRMP process was briefly discussed on an informational basis to raise awareness for the activity.

### 4.3 Additional Public Information Activities

Mohave County has and will continue to actively perform many types of public information activities to raise awareness of the flood risks in the county and build community resilience to flood related damages and loss. The following describe several of those activities:

- Mohave County Flood Control District Website - The MCFCD hosts, maintains, and continuously updates a robust and user-friendly website that contains multiple sources of flood risk identification and mitigation related information. The website is formatted to be usable by people of all experience levels and is beneficial to both the general public and agency users. Available resources include administrative and regulatory information, forms, and maps, real time rainfall and weather information, past and current flood mitigation activities, flood related public





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information and announcements, and more. The MCFCD website was briefly reviewed during the first Advisory Committee meeting and the flood map viewer application was used during the second and third Advisory Committee meetings for references. Additionally, MCFCD hosts a website with up-to-date flood warning information<sup>1</sup>. Ultimately, the FRMP will be posted to the website with a public notice announcing its availability for review and comment.

- **Flood Awareness Booklet** – In June 2015, MCFCD compiled and published a 23-page public education and awareness booklet describing flooding and flood risk management within Mohave County. The booklet is ideal for distribution at public events and venues and has been produced in both digital and hard-copy formats. In August 2015, MCFCD mailed 14,500 copies of the booklet to all owners with property located within a FEMA delineated Special Flood Hazard Area (SFHA).
- **Social Media** – Mohave County maintains a presence in the social media outlets of Facebook, Twitter, and YouTube. The MCFCD works closely with Mohave County Emergency Management to create postings to Facebook relative to flood risk related events and news. MCFCD will use both Facebook and Twitter to announce the availability of the FRMP with links provided to the website where the FRMP can be downloaded.



<sup>1</sup> <https://mohave.onerain.com/>



## SECTION 5: FLOOD RISK ASSESSMENT

One of the key elements to the FRMP process is the risk assessment. In performing a risk assessment, a community determines “what” can occur, “when” (how often) it is likely to occur, and “how bad” the effects could be<sup>2</sup>. The assessment focuses on the sources, frequency, extent, and causes of flooding with a vulnerability analysis that addresses the impact of flooding on people, property, infrastructure, the local economy, and natural floodplain functions. The vulnerability analysis was performed in a way such that the results reflect vulnerability at both a community/populated place, and HUC-8 watershed level, with a summary of all results at a countywide level.

### 5.1 Previous Flood Studies

#### 5.1.1 FEMA Flood Insurance Studies

FEMA Flood Insurance Studies and flood hazard area mapping have been produced in the county since the late 1970s with the first FEMA Flood Insurance Study and Flood Insurance Rate Maps (FIRMs) being completed in 1980. FEMA conducted a hydrologic and hydraulic restudy completed in October 2000 that modified flood hazards along several watercourses. The next major FEMA hydrology and hydraulics update to county floodplain data and mapping was completed in May and November of 2006 and the first DFIRMs were completed in November 2009 under FEMA’s Map Modernization Program. In August 2010, a Physical Map Revision (PMR) was initiated by the expiration of several Provisionally Accredited Levee (PAL) Agreements and became effective on February 20, 2013. Shortly after, a second PMR was initiated by Mohave County as a request to correct shifts to the SFHA to match underlying base data. That mapping became effective February 18, 2015.

The most recent revisions to SFHAs in the county are products of FEMA Risk MAP projects performed using Cooperative Technical Partner (CTP) grants, wherein multiple watercourses within Mohave County been restudied and re-mapped. These recent studies have been accomplished using updated topography and two-dimensional modeling tools to provide more accurate depictions of the flood risks associated with the shallow unconfined and highly distributive flood areas that characterize these watersheds. Details on several of these studies are listed in Table 3-4 and Table 3-5.

#### 5.1.2 Watershed Strategic Planning Studies

In 2011, MCFCD performed planning level flood risk analyses for the Golden Valley, Mohave Valley, North Kingman, and North Lake Havasu regional watershed areas within the unincorporated county. The purpose of the strategic planning studies was to identify existing and future flood risks within the context of a watershed boundary and recommend flood hazard management strategies and planning-level solutions to address mitigating flood risk areas. The

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<sup>2</sup> National Fire Protection Association, 2000, *Standard on Disaster/Emergency Management and Business Continuity Programs*, NFPA 1600.







recommended solutions identify areas that require regional and/or local flood mitigation measures (i.e., basins, channels, etc.), areas where floodplain delineations or re-delineations are needed, and areas of special flood or erosion hazards. The location of the watershed strategic planning studies are shown on Figure 5-1.

#### *5.1.3 Risk MAP Discovery*

In 2013, Mohave County used CTP grant funds to conduct FEMA Risk MAP Discovery projects that were focused on the Havasu-Mohave Lakes, Hualapai Wash (formerly Red Lake) and Sacramento Wash HUC-8 watersheds (see Figure 5-2). The scope of the Discovery process was to gather and validate available flood data and discuss activities that relate to reducing flood risk in the context of a multi-jurisdictional partnership between Mohave County, FEMA, local and regional floodplain and emergency managers, Indian tribes, and other stakeholders located within the watersheds. Two separate Discovery Reports (see Table 3-4) were prepared. The Discovery process did not generate new flood risk mapping, but rather compiled existing data and opened discussions of flood risk between and among agencies and jurisdictions within the watersheds.

#### *5.1.4 Mohave County Multi-Jurisdictional Hazard Mitigation Plan*

In 2004, Mohave County, the incorporated cities and towns within, and the Indian tribes located within the county, collaboratively conducted a multi-jurisdictional hazard mitigation planning (MJHMP) process per the requirements of the Disaster Mitigation Act of 2000, and prepared the county's first MJHMP. The county re-convened most of the same jurisdictions in 2009 to prepare the first five-year update of the MJHMP, which was approved by FEMA in February 2011. The MJHMP includes a full risk assessment for dam failure, drought, extreme heat, flood, levee failure, severe wind and wildfire hazards, development of mitigation strategy that defines goals and mitigation actions to address the profiled hazards, a capability assessment for each of the participating jurisdictions, development of a public involvement strategy and plan maintenance program. The current updated version of the plan is dated 2022.

#### *5.1.5 Other Studies*

Mohave County and other agencies, municipalities and land developers have completed many other studies and analyses that identify flood risk to some level. Those may include hydrologic and hydraulic analyses performed to:

- Support the design of drainage conveyance or storage facilities
- Prepare flood response plans
- Support residential, commercial, and industrial land development and design.

A comprehensive listing of studies and analyses performed by Mohave County or reviewed as a part of this FRMP is provided in Table 3-4 and Table 3-5. Figure 5-3 shows the locations of recent Mohave County flood risk projects.





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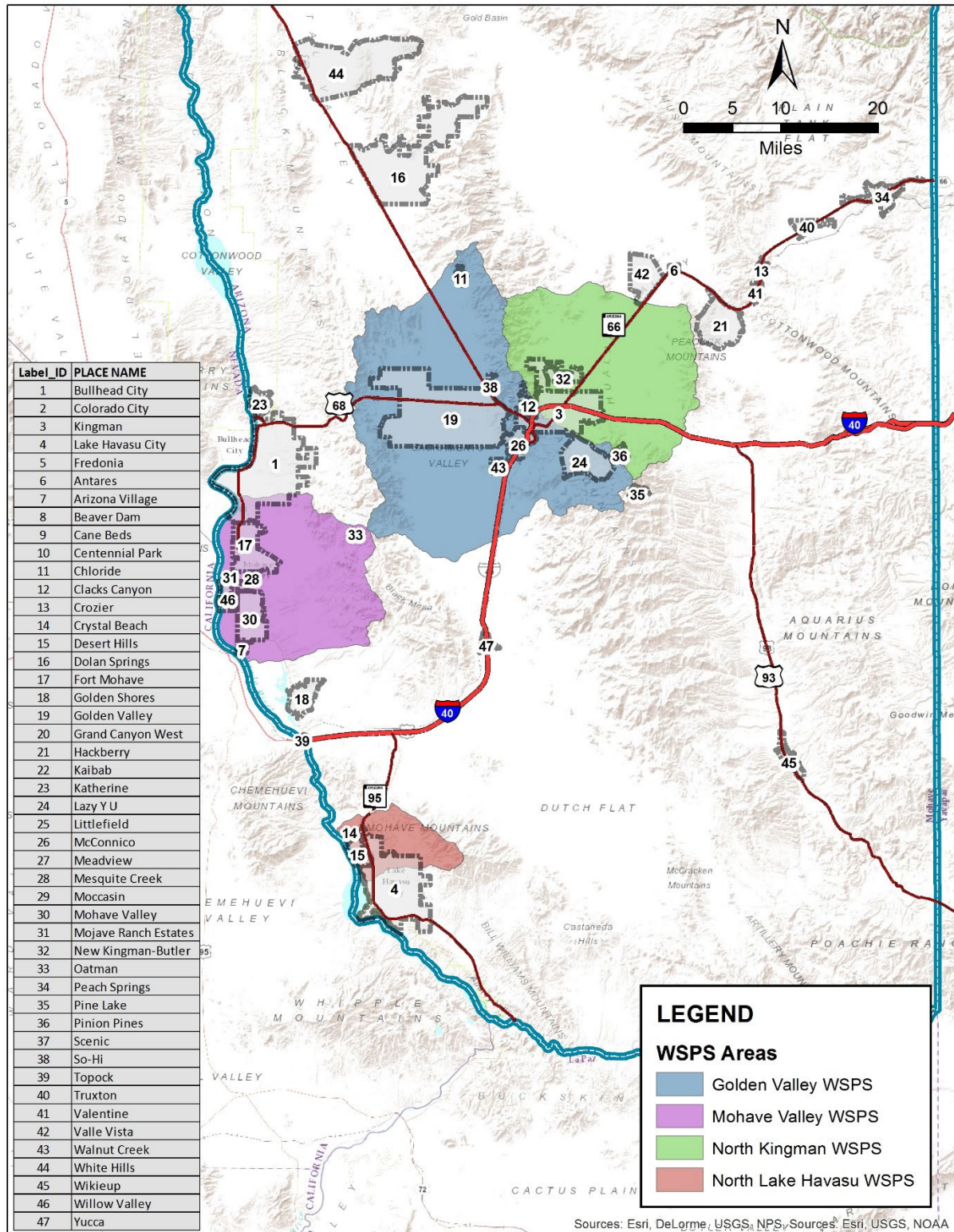


Figure 5-1 - Watershed strategic planning study areas







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Figure 5-2 - Discovery study watersheds map

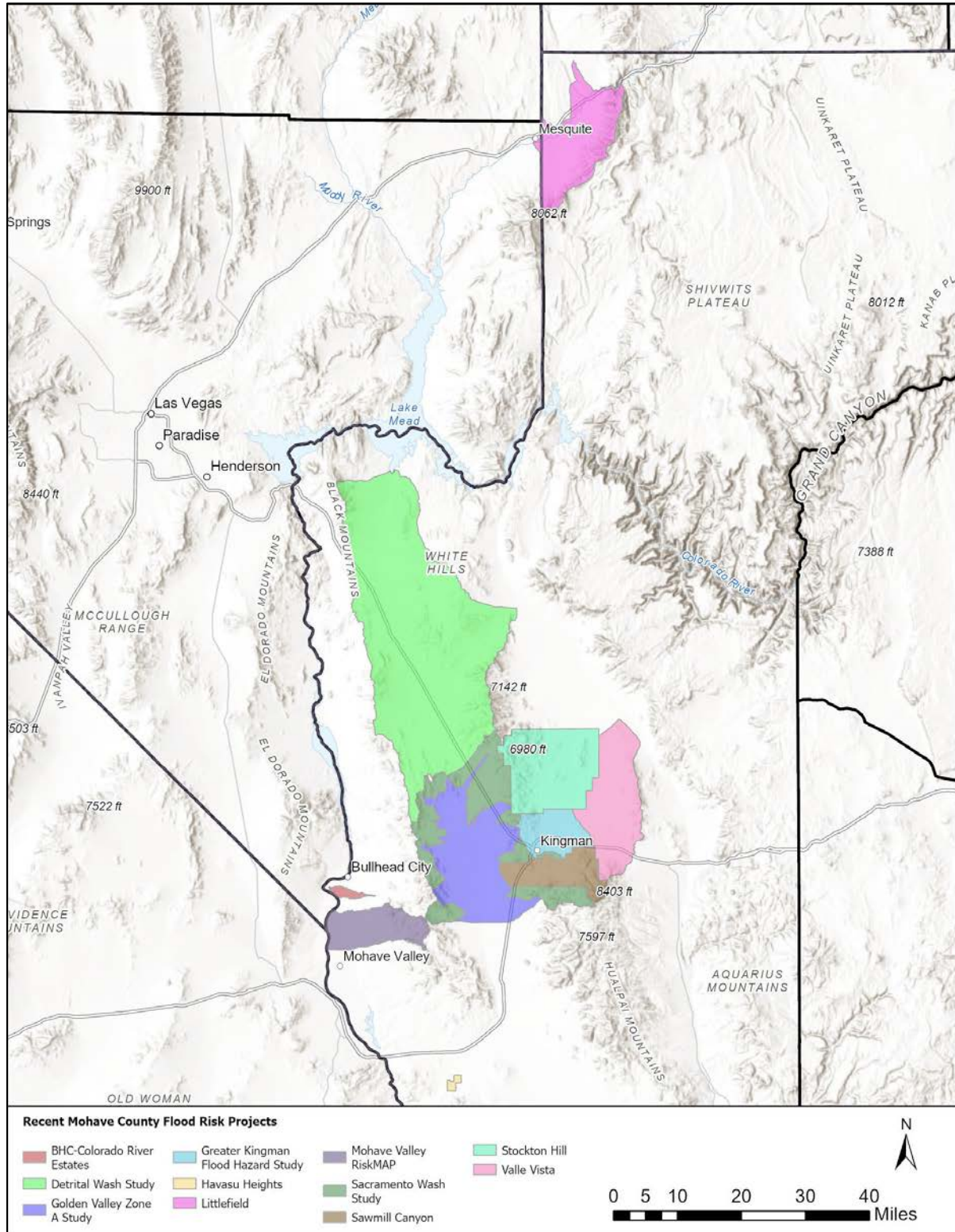






# MOHAVE COUNTY FLOOD RISK MANAGEMENT PLAN

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*Figure 5-3 - Recent Mohave County flood risk projects*





## 5.2 Repetitive Loss Analysis

Repetitive Loss (RL) properties are any insurable buildings for which two or more claims of more than \$1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. A RL property may or may not be currently insured by the NFIP. RL properties demonstrate a track record of repeated flooding for a certain location and are important to the NFIP since structures that flood frequently put a strain on the National Flood Insurance Fund. All RL properties within Unincorporated Mohave County have been mitigated as of the date of this document.

## 5.3 Flood Hazard Profile

### 5.3.1 Flooding History

Flooding is one of the top natural hazards to impact properties and citizens of Mohave County. According to the Arizona Division of Emergency Management (ADEM) and FEMA records, Mohave County has been included in 19 presidential and/or gubernatorial disaster declarations for flooding related events, with the most recent presidential declaration occurring in 2014. Those events are summarized in Table 5-1.

| <i>Table 5-1 - Presidential and gubernatorial disaster declarations for Mohave County</i> |                           |            |                          |            |
|---|---------------------------|------------|--------------------------|------------|
| Flood Date  | Gubernatorial Declaration |            | Presidential Declaration |            |
|   | No.                       | Date       | No.                      | Date       |
| 19 July 1974  | ---                       | 7/19/1974  | ---                      | ---        |
| 10 September 1976   | ---                       | 9/10/1976  | ---                      | ---        |
| 24 August 1977  | ---                       | 8/24/1977  | ---                      | ---        |
| 2 March 1978  | ---                       | 3/2/1978   | 550-DR                   | 3/04/1978  |
| 16 December 1978  | ---                       | 12/16/1978 | 570-DR                   | 12/21/1978 |
| 13 February 1980  | ---                       | 2/13/1980  | 614-DR                   | 2/19/1980  |
| 16 June 1983  | ---                       | 6/16/1983  | 686-DR                   | 7/01/1983  |
| 28 September 1983   | ---                       | 9/28/1983  | 691-DR                   | 10/05/1983 |
| 5 November 1983   | ---                       | 11/5/1983  | ---                      | ---        |
| 23 July 1984  | ---                       | 7/23/1984  | 730-DR                   | 1/15/1985  |
| 8 July-14 September 1990  | EUZ901                    | 9/07/1990  | 884-DR                   | 12/06/1990 |
| 8 January-6 March 1993  | 93003                     | 1/08/1993  | 977-DR                   | 01/19/1993 |
| 5-7 March 1995  | 95008                     | 3/07/1995  | ---                      | ---        |
| 24 September 1997   | 98002                     | 9/24/1997  | ---                      | ---        |
| 28-29 December 2004   | 25004                     | 12/29/2004 | 1581-DR                  | 2/17/2005  |
| 10-13 February 2005   | 25005                     | 2/16/2005  | 1586-DR                  | 3/14/2005  |
| 21 July-6 August 2007   | 28002                     | 9/14/2007  | ---                      | ---        |
| 18-22 January 2010  | ---                       | 1/18/2010  | 1888-DR                  | 3/18/2010  |





*Table 5-1 - Presidential and gubernatorial disaster declarations for Mohave County*

| Flood Date          | Gubernatorial Declaration |  | Presidential Declaration |           |
|---------------------|---------------------------|--|--------------------------|-----------|
|                     | No.                       | Date                                     | No.                      | Date      |
| 21-22 December 2010 | 73001                     | 1/27/2011                                | ---                      | ---       |
| 8 September 2014    | 73027                     | 09/08/2014,<br>10/01/2014,<br>11/04/2014 | DR4203                   | 11/5/2014 |
| 19 November 2018    | 73050                     | 11/19/2018                               | ---                      | ---       |
| 28 February 2019    | 73052                     | 02/28/2019                               | ---                      | ---       |

The National Centers for Environmental Information Storm Events Database<sup>3</sup> includes flood related incidents for Mohave County spanning from November 1996 through the present. Over 467 separate flooding incidents have been recorded by the NCDC database during the period of November 1996 through September 2021. Estimated losses for that period exceed \$17 million with 6 fatalities and 124 injuries. The following incidents represent examples of major flooding that has impacted the County:

- November 1996, heavy rain created flash flooding in Kingman causing street closures and some road damage. A few cars were abandoned but no injuries were reported. Also, the combination of rain and hail produced slippery roads resulting in numerous automobile accidents.
- August 1997, severe thunderstorms with very heavy rain began over central Mohave County around 12:30 am and ended around 2:30 am MST. Washes rapidly filled in the vicinity of Kingman and several roads were washed out. At least two cars were caught in a flooded wash and their four occupants had to be rescued by helicopter. Also, one woman was found dead hours later in a sewer drainage pond. It is unknown how she was caught in the flood waters. Another serious result occurred a few hours after the storms ended when a passenger train derailed while crossing a small bridge damaged and weakened by flood waters. Of the 302 passengers and crew members aboard, 116 were injured and of those eight sustained serious injuries.
- 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).

<sup>3</sup> <https://www.ncdc.noaa.gov/stormevents/>







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- 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.
- 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).
- 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).
- 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 all-time 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 the event resulted in a federal disaster declaration (FEMA-1888-DR) (NCDC, 2010 and ADEM, 2010).
- December 2010, the Beaver Dam Wash flooded the community of Beaver Dam. Six homes were washed away, 12 more were damaged, two mobile homes and a garage were destroyed, and a 300–400-foot stretch of Clark Gable Drive was washed out. The water flowed into the Virgin River, which then flooded Littlefield, damaging a sewer lift station. Damages were estimated to exceed \$4 million (NCDC, 2015; MCFCD, 2015).
- The 2012 monsoon season (July to September) produced multiple, strong monsoon thunderstorm outbreaks that flooded several areas of the Mojave Desert and southern Great Basin areas. Numerous storms produced flash flooding and/or severe weather across the county. In Lake Havasu City, one man drowned when a car was swept down a wash and there were 11 other swift water rescues. Many roads and highways across the county were closed due to flooding and debris. Lake Havasu City was particularly hard hit with Rotary Park being filled with mud, nearby sidewalks were undermined, a few homes flooded, and one roof collapsed from the rain. Collectively for the period, damages were estimated to exceed \$5.9 million, with one fatality and minor injuries (NCDC, 2015; MCFCD, 2015).
- The 2013 monsoon season was not as damaging as 2012, but still managed to produce several thunderstorm occurrences that impacted areas countywide. The most significant flooding occurred during the July 26–28<sup>th</sup> period. In the Dolan Springs area, a tour bus drove into a flooded wash at mile marker 16 on Pierce Ferry Road, floated down the





wash, and lodged on its side on an embankment. Everyone was rescued but the bus was a total loss. In Kingman, at least three cars were stuck, with flood water lapping over the hoods. Water and debris flowed over several roads, and one swift water rescue was necessary. During September flooding, heavy rain in the Sacramento Wash basin produced high flows in the wash which covered the Oatman-Topock Highway with mud and water and damaged 50 boat slips at the Topock 66 Spa and Resort on the Colorado River. Damages for the season were estimated to exceed \$0.9 million (NCDC, 2015; MCFCD, 2015).

- The 2014 monsoon season produced multiple thunderstorms, but individual damages for each storm were not as great as prior years. Flooding in Kingman and Golden Valley necessitated several swift water rescues and miscellaneous road closures and damages due to flooding and deposition of sediment debris. Damages for the season were estimated to exceed \$0.6 million (NCDC, 2015; MCFCD, 2015).
- September 2015, extremely heavy rain in the mountains above Hildale, UT resulted in major flash flooding on Short Creek in and downstream of Colorado City, AZ, as well as in other washes on the Arizona Strip. Several streets in Colorado City were flooded and impassable, and bridges were damaged. One man died on the back roads of the Arizona Strip when flood waters swept away his car.
- July 2021, at least three roads were closed, at least one home was inundated, and major flooding occurred inside the park, impacting several campground cabins.

Detailed descriptions and listings of the historic hazard events recorded for Mohave County are included in Appendix C.

### *5.3.2 Flood Hazard Mapping*

As previously discussed, Mohave County and FEMA have developed both regulatory and non-regulatory flood risk mapping as a part of multiple studies and analyses performed for areas throughout the county. For the purposes of this FRMP, components of those mapping studies are used to develop a comprehensive, countywide high hazard flood risk map that will be used to assess vulnerabilities of people, critical facilities and infrastructure, and general residential, commercial and industrial buildings to those flood risk areas.

The source components of the flood risk mapping include a compilation of:

- One percent probability floodplains mapped by FEMA as Special Flood Hazard Area (SFHA) "A" zones (e.g. – A, A1-99, AE, AH, AO, etc.) obtained from the most current FEMA Flood Hazard Layer database<sup>4</sup>.
- Other one percent probability non-regulatory flood depth grid data from miscellaneous Mohave County studies, including the Watershed Strategic

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<sup>4</sup> <https://msc.fema.gov/portal/home>





Planning Studies. Flood depths greater than or equal to 1-foot are shown in the flood risk mapping.

Figure 5-4 and Figure 5-5 present a broadscale depiction of the high hazard flood risk areas defined for Mohave County in this FRMP. Higher resolution maps are included as digital attachments in Appendix D.

#### **5.4 Other Natural Hazards**

The Mohave County MJHMP identifies multiple hazards that impact Mohave County, including: Dam Failure, Drought, Extreme Heat, Levee Failure, Severe Wind, and Wildfire. The majority of natural hazards and the dam and levee failures, have common or intersecting impacts with flooding. For example, when a watershed experiences a severe wildfire, it is very likely that flood flows generating by that watershed will increase 10- to 100-fold depending upon the severity and topology of the wildfire extents. Drought can also increase flooding due to a reduction in vegetative cover in a watershed, which in turn causes increased runoff during precipitation events. Most dam and levee failure events typically correspond with a heavy precipitation event that overwhelms the structure's capacity and results in catastrophic flooding downstream of these areas.

The MJHMP includes a full risk assessment for each of the listed hazards and reference is hereby made to that document for further consideration of any hazards and mitigation strategies.







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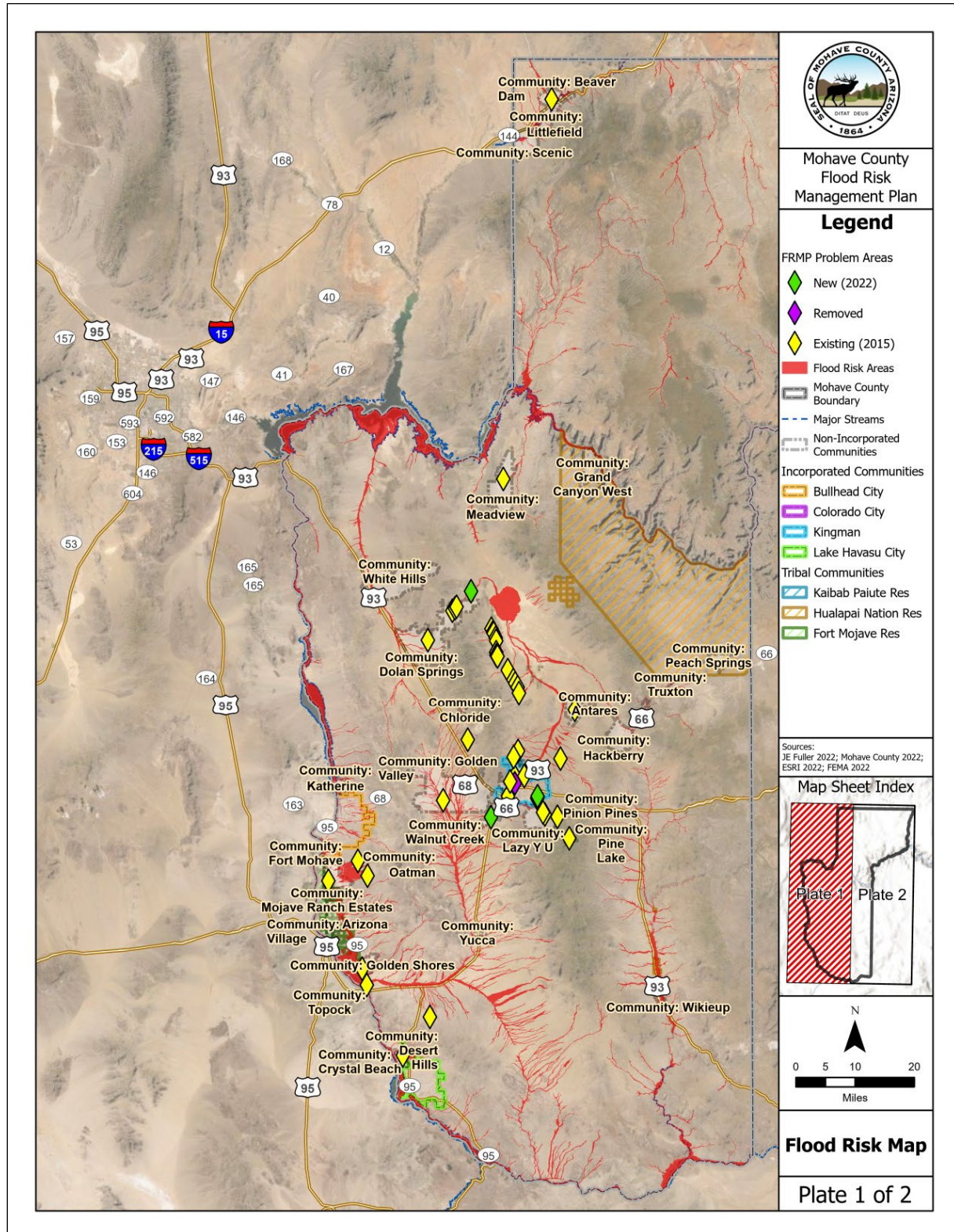


Figure 5-4 - Mohave County flood hazard area map - Plate 1







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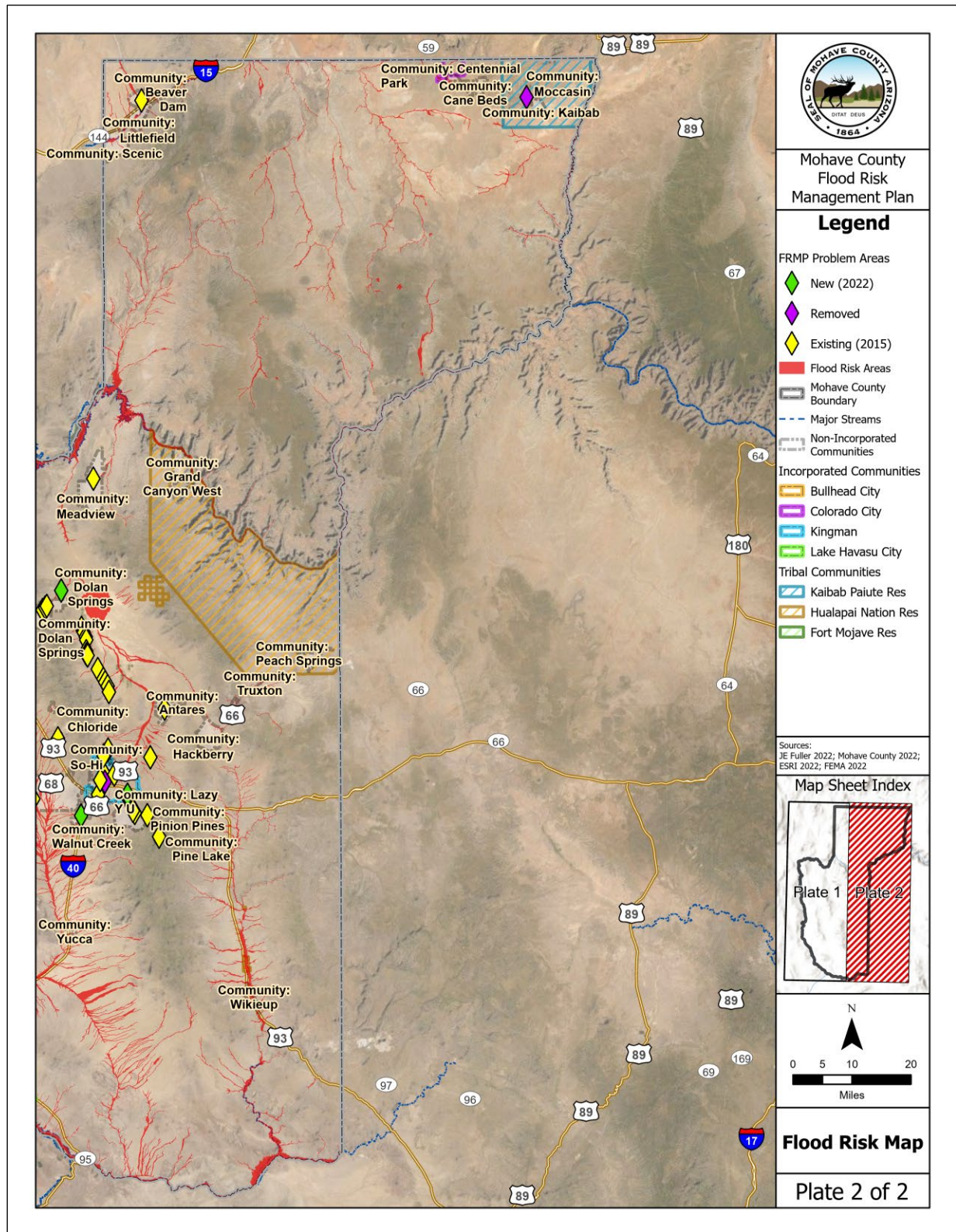


Figure 5-5 - Mohave County flood hazard area map - Plate 2





## 5.5 Vulnerability Analysis

### 5.5.1 General

The following sections summarize the methodologies used to perform the vulnerability analysis portion of this flood risk assessment. The results of the vulnerability analysis are also presented and are generally summarized by community and HUC-8 watershed for the extents of Mohave County. The sectors evaluated for vulnerability include:

- Critical facilities and infrastructure (see Section 5.5.2 below),
- People in terms of total population, population over 65 years of age, and population with household incomes of less than \$20,000 per year, and
- General residential, commercial, and industrial building counts.

### 5.5.2 Critical Facilities and Infrastructure

The 2022 Mohave County MJHMP identifies a list of critical facilities and infrastructure (CFI) for use in the MJHMP risk assessment. The CFI inventory is generally divided into *critical* and *non-critical* categories. According the MJHMP, *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.
- Significantly hinder a community's ability to recover following a disaster.

Following the criteria set forth by the Critical Infrastructure Assurance Office (CIAO), the State of Arizona has adopted eight general categories<sup>5</sup> that define critical facilities and infrastructure:

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.

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<sup>5</sup> Instituted via Executive Order 13010, which was signed by President Clinton in 1996.







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.

Figure 5-6 from the 2022 MJHMP shows the estimated Mohave County CFI counts by jurisdiction.

| Jurisdiction                                | Critical Facilities and Infrastructure |                          |                        |                                  |                         |                      |                     |                    | Non-Critical Facilities |          |            |               |              |
|---|--|--------------------------|------------------------|----------------------------------|-------------------------|----------------------|---------------------|--------------------|-------------------------|----------|------------|---------------|--------------|
|   | 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            |

**Figure 5-6. Estimated asset counts by jurisdiction (Source: MJHMP 2022)**

Other assets such as public libraries, schools, museums, parks, recreational facilities, historic buildings or sites, churches, residential care facilities, and so forth, are classified as non-critical facilities and infrastructure, as they would not necessarily 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. They are, however, still considered to be important facilities and critical and non-critical should not be construed to equate to important and non-important. For each asset, attributes such as name, description, physical address, geospatial position, and estimated replacement cost were identified to the greatest extent possible and entered into a GIS geodatabase.



### 5.5.3 HAZUS Population and Building Stock Estimates

Population and general residential, commercial, and industrial building inventories are estimated using the population and general building stock databases included with the HAZUS®-MH<sup>6</sup> program, wherein the developers of the HAZUS database have made attempts to correlate population and building/structure counts to 2010 Census block data. *It is noted that the HAZUS data population statistics will not equate to the current population statistics provided in Section 2.4. The latest HAZUS database release (November 2019) was used for this analysis and utilizes population data from the 2010 census. Other inconsistencies could result from changes in population counts associated with a particular census block, GIS positioning anomalies and the way HAZUS depicts certain census block data. It is also noted that the residential, commercial, and industrial building stock estimates for each census block may slightly under-predict the actual buildings present due to normal growth that has taken place since the 2010 Census data was compiled, and the general lack of commercial and industrial data for some of the more rural communities and counties. It is also worth noting that HAZUS replacement cost estimates in the latest database release are only updated to 2018 RSMeans valuations. Without a detailed, site-specific structure inventory of these types of buildings, the HAZUS database is still the best available and the results are representative of a general magnitude of population and residential, commercial, and industrial facility exposures to flood risks in the county.* Combining the exposure results from the CFI database and the HAZUS database provides a comprehensive depiction of the overall exposure of building stock and the two datasets are considered complimentary and not redundant.

A County-wide Level 1 HAZUS analysis (described below) was performed to determine a comprehensive high-level 100-year flood loss estimation for Mohave County. The analysis was performed using the latest HAZUS database release (November 2019) which considers 2010 Census Data and building valuations that reflect RSMeans 2018. Essential facilities, transportation, and utility data are reportedly up to date as of November 2019.

### 5.5.4 HAZUS Level 1 Basic Flood Loss Analysis

HAZUS version 4.2 was used for a County-wide Level 1 flood loss analysis. The simulations were compiled and run per guidance provided in the August 2018 version of FEMA's HAZUS Flood Model User Guidance manual. Default parameters for each step in the simulation process were left unchanged.

Preparing a Level 1 HAZUS simulation is a multi-step process, requiring the user to define a study region for which HAZUS will perform hydrologic analyses, floodplain delineations, and ultimately the flood loss analysis. HAZUS is limited to the size of the study region for which the analyses can be performed, although, HAZUS does allow the user to break the study region up into smaller "scenarios". The individual scenario results can be combined, representing the full study region results and estimations.

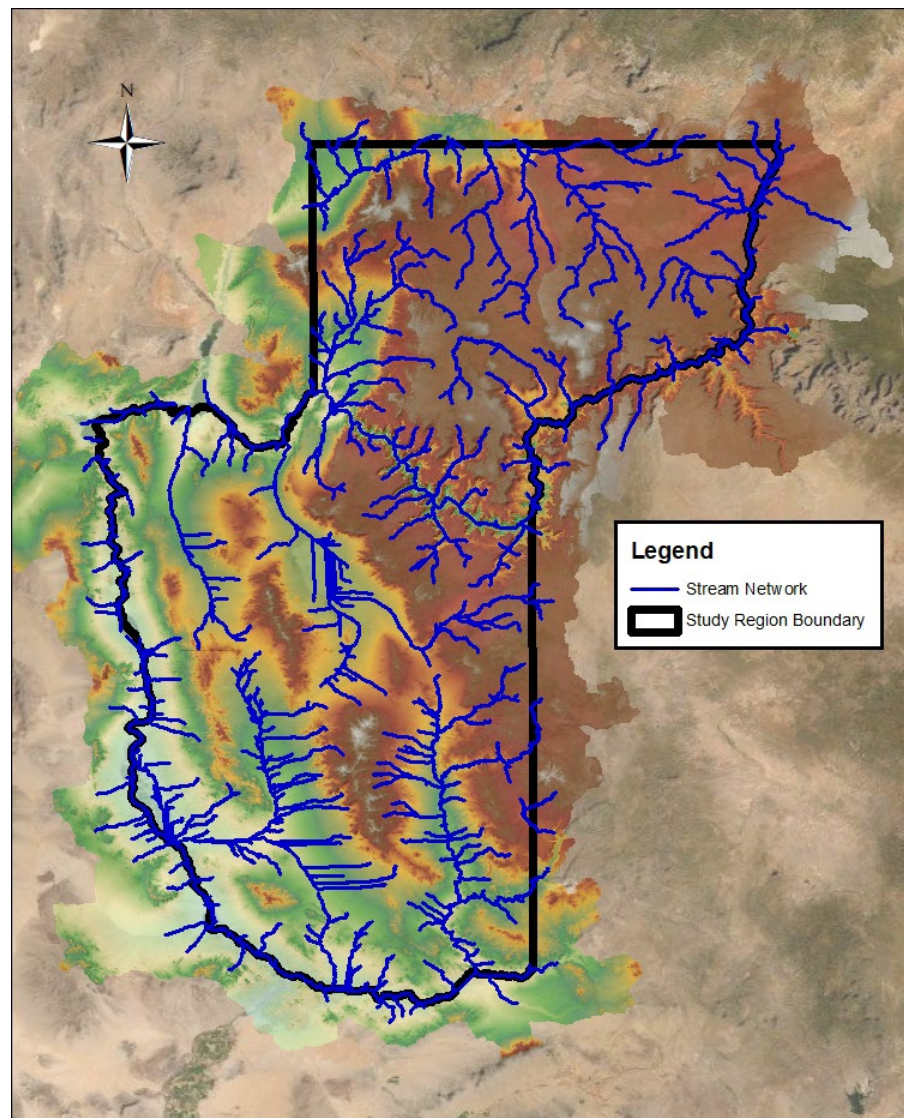
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<sup>6</sup> U.S. Department of Homeland Security, Federal Emergency Management Agency, HAZUS®-MH, version 4.2.





First, HAZUS performs a hydrologic analysis utilizing USGS Regression methodology for scenario specific stream network segments. The stream networks/flow paths are generated by HAZUS based on available USGS Digital Elevation Model (DEM) data (Figure 5-7). After the hydrologic calculations are performed, HAZUS produces a floodplain raster along the identified stream networks (Figure 5-8) for a storm recurrence interval of the users choosing (considering the USGS Regression hydrology calculations, assumed default manning's n-values, and USGS DEM data). For the purposes of this analysis, a County-wide 100-year storm was modeled.



*Figure 5-7. Mohave County, HAZUS Study Boundary and Stream Networks*





*Figure 5-8. Example HAZUS generated 100-year floodplain*

Once the 100-year floodplains are generated, the flood loss analysis can be performed. The floodplains are then intersected with the underlying 2010 Census tracts to determine building exposure to flooding for the modeled storm. The total time to prepare and run the required analyses was nearly two-weeks. The results of the County-wide 100-year flood loss analysis are summarized below in Table 5-2 to Table 5-7.



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Table 5-2 – HAZUS Summary Report Table 1

| Total Possible Building Exposure by Occupancy Type for the Study Region |                     |                  |
|---|---------------------|------------------|
| Occupancy   | Exposure (x\$1,000) | Percent of Total |
| Residential   | \$ 14,812,923       | 85.20%           |
| Commercial  | \$ 1,661,789        | 9.60%            |
| Industrial  | \$ 445,714          | 2.60%            |
| Agricultural  | \$ 31,242           | 0.20%            |
| Religion  | \$ 153,616          | 0.90%            |
| Government  | \$ 63,067           | 0.40%            |
| Education   | \$ 226,613          | 1.30%            |
| Total   | \$ 17,394,964       | 100%             |

Table 5-3 – HAZUS Combined Summary Report Table 2

| Building Exposure by Occupancy Type for all Scenarios |                     |                  |
|---|---------------------|------------------|
| Occupancy   | Exposure (x\$1,000) | Percent of Total |
| Residential   | \$ 2,314,541        | 86.90%           |
| Commercial  | \$ 227,425          | 8.50%            |
| Industrial  | \$ 58,671           | 2.20%            |
| Agricultural  | \$ 6,117            | 0.20%            |
| Religion  | \$ 21,961           | 0.80%            |
| Government  | \$ 10,315           | 0.40%            |
| Education   | \$ 23,200           | 0.90%            |
| Total   | \$ 2,662,230        | 100%             |





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Table 5-4 – HAZUS Combined Summary Report Table 3

| Expected Building Damage by Occupancy |       |       |       |       |       |       |       |       |       |       |       |      |       |       |      |       |       |       |
|---------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|-------|------|-------|-------|-------|
| Occupancy                             | 1-10  |       |       | 11-20 |       |       | 21-30 |       |       | 31-40 |       |      | 41-50 |       |      | >50   |       |       |
|                                       | Count | Total | %     | Count | Total | %     | Count | Total | %     | Count | Total | %    | Count | Total | %    | Count | Total | %     |
| Agriculture                           | 0     | 0     | 0.0%  | 0     | 0     | 0.0%  | 0     | 0     | 0.0%  | 0     | 0     | 0.0% | 0     | 0     | 0.0% | 0     | 0     | 0.0%  |
| Commercial                            | 1     | 2     | 50.0% | 1     | 2     | 50.0% | 0     | 0     | 0.0%  | 0     | 0     | 0.0% | 0     | 0     | 0.0% | 0     | 0     | 0.0%  |
| Education                             | 0     | 0     | 0.0%  | 0     | 0     | 0.0%  | 0     | 0     | 0.0%  | 0     | 0     | 0.0% | 0     | 0     | 0.0% | 0     | 0     | 0.0%  |
| Government                            | 0     | 0     | 0.0%  | 0     | 0     | 0.0%  | 0     | 0     | 0.0%  | 0     | 0     | 0.0% | 0     | 0     | 0.0% | 0     | 0     | 0.0%  |
| Industrial                            | 0     | 0     | 0.0%  | 0     | 0     | 0.0%  | 0     | 0     | 0.0%  | 0     | 0     | 0.0% | 0     | 0     | 0.0% | 0     | 0     | 0.0%  |
| Religion                              | 0     | 0     | 0.0%  | 0     | 0     | 0.0%  | 0     | 0     | 0.0%  | 0     | 0     | 0.0% | 0     | 0     | 0.0% | 0     | 0     | 0.0%  |
| Residential                           | 178   | 3,560 | 5.0%  | 423   | 3,525 | 12.0% | 347   | 3,470 | 10.0% | 208   | 3,467 | 6.0% | 249   | 3,557 | 7.0% | 2,229 | 3,654 | 61.0% |
| Total                                 | 179   | 3,562 | 5.0%  | 424   | 3,527 | 12.0% | 347   | 3,470 | 10.0% | 208   | 3,467 | 6.0% | 249   | 3,557 | 7.0% | 2,229 | 3,654 | 61.0% |

Table 5-5 – HAZUS Combined Summary Report Table 4

| Expected Building Damage by Building Type |       |       |      |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|---|-------|-------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Occupancy                                 | 1-10  |       |      | 11-20 |       |       | 21-30 |       |       | 31-40 |       |       | 41-50 |       |       | >50   |       |       |
|   | Count | Total | %    | Count | Total | %     | Count | Total | %     | Count | Total | %     | Count | Total | %     | Count | Total | %     |
| Concrete                                  | 0     | 0     | 0.0% | 0     | 0     | 0.0%  | 0     | 0     | 0.0%  | 0     | 0     | 0.0%  | 0     | 0     | 0.0%  | 0     | 0     | 0.0%  |
| ManufHousing                              | 44    | 2,200 | 2.0% | 44    | 2,200 | 2.0%  | 53    | 1,767 | 3.0%  | 0     | 0     | 0.0%  | 58    | 1,933 | 3.0%  | 1,833 | 2,037 | 90.0% |
| Masonry                                   | 37    | 463   | 8.0% | 104   | 433   | 24.0% | 72    | 450   | 16.0% | 58    | 446   | 13.0% | 50    | 455   | 11.0% | 116   | 430   | 27.0% |
| Steel                                     | 0     | 0     | 0.0% | 0     | 0     | 0.0%  | 0     | 0     | 0.0%  | 0     | 0     | 0.0%  | 0     | 0     | 0.0%  | 0     | 0     | 0.0%  |
| Wood                                      | 97    | 1,213 | 8.0% | 275   | 1,146 | 24.0% | 221   | 1,163 | 19.0% | 150   | 1,154 | 13.0% | 141   | 1,175 | 12.0% | 279   | 1,163 | 24.0% |







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Table 5-6 – HAZUS Combined Summary Report Table 5

| Expected Damage to Essential Facilities |       |                   |                      |             |
|---|-------|-------------------|----------------------|-------------|
| Classification                          | Total | At Least Moderate | At Least Substantial | Loss of Use |
| Emergency Operation Centers             | 1     | 0                 | 0                    | 0           |
| Fire Stations                           | 45    | 2                 | 0                    | 2           |
| Hospitals                               | 7     | 0                 | 0                    | 0           |
| Police Stations                         | 17    | 1                 | 0                    | 1           |
| Schools                                 | 88    | 2                 | 0                    | 2           |

Table 5-7 – HAZUS Combined Summary Report Table 6

| Building-Related Economic Loss Estimates (Millions of Dollars) |             |            |            |          |           |
|--|-------------|------------|------------|----------|-----------|
| Area   | Residential | Commercial | Industrial | Others   | Total     |
| Building   | \$ 356.50   | \$ 13.67   | \$ 3.22    | \$ 2.23  | \$ 375.62 |
| Content  | \$ 178.88   | \$ 37.14   | \$ 5.84    | \$ 12.13 | \$ 233.99 |
| Inventory  | \$ -        | \$ 0.63    | \$ 0.99    | \$ 0.24  | \$ 1.86   |
| Subtotal   | \$ 535.38   | \$ 51.44   | \$ 10.05   | \$ 14.61 | \$ 611.47 |





### 5.5.5 *Loss Estimations Due to Flooding*

Economic losses to structures and facilities are estimated by multiplying the exposed facility replacement cost estimates by an assumed loss to exposure ratio. The loss to exposure ratio is based on 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 flood hazard areas will have a loss-to-exposure ratio of 0.20 (or 20%). It is noted that this ratio is highly subjective and the resultant loss estimates are solely intended to provide an understanding of relative risk from the flood hazards and potential losses. The reality is that uncertainties are inherent in any loss estimation methodology due to incomplete scientific knowledge concerning hazards and our ability to predict their effects on the built environment; approximations and simplifications that are necessary for a comprehensive and efficient analysis; and lack of detailed data necessary to implement a viable statistical approach to loss estimations.

It is also noted that the loss and exposure numbers presented in this FRMP are not annualized and represent a comprehensive evaluation of the County as a whole that assumes all 100-year flood hazard areas are active at the same time. It is unlikely that a storm event would occur that would flood all the delineated high flood hazard areas at the same time. Accordingly, actual event-based losses and exposure are likely to be some fraction of those estimated for the whole county.

### 5.5.6 *Vulnerability Analysis Results*

Exposure and loss estimations for CFI, population, and general building stock are summarized in the following tables. Data are generally compiled and summarized by HUC-8 watershed and community. On a county-wide basis, there are a total of 11 CFI representing 3.6% of the total database that exposed to high hazard flooding. Approximately 32,965 people, or 15.5% of the total county-wide population, are exposed to high hazard flooding at their places of residence. There is a total of 5,541 (5.46% of total), 181 (5.59% of total), and 49 (4.85% of total) residential, commercial, and industrial structures, respectively, that are exposed to high flood hazard areas. Total residential, commercial, and industrial structure losses are estimated at \$186.7 million, \$20.4 million, and \$4.5 million respectively.

## 5.6 Problem Area Identification

The Advisory Committee spent a significant portion of the second and third meetings reviewing the 43 problem drainage areas throughout the county that were identified during the 2015 FRMP process, in addition to identifying any new problem areas that have experienced flood risk issues since 2015. During those exercises, active GIS maps showing aerial photography, roadways, and other basemap layers, overlain with the flood hazard layer discussed in Section 5.3.2, were displayed for reference and a visual aid. Of the 43 previously identified area, two have been mitigated from flood risk since 2015. The remaining 41 problem





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areas are being kept as active for this 2022 update. Four new problem areas were identified by the Advisory Committee and were added to the 2022 Problem Area GIS database.

In general, the types of drainage issues identified included:

- Flooding issues at major road crossings
- Ineffective or undersized drainage infrastructure
- No drainage infrastructure where something is needed
- Areas that need floodplain mapping to better communicate the flood risk
- Post-wildfire flooding and sediment transport issues in a few forested areas

Each of the identified problem area location are indicated on Figure 5-4 and Figure 5-5 and on the series of maps in Appendix D.





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Table 5-8 - Critical and Non-Critical Infrastructure and Facility high hazard flood exposure and loss estimates

| Communities by HUC-8 Watershed                  | Total Facilities Reported by Community* | Impacted Facilities** | Percentage of Total Community Facilities Impacted | Estimated Replacement Cost (x\$1,000)*** | Estimated Structure Loss (x\$1,000) |
|---|---|-----------------------|---|--|-------------------------------------|
| <b>Big Sandy Watershed-Wide Totals</b>          | <b>2</b>                                | <b>0</b>              | <b>0.00%</b>                                      | <b>\$0</b>                               | <b>\$0</b>                          |
| Kingman   | 1                                       | 0                     | 0.00%   | \$0                                      | \$0                                 |
| Wikieup   | 1                                       | 0                     | 0.00%   | \$0                                      | \$0                                 |
| <b>Bill Williams Watershed-Wide Totals</b>      | <b>1</b>                                | <b>0</b>              | <b>0.00%</b>                                      | <b>\$0</b>                               | <b>\$0</b>                          |
| Unnamed Mohave County                           | 1                                       | 0                     | 0.00%   | \$0                                      | \$0                                 |
| <b>Detrital Wash Watershed-Wide Totals</b>      | <b>2</b>                                | <b>0</b>              | <b>0.00%</b>                                      | <b>\$0</b>                               | <b>\$0</b>                          |
| Dolan Springs                                   | 2                                       | 0                     | 0.00%   | \$0                                      | \$0                                 |
| <b>Fort Pierce Wash Watershed-Wide Totals</b>   | <b>19</b>                               | <b>0</b>              | <b>0.00%</b>                                      | <b>\$0</b>                               | <b>\$0</b>                          |
| Colorado City                                   | 18                                      | 0                     | 0.00%   | \$0                                      | \$0                                 |
| Unnamed Mohave County                           | 1                                       | 0                     | 0.00%   | \$0                                      | \$0                                 |
| <b>Grand Canyon Watershed-Wide Totals</b>       | <b>2</b>                                | <b>1</b>              | <b>50.00%</b>                                     | <b>\$12</b>                              | <b>\$2</b>                          |
| Unnamed Mohave County                           | 2                                       | 1                     | 50.00%  | \$12                                     | \$2                                 |
| <b>Havas-Mohave Lakes Watershed-Wide Totals</b> | <b>126</b>                              | <b>4</b>              | <b>3.17%</b>                                      | <b>\$4,140</b>                           | <b>\$828</b>                        |
| Arizona Village                                 | 1                                       | 0                     | 0.00%   | \$0                                      | \$0                                 |
| Bullhead City                                   | 58                                      | 1                     | 1.72%   | \$237                                    | \$47                                |
| Desert Hills                                    | 2                                       | 1                     | 50.00%  | \$949                                    | \$190                               |
| Fort Mohave                                     | 8                                       | 2                     | 25.00%  | \$2,954                                  | \$591                               |





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Table 5-8 - Critical and Non-Critical Infrastructure and Facility high hazard flood exposure and loss estimates

| Communities by HUC-8 Watershed             | Total Facilities Reported by Community* | Impacted Facilities** | Percentage of Total Community Facilities Impacted | Estimated Replacement Cost (x\$1,000)*** | Estimated Structure Loss (x\$1,000) |
|--|---|-----------------------|---|--|-------------------------------------|
| Golden Shores                              | 3                                       | 0                     | 0.00%   | \$0                                      | \$0                                 |
| Lake Havasu City                           | 42                                      | 0                     | 0.00%   | \$0                                      | \$0                                 |
| Mohave Valley                              | 5                                       | 0                     | 0.00%   | \$0                                      | \$0                                 |
| Oatman                                     | 1                                       | 0                     | 0.00%   | \$0                                      | \$0                                 |
| Unnamed Mohave County                      | 3                                       | 0                     | 0.00%   | \$0                                      | \$0                                 |
| Willow Valley                              | 3                                       | 0                     | 0.00%   | \$0                                      | \$0                                 |
| <b>Hualapai Wash Watershed-Wide Totals</b> | <b>80</b>                               | <b>0</b>              | <b>0.00%</b>                                      | <b>\$0</b>                               | <b>\$0</b>                          |
| Kingman                                    | 71                                      | 0                     | 0.00%   | \$0                                      | \$0                                 |
| New Kingman-Butler                         | 6                                       | 0                     | 0.00%   | \$0                                      | \$0                                 |
| Truxton                                    | 1                                       | 0                     | 0.00%   | \$0                                      | \$0                                 |
| Valle Vista                                | 2                                       | 0                     | 0.00%   | \$0                                      | \$0                                 |
| <b>Lake Mead Watershed-Wide Totals</b>     | <b>5</b>                                | <b>0</b>              | <b>0.00%</b>                                      | <b>\$0</b>                               | <b>\$0</b>                          |
| Meadview                                   | 2                                       | 0                     | 0.00%   | \$0                                      | \$0                                 |
| Unnamed Mohave County                      | 3                                       | 0                     | 0.00%   | \$0                                      | \$0                                 |
| <b>Lower Virgin Watershed-Wide Totals</b>  | <b>4</b>                                | <b>0</b>              | <b>0.00%</b>                                      | <b>\$0</b>                               | <b>\$0</b>                          |
| Beaver Dam                                 | 3                                       | 0                     | 0.00%   | \$0                                      | \$0                                 |
| Unnamed Mohave County                      | 1                                       | 0                     | 0.00%   | \$0                                      | \$0                                 |
| <b>Sacramento Watershed-Wide Totals</b>    | <b>61</b>                               | <b>6</b>              | <b>9.84%</b>                                      | <b>\$4,233</b>                           | <b>\$847</b>                        |
| Chloride                                   | 2                                       | 1                     | 50.00%  | \$267                                    | \$53                                |





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Table 5-8 - Critical and Non-Critical Infrastructure and Facility high hazard flood exposure and loss estimates

| Communities by HUC-8 Watershed | Total Facilities Reported by Community* | Impacted Facilities** | Percentage of Total Community Facilities Impacted | Estimated Replacement Cost (x\$1,000)*** | Estimated Structure Loss (x\$1,000) |
|--------------------------------|---|-----------------------|---|--|-------------------------------------|
| Golden Valley                  | 4                                       | 0                     | 0.00%   | \$0                                      | \$0                                 |
| Kingman                        | 44                                      | 4                     | 9.09%   | \$3,664                                  | \$733                               |
| McConnico                      | 1                                       | 1                     | 100.00%   | \$302                                    | \$60                                |
| Unnamed Mohave County          | 4                                       | 0                     | 0.00%   | \$0                                      | \$0                                 |
| Clacks Canyon                  | 4                                       | 0                     | 0.00%   | \$0                                      | \$0                                 |
| Yucca                          | 2                                       | 0                     | 0.00%   | \$0                                      | \$0                                 |

**Notes:**

\* Total facilities within each community determined utilizing a database provided by Mohave County dated 2015.

\*\* Impacted facilities are determined by spatially intersecting 2015 Mohave County facilities database with latest available NFHL dataset (as of January 2022) using high-hazard flood zones (A, AE, AH, and AO).

\*\*\* Replacement and loss estimates for impacted facilities determined by utilizing the 2015 database provided by Mohave County, and adjusting for inflation since 2015 (18.62% between January 2015 and January 2022).







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Table 5-9 - Population Sectors Exposed to High Hazard Flood

| Community             | Total Population* | Population Exposed** | Percent of Population Exposed | Total Population Over 65*** | Population Over 65 Exposed*** | Percent of Population Over 65 Exposed | Total Household Incomes Under \$20K*** | Household Incomes Under \$20K Exposed*** | Percent of Incomes Under \$20K Exposed |
|-----------------------|-------------------|----------------------|-------------------------------|-----------------------------|-------------------------------|---------------------------------------|--|--|--|
| <b>Big Sandy</b>      | <b>1,515</b>      | <b>116</b>           | <b>7.67%</b>                  | <b>431</b>                  | <b>20</b>                     | <b>4.64%</b>                          | <b>106</b>                             | <b>10</b>                                | <b>9.43%</b>                           |
| Pine Lake             | 142               | 3                    | 2.24%                         | 39                          | 1                             | 2.56%                                 | 7                                      | 0  | 0.00%                                  |
| Unnamed Hualapai Res  | 4                 | 0                    | 0.45%                         | 5                           | 0                             | 0.00%                                 | 1                                      | 0  | 0.00%                                  |
| Unnamed Mohave County | 1,235             | 10                   | 0.79%                         | 362                         | 10                            | 2.76%                                 | 77                                     | 4  | 5.19%                                  |
| Wikieup               | 135               | 103                  | 76.62%                        | 25                          | 9                             | 36.00%                                | 21                                     | 6  | 28.57%                                 |
| <b>Bill Williams</b>  | <b>59</b>         | <b>0</b>             | <b>0.72%</b>                  | <b>17</b>                   | <b>0</b>                      | <b>0.00%</b>                          | <b>22</b>                              | <b>1</b>                                 | <b>4.55%</b>                           |
| Unnamed Mohave County | 59                | 0                    | 0.72%                         | 17                          | 0                             | 0.00%                                 | 22                                     | 1  | 4.55%                                  |
| <b>Burro</b>          | <b>25</b>         | <b>0</b>             | <b>0.02%</b>                  | <b>7</b>                    | <b>0</b>                      | <b>0.00%</b>                          | <b>3</b>                               | <b>0</b>                                 | <b>0.00%</b>                           |
| Unnamed Mohave County | 25                | 0                    | 0.02%                         | 7                           | 0                             | 0.00%                                 | 3                                      | 0  | 0.00%                                  |
| <b>Detrital Wash</b>  | <b>1,529</b>      | <b>115</b>           | <b>7.52%</b>                  | <b>469</b>                  | <b>15</b>                     | <b>3.20%</b>                          | <b>132</b>                             | <b>5</b>                                 | <b>3.79%</b>                           |
| Dolan Springs         | 988               | 84                   | 8.48%                         | 401                         | 11                            | 2.74%                                 | 69                                     | 1  | 1.45%                                  |
| Unnamed Mohave County | 196               | 1                    | 0.28%                         | 68                          | 4                             | 5.88%                                 | 63                                     | 3  | 4.76%                                  |
| White Hills           | 345               | 31                   | 8.87%                         | -                           | -                             | 0.00%                                 | -                                      | -  | 0.00%                                  |





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Table 5-9 - Population Sectors Exposed to High Hazard Flood

| Community                 | Total Population* | Population Exposed** | Percent of Population Exposed | Total Population Over 65*** | Population Over 65 Exposed*** | Percent of Population Over 65 Exposed | Total Household Incomes Under \$20K*** | Household Incomes Under \$20K Exposed*** | Percent of Incomes Under \$20K Exposed |
|---------------------------|-------------------|----------------------|-------------------------------|-----------------------------|-------------------------------|---------------------------------------|--|--|--|
| <b>Fort Pierce Wash</b>   | <b>4,568</b>      | <b>745</b>           | <b>16.32%</b>                 | <b>175</b>                  | <b>10</b>                     | <b>5.71%</b>                          | <b>296</b>                             | <b>17</b>                                | <b>5.74%</b>                           |
| Cane Beds                 | 466               | 50                   | 10.83%                        | 68                          | 4                             | 5.88%                                 | 45                                     | 4  | 8.89%                                  |
| Centennial Park           | 1,578             | 370                  | 23.44%                        | 21                          | 1                             | 4.76%                                 | 75                                     | 7  | 9.33%                                  |
| Colorado City             | 2,475             | 325                  | 13.13%                        | 86                          | 5                             | 5.81%                                 | 174                                    | 7  | 4.02%                                  |
| Unnamed Kaibab Res        | 0                 | 0                    | 0.00%                         | 0                           | 0                             | 0.00%                                 | 2                                      | 0  | 0.00%                                  |
| Unnamed Mohave County     | 49                | 0                    | 0.53%                         | -                           | -                             | 0.00%                                 | -                                      | -  | 0.00%                                  |
| <b>Grand Canyon</b>       | <b>717</b>        | <b>0</b>             | <b>0.02%</b>                  | <b>40</b>                   | <b>0</b>                      | <b>0.00%</b>                          | <b>64</b>                              | <b>0</b>                                 | <b>0.00%</b>                           |
| Peach Springs             | 596               | 0                    | 0.00%                         | 36                          | 0                             | 0.00%                                 | 55                                     | 0  | 0.00%                                  |
| Unnamed Hualapai Res      | 116               | 0                    | 0.09%                         | 5                           | 0                             | 0.00%                                 | 9                                      | 0  | 0.00%                                  |
| Unnamed Mohave County     | 5                 | 0                    | 0.24%                         | -                           | -                             | 0.00%                                 | -                                      | -  | 0.00%                                  |
| <b>Grand Wash</b>         | <b>2</b>          | <b>0</b>             | <b>0.35%</b>                  | <b>1</b>                    | <b>0</b>                      | <b>0.00%</b>                          | <b>0</b>                               | <b>0</b>                                 | <b>0.00%</b>                           |
| Unnamed Mohave County     | 2                 | 0                    | 0.35%                         | 1                           | 0                             | 0.00%                                 | 0                                      | 0  | 0.00%                                  |
| <b>Havas-Mohave Lakes</b> | <b>127,752</b>    | <b>25,493</b>        | <b>19.96%</b>                 | <b>29879</b>                | <b>1669</b>                   | <b>5.59%</b>                          | <b>9893</b>                            | <b>498</b>                               | <b>5.03%</b>                           |





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Table 5-9 - Population Sectors Exposed to High Hazard Flood

| Community               | Total Population* | Population Exposed** | Percent of Population Exposed | Total Population Over 65*** | Population Over 65 Exposed*** | Percent of Population Over 65 Exposed | Total Household Incomes Under \$20K*** | Household Incomes Under \$20K Exposed*** | Percent of Incomes Under \$20K Exposed |
|-------------------------|-------------------|----------------------|-------------------------------|-----------------------------|-------------------------------|---------------------------------------|--|--|--|
| Arizona Village         | 1,055             | 96                   | 9.14%                         | 100                         | 12                            | 12.00%                                | 68                                     | 2  | 2.94%                                  |
| Bullhead City           | 41,296            | 10,214               | 24.73%                        | 9460                        | 764                           | 8.08%                                 | 4044                                   | 277                                      | 6.85%                                  |
| Crystal Beach           | 249               | 122                  | 48.79%                        | 68                          | 13                            | 19.12%                                | 23                                     | 3  | 13.04%                                 |
| Desert Hills            | 2,760             | 1,330                | 48.20%                        | 741                         | 60                            | 8.10%                                 | 248                                    | 20                                       | 8.06%                                  |
| Fort Mohave             | 16,165            | 6,185                | 38.26%                        | 3332                        | 441                           | 13.24%                                | 864                                    | 108                                      | 12.50%                                 |
| Golden Shores           | 1,925             | 115                  | 5.98%                         | 781                         | 0                             | 0.00%                                 | 206                                    | 0  | 0.00%                                  |
| Katherine               | 76                | 37                   | 48.68%                        | 37                          | 9                             | 24.32%                                | 24                                     | 3  | 12.50%                                 |
| Lake Havasu City        | 57,024            | 5,778                | 10.13%                        | 14104                       | 242                           | 1.72%                                 | 4021                                   | 52                                       | 1.29%                                  |
| Mesquite Creek          | 402               | 231                  | 57.40%                        | 209                         | 5                             | 2.39%                                 | 19                                     | 0  | 0.00%                                  |
| Mohave Valley           | 2,690             | 1,212                | 45.06%                        | 444                         | 10                            | 2.25%                                 | 138                                    | 3  | 2.17%                                  |
| Mojave Ranch Estates    | 53                | 3                    | 6.32%                         | 5                           | 0                             | 0.00%                                 | 2                                      | 0  | 0.00%                                  |
| Oatman                  | 101               | 0                    | 0.00%                         | 37                          | 7                             | 18.92%                                | 22                                     | 4  | 18.18%                                 |
| Topock                  | 0                 | 0                    | 29.37%                        | 1                           | 1                             | 100.00%                               | 0                                      | 0  | 0.00%                                  |
| Unnamed Fort Mojave Res | 79                | 26                   | 33.11%                        | 8                           | 0                             | 0.00%                                 | 0                                      | 0  | 0.00%                                  |
| Unnamed Mohave County   | 2,818             | 41                   | 1.46%                         | 552                         | 107                           | 19.38%                                | 214                                    | 25                                       | 11.68%                                 |
| Willow Valley           | 1,057             | 103                  | 9.75%                         | -                           | -                             | 0.00%                                 | -                                      | -  | 0.00%                                  |
| <b>Hualapai Wash</b>    | <b>52,273</b>     | <b>2,506</b>         | <b>4.79%</b>                  | <b>9665</b>                 | <b>263</b>                    | <b>2.72%</b>                          | <b>4207</b>                            | <b>112</b>                               | <b>2.66%</b>                           |
| Antares                 | 132               | 0                    | 0.00%                         | 48                          | 0                             | 0.00%                                 | 23                                     | 0  | 0.00%                                  |
| Clacks Canyon           | 1                 | 0                    | 0.00%                         | 0                           | 0                             | 0.00%                                 | 1                                      | 0  | 0.00%                                  |
| Crozier                 | 21                | 7                    | 33.54%                        | 5                           | 1                             | 20.00%                                | 3                                      | 0  | 0.00%                                  |





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Table 5-9 - Population Sectors Exposed to High Hazard Flood

| Community             | Total Population* | Population Exposed** | Percent of Population Exposed | Total Population Over 65*** | Population Over 65 Exposed*** | Percent of Population Over 65 Exposed | Total Household Incomes Under \$20K*** | Household Incomes Under \$20K Exposed*** | Percent of Incomes Under \$20K Exposed |
|-----------------------|-------------------|----------------------|-------------------------------|-----------------------------|-------------------------------|---------------------------------------|--|--|--|
| Dolan Springs         | 744               | 11                   | 1.45%                         | 279                         | 5                             | 1.79%                                 | 46                                     | 1  | 2.17%                                  |
| Hackberry             | 103               | 5                    | 4.57%                         | 26                          | 0                             | 0.00%                                 | 2                                      | 0  | 0.00%                                  |
| Kingman               | 28,793            | 561                  | 1.95%                         | 4815                        | 126                           | 2.62%                                 | 1741                                   | 50                                       | 2.87%                                  |
| Meadview              | 10                | 0                    | 0.00%                         | 1                           | 0                             | 0.00%                                 | 0                                      | 0  | 0.00%                                  |
| New Kingman-Butler    | 12,888            | 1,846                | 14.32%                        | 2467                        | 55                            | 2.23%                                 | 1541                                   | 40                                       | 2.60%                                  |
| Peach Springs         | 501               | 0                    | 0.00%                         | 41                          | 0                             | 0.00%                                 | 59                                     | 0  | 0.00%                                  |
| Pinion Pines          | 135               | 0                    | 0.00%                         | 42                          | 4                             | 9.52%                                 | 9                                      | 1  | 11.11%                                 |
| Truxton               | 104               | 6                    | 5.73%                         | 28                          | 0                             | 0.00%                                 | 13                                     | 0  | 0.00%                                  |
| Unnamed Hualapai Res  | 37                | 0                    | 0.00%                         | 0                           | 0                             | 0.00%                                 | 9                                      | 0  | 0.00%                                  |
| Unnamed Mohave County | 6,965             | 69                   | 0.99%                         | 1349                        | 72                            | 5.34%                                 | 603                                    | 20                                       | 3.32%                                  |
| Valentine             | 39                | 2                    | 5.92%                         | 5                           | 0                             | 0.00%                                 | 6                                      | 0  | 0.00%                                  |
| Valle Vista           | 1,801             | 0                    | 0.00%                         | 559                         | 0                             | 0.00%                                 | 151                                    | 0  | 0.00%                                  |
| <b>Kanab</b>          | <b>291</b>        | <b>0</b>             | <b>0.01%</b>                  | <b>33</b>                   | <b>0</b>                      | <b>0.00%</b>                          | <b>35</b>                              | <b>0</b>                                 | <b>0.00%</b>                           |
| Fredonia              | 0                 | 0                    | 99.98%                        | -                           | -                             | 0.00%                                 | -                                      | -  | 0.00%                                  |
| Kaibab                | 140               | 0                    | 0.00%                         | 8                           | 0                             | 0.00%                                 | 14                                     | 0  | 0.00%                                  |
| Moccasin              | 53                | 0                    | 0.00%                         | 18                          | 0                             | 0.00%                                 | 10                                     | 0  | 0.00%                                  |
| Unnamed Kaibab Res    | 81                | 0                    | 0.00%                         | 7                           | 0                             | 0.00%                                 | 11                                     | 0  | 0.00%                                  |
| Unnamed Mohave County | 17                | 0                    | 0.13%                         | -                           | -                             | 0.00%                                 | -                                      | -  | 0.00%                                  |





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Table 5-9 - Population Sectors Exposed to High Hazard Flood

| Community              | Total Population* | Population Exposed** | Percent of Population Exposed | Total Population Over 65*** | Population Over 65 Exposed*** | Percent of Population Over 65 Exposed | Total Household Incomes Under \$20K*** | Household Incomes Under \$20K Exposed*** | Percent of Incomes Under \$20K Exposed |
|------------------------|-------------------|----------------------|-------------------------------|-----------------------------|-------------------------------|---------------------------------------|--|--|--|
| <b>Lake Mead</b>       | <b>1,448</b>      | <b>28</b>            | <b>1.91%</b>                  | <b>539</b>                  | <b>0</b>                      | <b>0.00%</b>                          | <b>307</b>                             | <b>0</b>                                 | <b>0.00%</b>                           |
| Grand Canyon West      | 0                 | 0                    | 0.00%                         | 1                           | 0                             | 0.00%                                 | 1                                      | 0  | 0.00%                                  |
| Meadview               | 1,408             | 27                   | 1.92%                         | 536                         | 0                             | 0.00%                                 | 305                                    | 0  | 0.00%                                  |
| Unnamed Hualapai Res   | 0                 | 0                    | 0.47%                         | 2                           | 0                             | 0.00%                                 | 1                                      | 0  | 0.00%                                  |
| Unnamed Mohave County  | 39                | 1                    | 1.56%                         | -                           | -                             | 0.00%                                 | -                                      | -  | 0.00%                                  |
| <b>Lower Virgin</b>    | <b>3,154</b>      | <b>667</b>           | <b>21.14%</b>                 | <b>1032</b>                 | <b>77</b>                     | <b>7.46%</b>                          | <b>260</b>                             | <b>18</b>                                | <b>6.92%</b>                           |
| Beaver Dam             | 1,551             | 285                  | 18.37%                        | 570                         | 67                            | 11.75%                                | 141                                    | 15                                       | 10.64%                                 |
| Littlefield            | 256               | 73                   | 28.54%                        | 59                          | 6                             | 10.17%                                | 18                                     | 2  | 11.11%                                 |
| Scenic                 | 1,320             | 309                  | 23.40%                        | 403                         | 4                             | 0.99%                                 | 101                                    | 1  | 0.99%                                  |
| Unnamed Mohave County  | 27                | 0                    | 0.17%                         | -                           | -                             | 0.00%                                 | -                                      | -  | 0.00%                                  |
| <b>Sacramento Wash</b> | <b>19,736</b>     | <b>3,294</b>         | <b>16.69%</b>                 | <b>3838</b>                 | <b>379</b>                    | <b>9.87%</b>                          | <b>1944</b>                            | <b>210</b>                               | <b>10.80%</b>                          |
| Chloride               | 229               | 41                   | 18.02%                        | 121                         | 12                            | 9.92%                                 | 77                                     | 7  | 9.09%                                  |
| Clacks Canyon          | 166               | 12                   | 7.38%                         | 35                          | 4                             | 11.43%                                | 5                                      | 0  | 0.00%                                  |
| Golden Valley          | 8,792             | 2,950                | 33.55%                        | 2149                        | 245                           | 11.40%                                | 1012                                   | 117                                      | 11.56%                                 |
| Kingman                | 3,852             | 83                   | 2.15%                         | 533                         | 28                            | 5.25%                                 | 274                                    | 24                                       | 8.76%                                  |
| Lazy Y U               | 473               | 7                    | 1.43%                         | 70                          | 6                             | 8.57%                                 | 22                                     | 2  | 9.09%                                  |
| McConnico              | 63                | 15                   | 24.41%                        | 15                          | 6                             | 40.00%                                | 14                                     | 8  | 57.14%                                 |







# MOHAVE COUNTY FLOOD RISK MANAGEMENT PLAN

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Table 5-9 - Population Sectors Exposed to High Hazard Flood

| Community               | Total Population* | Population Exposed** | Percent of Population Exposed | Total Population Over 65*** | Population Over 65 Exposed*** | Percent of Population Over 65 Exposed | Total Household Incomes Under \$20K*** | Household Incomes Under \$20K Exposed*** | Percent of Incomes Under \$20K Exposed |
|-------------------------|-------------------|----------------------|-------------------------------|-----------------------------|-------------------------------|---------------------------------------|--|--|--|
| Pinion Pines            | 23                | 0                    | 0.00%                         | 7                           | 1                             | 14.29%                                | 1                                      | 0  | 0.00%                                  |
| So-Hi                   | 427               | 0                    | 0.00%                         | 108                         | 7                             | 6.48%                                 | 30                                     | 2  | 6.67%                                  |
| Topock                  | 2                 | 1                    | 62.02%                        | 6                           | 1                             | 16.67%                                | 2                                      | 0  | 0.00%                                  |
| Unnamed Fort Mojave Res | 0                 | 0                    | 0.00%                         | 0                           | 0                             | 0.00%                                 | 0                                      | 0  | 0.00%                                  |
| Unnamed Mohave County   | 5,041             | 87                   | 1.72%                         | 630                         | 67                            | 10.63%                                | 444                                    | 47                                       | 10.59%                                 |
| Walnut Creek            | 570               | 87                   | 15.17%                        | 164                         | 4                             | 2.44%                                 | 63                                     | 2  | 3.17%                                  |
| Yucca                   | 96                | 12                   | 12.20%                        | -                           | -                             | 0.00%                                 | -                                      | -  | 0.00%                                  |
|                         |                   |                      |                               |                             |                               |                                       |  |  |  |
| <b>Santa Maria</b>      | <b>2</b>          | <b>0</b>             | <b>0.06%</b>                  | <b>2</b>                    | <b>0</b>                      | <b>0.00%</b>                          | <b>1</b>                               | <b>0</b>                                 | <b>0.00%</b>                           |
| Unnamed Mohave County   | 2                 | 0                    | 0.06%                         | 2                           | 0                             | 0.00%                                 | 1                                      | 0  | 0.00%                                  |

## Notes:

\* Total community populations determined using 2020 census data for Mohave County.

\*\* Exposed total population determined by spatially intersecting 2020 Mohave County census tracts with latest available FEMA NFHL dataset (as of January 2022) using high-hazard flood zones (A, AE, AH, and AO).

\*\*\* Updated data unavailable as of January 2022. Values for total populations and total exposed determined during the 2015 FRMP update and used for this analysis.





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Table 5-10 - HAZUS Residential Building Exposure and Loss Estimates for High Flood Hazard

| Community                      | Total Residential Building Count* | Total Residential Building Value (x\$1000)** | Total Residential Content Value (x\$1000)** |  | HIGH FLOOD HAZARD EXPOSURE AND LOSS ESTIMATES |  |   |  |  |
|--------------------------------|-----------------------------------|--|---|--|---|--|---|--|--|
|                                |                                   |  |   |  | Residential Building Count*                   | Residential Building Percent of Exposure | Residential Building Value Exposure (x\$1000) | Residential Content Value Exposure (x\$1000) | Residential Building Loss Estimate (x\$1000) |
| Big Sandy Watershed            |                                   |  |   |  |   |  |   |  |  |
| Pine Lake                      | 148                               | \$30,689                                     | \$15,345                                    |  | 4   | 2.70%                                    | \$829   | \$415  | \$166  |
| Unnamed Hualapai Res           | 7                                 | \$1,306                                      | \$653                                       |  | 0   | 0.00%                                    | \$0   | \$0  | \$0  |
| Unnamed Mohave County          | 837                               | \$166,315                                    | \$83,157                                    |  | 28  | 3.35%                                    | \$5,564                                       | \$2,782                                      | \$1,113                                      |
| Wikieup                        | 103                               | \$13,524                                     | \$6,762                                     |  | 31  | 30.10%                                   | \$4,070                                       | \$2,035                                      | \$814  |
| Big Sandy Watershed Totals     | 1,095                             | \$211,834                                    | \$105,917                                   |  | 63  | 5.75%                                    | \$12,188                                      | \$6,094                                      | \$2,438                                      |
| Bill Williams Watershed        |                                   |  |   |  |   |  |   |  |  |
| Unnamed Mohave County          | 89                                | \$12,753                                     | \$6,376                                     |  | 4   | 4.49%                                    | \$573   | \$287  | \$115  |
| Bill Williams Watershed Totals | 89                                | \$12,753                                     | \$6,376                                     |  | 4   | 4.49%                                    | \$573   | \$287  | \$115  |
| Burro Watershed                |                                   |  |   |  |   |  |   |  |  |
| Unnamed Mohave County          | 16                                | \$3,836                                      | \$1,918                                     |  | 0   | 0.00%                                    | \$0   | \$0  | \$0  |
| Burro Watershed Totals         | 16                                | \$3,836                                      | \$1,918                                     |  | 0   | 0.00%                                    | \$0   | \$0  | \$0  |
| Detrital Wash Watershed        |                                   |  |   |  |   |  |   |  |  |
| Dolan Springs                  | 918                               | \$87,572                                     | \$43,786                                    |  | 27  | 2.94%                                    | \$2,576                                       | \$1,288                                      | \$515  |
| Unnamed Mohave County          | 180                               | \$17,349                                     | \$8,675                                     |  | 10  | 5.56%                                    | \$964   | \$482  | \$193  |
| White Hills                    | 286                               | \$22,809                                     | \$11,405                                    |  | 1   | 0.35%                                    | \$80  | \$40   | \$16   |
| Detrital Wash Watershed Totals | 1,384                             | \$127,731                                    | \$63,866                                    |  | 38  | 2.75%                                    | \$3,507                                       | \$1,754                                      | \$701  |
| Fort Pierce Watershed          |                                   |  |   |  |   |  |   |  |  |
| Cane Beds                      | 159                               | \$28,472                                     | \$14,236                                    |  | 17  | 10.69%                                   | \$3,044                                       | \$1,522                                      | \$609  |





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Table 5-10 - HAZUS Residential Building Exposure and Loss Estimates for High Flood Hazard

| Community                               | Total Residential Building Count* | Total Residential Building Value (x\$1000)** | Total Residential Content Value (x\$1000)** | HIGH FLOOD HAZARD EXPOSURE AND LOSS ESTIMATES |  |   |  |  |
|---|-----------------------------------|--|---|---|--|---|--|--|
|   |                                   |  |   | Residential Building Count*                   | Residential Building Percent of Exposure | Residential Building Value Exposure (x\$1000) | Residential Content Value Exposure (x\$1000) | Residential Building Loss Estimate (x\$1000) |
| Centennial Park                         | 210                               | \$37,981                                     | \$18,990                                    | 21  | 10.00%                                   | \$3,798                                       | \$1,899                                      | \$760  |
| Colorado City                           | 573                               | \$98,318                                     | \$49,159                                    | 23  | 4.01%                                    | \$3,946                                       | \$1,973                                      | \$789  |
| Unnamed Kaibab Res                      | 4                                 | \$754  | \$377                                       | 0   | 0.00%                                    | \$0   | \$0  | \$0  |
| Unnamed Mohave County                   | 34                                | \$5,118                                      | \$2,559                                     | 2   | 5.88%                                    | \$301   | \$151  | \$60   |
| <b>Fort Pierce Watershed Totals</b>     | <b>980</b>                        | <b>\$170,644</b>                             | <b>\$85,322</b>                             | <b>63</b>                                     | <b>6.43%</b>                             | <b>\$10,970</b>                               | <b>\$5,485</b>                               | <b>\$2,194</b>                               |
| <b>Grand Canyon Watershed</b>           |                                   |  |   |   |  |   |  |  |
| Peach Springs                           | 173                               | \$34,316                                     | \$17,158                                    | 0   | 0.00%                                    | \$0   | \$0  | \$0  |
| Unnamed Hualapai Res                    | 26                                | \$4,981                                      | \$2,490                                     | 0   | 0.00%                                    | \$0   | \$0  | \$0  |
| Unnamed Mohave County                   | 13                                | \$1,375                                      | \$687                                       | 1   | 7.69%                                    | \$106   | \$53   | \$21   |
| <b>Grand Canyon Watershed Totals</b>    | <b>213</b>                        | <b>\$40,671</b>                              | <b>\$20,336</b>                             | <b>1</b>                                      | <b>0.47%</b>                             | <b>\$191</b>                                  | <b>\$95</b>                                  | <b>\$38</b>                                  |
| <b>Grand Wash Watershed</b>             |                                   |  |   |   |  |   |  |  |
| Unnamed Mohave County                   | 6                                 | \$861  | \$431                                       | 0   | 0.00%                                    | \$0   | \$0  | \$0  |
| <b>Grand Wash Watershed Totals</b>      | <b>6</b>                          | <b>\$861</b>                                 | <b>\$431</b>                                | <b>0</b>                                      | <b>0.00%</b>                             | <b>\$0</b>                                    | <b>\$0</b>                                   | <b>\$0</b>                                   |
| <b>Havasupai-Mohave Lakes Watershed</b> |                                   |  |   |   |  |   |  |  |
| Arizona Village                         | 511                               | \$57,562                                     | \$28,781                                    | 60  | 11.74%                                   | \$6,759                                       | \$3,379                                      | \$1,352                                      |
| Bullhead City                           | 20,201                            | \$3,188,396                                  | \$1,594,198                                 | 1,603   | 7.94%                                    | \$253,007                                     | \$126,504                                    | \$50,601                                     |
| Crystal Beach                           | 181                               | \$22,511                                     | \$11,255                                    | 24  | 13.26%                                   | \$2,985                                       | \$1,492                                      | \$597  |
| Desert Hills                            | 1,816                             | \$211,025                                    | \$105,512                                   | 162   | 8.92%                                    | \$18,825                                      | \$9,412                                      | \$3,765                                      |
| Fort Mohave                             | 6,883                             | \$1,259,601                                  | \$629,800                                   | 931   | 13.53%                                   | \$170,375                                     | \$85,187                                     | \$34,075                                     |
| Golden Shores                           | 1,637                             | \$150,571                                    | \$75,286                                    | 0   | 0.00%                                    | \$0   | \$0  | \$0  |





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Table 5-10 - HAZUS Residential Building Exposure and Loss Estimates for High Flood Hazard

| Community                                  | Total Residential Building Count* | Total Residential Building Value (x\$1000)** | Total Residential Content Value (x\$1000)** | HIGH FLOOD HAZARD EXPOSURE AND LOSS ESTIMATES |  |   |  |  |
|--|-----------------------------------|--|---|---|--|---|--|--|
|  |                                   |  |   | Residential Building Count*                   | Residential Building Percent of Exposure | Residential Building Value Exposure (x\$1000) | Residential Content Value Exposure (x\$1000) | Residential Building Loss Estimate (x\$1000) |
| Katherine                                  | 132                               | \$13,355                                     | \$6,678                                     | 13  | 9.85%                                    | \$1,315                                       | \$658  | \$263  |
| Lake Havasu City                           | 28,680                            | \$6,473,622                                  | \$3,236,811                                 | 466   | 1.62%                                    | \$105,185                                     | \$52,593                                     | \$21,037                                     |
| Mesquite Creek                             | 262                               | \$58,333                                     | \$29,166                                    | 7   | 2.67%                                    | \$1,559                                       | \$779  | \$312  |
| Mohave Valley                              | 1,291                             | \$277,828                                    | \$138,914                                   | 28  | 2.17%                                    | \$6,026                                       | \$3,013                                      | \$1,205                                      |
| Mojave Ranch Estates                       | 25                                | \$5,480                                      | \$2,740                                     | 1   | 4.00%                                    | \$219   | \$110  | \$44   |
| Oatman                                     | 114                               | \$16,123                                     | \$8,061                                     | 20  | 17.54%                                   | \$2,829                                       | \$1,414                                      | \$566  |
| Topock                                     | 4                                 | \$483  | \$241                                       | 2   | 50.00%                                   | \$241   | \$121  | \$48   |
| Unnamed Fort Mojave Res                    | 36                                | \$7,851                                      | \$3,926                                     | 0   | 0.00%                                    | \$0   | \$0  | \$0  |
| Unnamed Mohave County                      | 1,637                             | \$262,640                                    | \$131,320                                   | 357   | 21.81%                                   | \$57,277                                      | \$28,639                                     | \$11,455                                     |
| Willow Valley                              | 1,301                             | \$150,758                                    | \$75,379                                    | 16  | 1.23%                                    | \$1,854                                       | \$927  | \$371  |
| <b>Havas-Mohave Lakes Watershed Totals</b> | <b>64,711</b>                     | <b>\$12,156,140</b>                          | <b>\$6,078,070</b>                          | <b>3,690</b>                                  | <b>5.70%</b>                             | <b>\$693,177</b>                              | <b>\$346,588</b>                             | <b>\$138,635</b>                             |
| <b>Hualapai Wash Watershed</b>             |                                   |  |   |   |  |   |  |  |
| Antares                                    | 101                               | \$13,813                                     | \$6,907                                     | 0   | 0.00%                                    | \$0   | \$0  | \$0  |
| Clacks Canyon                              | 0                                 | \$1  | \$1   | 0   | 0.00%                                    | \$0   | \$0  | \$0  |
| Crozier                                    | 8                                 | \$1,469                                      | \$734                                       | 2   | 25.00%                                   | \$367   | \$184  | \$73   |
| Dolan Springs                              | 626                               | \$57,283                                     | \$28,641                                    | 11  | 1.76%                                    | \$1,007                                       | \$503  | \$201  |
| Hackberry                                  | 44                                | \$9,134                                      | \$4,567                                     | 0   | 0.00%                                    | \$0   | \$0  | \$0  |
| Kingman                                    | 9,698                             | \$2,185,068                                  | \$1,092,534                                 | 255   | 2.63%                                    | \$57,454                                      | \$28,727                                     | \$11,491                                     |
| Meadview                                   | 6                                 | \$465  | \$232                                       | 0   | 0.00%                                    | \$0   | \$0  | \$0  |





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Table 5-10 - HAZUS Residential Building Exposure and Loss Estimates for High Flood Hazard

| Community                             | Total Residential Building Count* | Total Residential Building Value (x\$1000)** | Total Residential Content Value (x\$1000)** | HIGH FLOOD HAZARD EXPOSURE AND LOSS ESTIMATES |  |   |  |  |
|---------------------------------------|-----------------------------------|--|---|---|--|---|--|--|
|                                       |                                   |  |   | Residential Building Count*                   | Residential Building Percent of Exposure | Residential Building Value Exposure (x\$1000) | Residential Content Value Exposure (x\$1000) | Residential Building Loss Estimate (x\$1000) |
| New Kingman-Butler                    | 5,772                             | \$563,936                                    | \$281,968                                   | 160   | 2.77%                                    | \$15,632                                      | \$7,816                                      | \$3,126                                      |
| Peach Springs                         | 177                               | \$33,002                                     | \$16,501                                    | 0   | 0.00%                                    | \$0   | \$0  | \$0  |
| Pinion Pines                          | 86                                | \$17,946                                     | \$8,973                                     | 7   | 8.14%                                    | \$1,461                                       | \$730  | \$292  |
| Truxton                               | 70                                | \$12,325                                     | \$6,162                                     | 0   | 0.00%                                    | \$0   | \$0  | \$0  |
| Unnamed Hualapai Res                  | 19                                | \$4,275                                      | \$2,138                                     | 0   | 0.00%                                    | \$0   | \$0  | \$0  |
| Unnamed Mohave County                 | 3,110                             | \$454,851                                    | \$227,425                                   | 153   | 4.92%                                    | \$22,377                                      | \$11,188                                     | \$4,475                                      |
| Valentine                             | 7                                 | \$936  | \$468                                       | 0   | 0.00%                                    | \$0   | \$0  | \$0  |
| Valle Vista                           | 883                               | \$156,487                                    | \$78,244                                    | 0   | 0.00%                                    | \$0   | \$0  | \$0  |
| White Hills                           | 9                                 | \$1,696                                      | \$848                                       | 0   | 0.00%                                    | \$0   | \$0  | \$0  |
| <b>Hualapai Wash Watershed Totals</b> | <b>20,616</b>                     | <b>\$3,512,688</b>                           | <b>\$1,756,344</b>                          | <b>588</b>                                    | <b>2.85%</b>                             | <b>\$100,178</b>                              | <b>\$50,089</b>                              | <b>\$20,036</b>                              |
| <b>Kanab Watershed</b>                |                                   |  |   |   |  |   |  |  |
| Fredonia                              | 0                                 | \$1  | \$1   | 0   | 0.00%                                    | \$0   | \$0  | \$0  |
| Kaibab                                | 50                                | \$10,758                                     | \$5,379                                     | 0   | 0.00%                                    | \$0   | \$0  | \$0  |
| Moccasin                              | 36                                | \$6,421                                      | \$3,210                                     | 0   | 0.00%                                    | \$0   | \$0  | \$0  |
| Unnamed Kaibab Res                    | 41                                | \$7,343                                      | \$3,671                                     | 0   | 0.00%                                    | \$0   | \$0  | \$0  |
| Unnamed Mohave County                 | 12                                | \$1,791                                      | \$896                                       | 0   | 0.00%                                    | \$0   | \$0  | \$0  |
| <b>Kanab Watershed Totals</b>         | <b>139</b>                        | <b>\$26,313</b>                              | <b>\$13,157</b>                             | <b>0</b>                                      | <b>0.00%</b>                             | <b>\$0</b>                                    | <b>\$0</b>                                   | <b>\$0</b>                                   |
| <b>Lake Mead Watershed</b>            |                                   |  |   |   |  |   |  |  |
| Grand Canyon West                     | 18                                | \$3,393                                      | \$1,696                                     | 0   | 0.00%                                    | \$0   | \$0  | \$0  |
| Meadview                              | 1,324                             | \$125,565                                    | \$62,783                                    | 0   | 0.00%                                    | \$0   | \$0  | \$0  |







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Table 5-10 - HAZUS Residential Building Exposure and Loss Estimates for High Flood Hazard

| Community                            | Total Residential Building Count* | Total Residential Building Value (x\$1000)** | Total Residential Content Value (x\$1000)** | HIGH FLOOD HAZARD EXPOSURE AND LOSS ESTIMATES |  |   |  |  |
|--------------------------------------|-----------------------------------|--|---|---|--|---|--|--|
|                                      |                                   |  |   | Residential Building Count*                   | Residential Building Percent of Exposure | Residential Building Value Exposure (x\$1000) | Residential Content Value Exposure (x\$1000) | Residential Building Loss Estimate (x\$1000) |
| Unnamed Hualapai Res                 | 4                                 | \$370  | \$185                                       | 0   | 0.00%                                    | \$0   | \$0  | \$0  |
| Unnamed Mohave County                | 180                               | \$15,561                                     | \$7,780                                     | 2   | 1.11%                                    | \$173   | \$86   | \$35   |
| <b>Lake Mead Watershed Totals</b>    | <b>1,526</b>                      | <b>\$144,888</b>                             | <b>\$72,444</b>                             | <b>2</b>                                      | <b>0.13%</b>                             | <b>\$190</b>                                  | <b>\$95</b>                                  | <b>\$38</b>                                  |
| <b>Lower Virgin Watershed</b>        |                                   |  |   |   |  |   |  |  |
| Beaver Dam                           | 1,151                             | \$139,675                                    | \$69,838                                    | 135   | 11.73%                                   | \$16,382                                      | \$8,191                                      | \$3,276                                      |
| Littlefield                          | 148                               | \$18,557                                     | \$9,278                                     | 16  | 10.81%                                   | \$2,006                                       | \$1,003                                      | \$401  |
| Scenic                               | 747                               | \$90,985                                     | \$45,493                                    | 10  | 1.34%                                    | \$1,218                                       | \$609  | \$244  |
| Unnamed Mohave County                | 14                                | \$1,772                                      | \$886                                       | 0   | 0.00%                                    | \$0   | \$0  | \$0  |
| <b>Lower Virgin Watershed Totals</b> | <b>2,060</b>                      | <b>\$250,989</b>                             | <b>\$125,495</b>                            | <b>161</b>                                    | <b>7.82%</b>                             | <b>\$19,616</b>                               | <b>\$9,808</b>                               | <b>\$3,923</b>                               |
| <b>Sacramento Watershed</b>          |                                   |  |   |   |  |   |  |  |
| Chloride                             | 204                               | \$25,077                                     | \$12,539                                    | 20  | 9.80%                                    | \$2,459                                       | \$1,229                                      | \$492  |
| Clacks Canyon                        | 83                                | \$17,002                                     | \$8,501                                     | 9   | 10.84%                                   | \$1,844                                       | \$922  | \$369  |
| Golden Valley                        | 4,271                             | \$467,187                                    | \$233,594                                   | 526   | 12.32%                                   | \$57,537                                      | \$28,768                                     | \$11,507                                     |
| Kingman                              | 1,515                             | \$329,832                                    | \$164,916                                   | 112   | 7.39%                                    | \$24,384                                      | \$12,192                                     | \$4,877                                      |
| Lazy Y U                             | 193                               | \$40,161                                     | \$20,081                                    | 17  | 8.81%                                    | \$3,538                                       | \$1,769                                      | \$708  |
| McConnico                            | 53                                | \$7,270                                      | \$3,635                                     | 27  | 50.94%                                   | \$3,704                                       | \$1,852                                      | \$741  |
| Pinion Pines                         | 14                                | \$2,809                                      | \$1,404                                     | 2   | 14.29%                                   | \$401   | \$201  | \$80   |
| So-Hi                                | 228                               | \$26,132                                     | \$13,066                                    | 15  | 6.58%                                    | \$1,719                                       | \$860  | \$344  |
| Topock                               | 42                                | \$4,581                                      | \$2,291                                     | 4   | 9.52%                                    | \$436   | \$218  | \$87   |
| Unnamed Fort Mojave Res              | 0                                 | \$0  | \$0   | 0   | 0.00%                                    | \$0   | \$0  | \$0  |





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Table 5-10 - HAZUS Residential Building Exposure and Loss Estimates for High Flood Hazard

| Community  | Total Residential Building Count* | Total Residential Building Value (x\$1000)** | Total Residential Content Value (x\$1000)** | HIGH FLOOD HAZARD EXPOSURE AND LOSS ESTIMATES |  |   |  |  |
|--|-----------------------------------|--|---|---|--|---|--|--|
|  |                                   |  |   | Residential Building Count*                   | Residential Building Percent of Exposure | Residential Building Value Exposure (x\$1000) | Residential Content Value Exposure (x\$1000) | Residential Building Loss Estimate (x\$1000) |
| Unnamed Mohave County  | 1,628                             | \$233,452                                    | \$116,726                                   | 190   | 11.67%                                   | \$27,246                                      | \$13,623                                     | \$5,449                                      |
| Walnut Creek   | 249                               | \$31,540                                     | \$15,770                                    | 7   | 2.81%                                    | \$887   | \$443  | \$177  |
| Yucca  | 97                                | \$12,654                                     | \$6,327                                     | 2   | 2.06%                                    | \$261   | \$130  | \$52   |
| <b>Sacramento Wash Watershed Totals</b>  | <b>8,577</b>                      | <b>\$1,197,698</b>                           | <b>\$598,849</b>                            | <b>931</b>                                    | <b>10.85%</b>                            | <b>\$130,005</b>                              | <b>\$65,003</b>                              | <b>\$26,001</b>                              |
| <b>Santa Maria Watershed</b>   |                                   |  |   |   |  |   |  |  |
| Unnamed Mohave County  | 5                                 | \$680  | \$340                                       | 0   | 0.00%                                    | \$0   | \$0  | \$0  |
| <b>Santa Maria Watershed Totals</b>  | <b>5</b>                          | <b>\$680</b>                                 | <b>\$340</b>                                | <b>0</b>                                      | <b>0.00%</b>                             | <b>\$0</b>                                    | <b>\$0</b>                                   | <b>\$0</b>                                   |
| <b>Notes:</b><br>* Total building and exposed building count derived from 2015 FRMP. Newer data not available as of January 2022.<br>** Building and content value derived from 2015 FRMP and increased to account for inflation from January 2015 to January 2022 (18.62%). |                                   |  |   |   |  |   |  |  |





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Table 5-11 - HAZUS Commercial Building Exposure and Loss Estimate for High Flood Hazard

| Community                      | Total Commercial Building Count | Total Commercial Building Value (x\$1000) | Total Commercial Content Value (x\$1000) |  | HIGH FLOOD HAZARD EXPOSURE AND LOSS ESTIMATES |   |  |   |   |
|--------------------------------|---------------------------------|---|--|--|---|---|--|---|---|
|                                |                                 |   |  |  | Commercial Building Count                     | Commercial Building Percent of Exposure | Commercial Building Value Exposure (x\$1000) | Commercial Content Value Exposure (x\$1000) | Commercial Building Loss Estimate (x\$1000) |
| Big Sandy Watershed            |                                 |   |  |  |   |   |  |   |   |
| Pine Lake                      | 0                               | \$7                                       | \$7                                      |  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Unnamed Hualapai Res           | 0                               | \$0                                       | \$0                                      |  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Unnamed Mohave County          | 8                               | \$4,302                                   | \$4,302                                  |  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Wikieup                        | 0                               | \$0                                       | \$0                                      |  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Big Sandy Watershed Totals     | 8                               | \$4,309                                   | \$4,309                                  |  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Bill Williams Watershed        |                                 |   |  |  |   |   |  |   |   |
| Unnamed Mohave County          | 0                               | \$71                                      | \$71                                     |  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Bill Williams Watershed Totals | 0                               | \$71                                      | \$71                                     |  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Burro Watershed                |                                 |   |  |  |   |   |  |   |   |
| Unnamed Mohave County          | 4                               | \$2,090                                   | \$2,090                                  |  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Burro Watershed Totals         | 4                               | \$2,090                                   | \$2,090                                  |  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Detrital Wash Watershed        |                                 |   |  |  |   |   |  |   |   |
| Dolan Springs                  | 10                              | \$3,194                                   | \$3,194                                  |  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Unnamed Mohave County          | 11                              | \$3,498                                   | \$3,498                                  |  | 1   | 9.09%                                   | \$318  | \$318                                       | \$64  |
| White Hills                    | 0                               | \$0                                       | \$0                                      |  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Detrital Wash Watershed Totals | 21                              | \$6,693                                   | \$6,693                                  |  | 1   | 4.76%                                   | \$319  | \$319                                       | \$64  |
| Fort Pierce Watershed          |                                 |   |  |  |   |   |  |   |   |
| Cane Beds                      | 0                               | \$0                                       | \$0                                      |  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |





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Table 5-11 - HAZUS Commercial Building Exposure and Loss Estimate for High Flood Hazard

| Community                            | Total Commercial Building Count | Total Commercial Building Value (x\$1000) | Total Commercial Content Value (x\$1000) | HIGH FLOOD HAZARD EXPOSURE AND LOSS ESTIMATES |   |  |   |   |
|--------------------------------------|---------------------------------|---|--|---|---|--|---|---|
|                                      |                                 |   |  | Commercial Building Count                     | Commercial Building Percent of Exposure | Commercial Building Value Exposure (x\$1000) | Commercial Content Value Exposure (x\$1000) | Commercial Building Loss Estimate (x\$1000) |
| Centennial Park                      | 11                              | \$12,959                                  | \$12,959                                 | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Colorado City                        | 17                              | \$4,473                                   | \$4,473                                  | 2   | 11.76%                                  | \$526  | \$526                                       | \$105                                       |
| Unnamed Kaibab Res                   | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Unnamed Mohave County                | 4                               | \$3,570                                   | \$3,570                                  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| <b>Fort Pierce Watershed Totals</b>  | <b>32</b>                       | <b>\$21,003</b>                           | <b>\$21,003</b>                          | <b>2</b>                                      | <b>6.25%</b>                            | <b>\$1,313</b>                               | <b>\$1,313</b>                              | <b>\$263</b>                                |
| <b>Grand Canyou Watershed</b>        |                                 |   |  |   |   |  |   |   |
| Peach Springs                        | 1                               | \$646                                     | \$646                                    | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Unnamed Hualapai Res                 | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Unnamed Mohave County                | 0                               | \$140                                     | \$140                                    | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| <b>Grand Canyon Watershed Totals</b> | <b>1</b>                        | <b>\$786</b>                              | <b>\$786</b>                             | <b>0</b>                                      | <b>0.00%</b>                            | <b>\$0</b>                                   | <b>\$0</b>                                  | <b>\$0</b>                                  |
| <b>Grand Wash Watershed</b>          |                                 |   |  |   |   |  |   |   |
| Unnamed Mohave County                | 8                               | \$4,694                                   | \$4,694                                  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| <b>Grand Wash Watershed Totals</b>   | <b>8</b>                        | <b>\$4,694</b>                            | <b>\$4,694</b>                           | <b>0</b>                                      | <b>0.00%</b>                            | <b>\$0</b>                                   | <b>\$0</b>                                  | <b>\$0</b>                                  |
| <b>Havasu-Mohave Lakes Watershed</b> |                                 |   |  |   |   |  |   |   |
| Arizona Village                      | 5                               | \$2,094                                   | \$2,094                                  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Bullhead City                        | 569                             | \$370,252                                 | \$370,252                                | 66  | 11.60%                                  | \$42,947                                     | \$42,947                                    | \$8,589                                     |
| Crystal Beach                        | 3                               | \$877                                     | \$877                                    | 1   | 33.33%                                  | \$292  | \$292                                       | \$58  |
| Desert Hills                         | 38                              | \$21,183                                  | \$21,183                                 | 3   | 7.89%                                   | \$1,672                                      | \$1,672                                     | \$334                                       |
| Fort Mohave                          | 186                             | \$118,200                                 | \$118,200                                | 19  | 10.22%                                  | \$12,074                                     | \$12,074                                    | \$2,415                                     |
| Golden Shores                        | 13                              | \$5,270                                   | \$5,270                                  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |





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Table 5-11 - HAZUS Commercial Building Exposure and Loss Estimate for High Flood Hazard

| Community                                  | Total Commercial Building Count | Total Commercial Building Value (x\$1000) | Total Commercial Content Value (x\$1000) | HIGH FLOOD HAZARD EXPOSURE AND LOSS ESTIMATES |   |  |   |   |
|--|---------------------------------|---|--|---|---|--|---|---|
|  |                                 |   |  | Commercial Building Count                     | Commercial Building Percent of Exposure | Commercial Building Value Exposure (x\$1000) | Commercial Content Value Exposure (x\$1000) | Commercial Building Loss Estimate (x\$1000) |
| Katherine                                  | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Lake Havasu City                           | 1,083                           | \$670,490                                 | \$670,490                                | 11  | 1.02%                                   | \$6,810                                      | \$6,810                                     | \$1,362                                     |
| Mesquite Creek                             | 0                               | \$112                                     | \$112                                    | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Mohave Valley                              | 35                              | \$15,301                                  | \$15,301                                 | 1   | 2.86%                                   | \$437  | \$437                                       | \$87  |
| Mojave Ranch Estates                       | 2                               | \$688                                     | \$688                                    | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Oatman                                     | 2                               | \$231                                     | \$231                                    | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Topock                                     | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Unnamed Fort Mojave Res                    | 11                              | \$7,808                                   | \$7,808                                  | 1   | 9.09%                                   | \$710  | \$710                                       | \$142                                       |
| Unnamed Mohave County                      | 54                              | \$18,486                                  | \$18,486                                 | 6   | 11.11%                                  | \$2,054                                      | \$2,054                                     | \$411                                       |
| Willow Valley                              | 11                              | \$5,719                                   | \$5,719                                  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| <b>Havas-Mohave Lakes Watershed Totals</b> | <b>2,012</b>                    | <b>\$1,236,710</b>                        | <b>\$1,236,710</b>                       | <b>108</b>                                    | <b>5.37%</b>                            | <b>\$66,384</b>                              | <b>\$66,384</b>                             | <b>\$13,277</b>                             |
| <b>Hualapai Wash Watershed</b>             |                                 |   |  |   |   |  |   |   |
| Antares                                    | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Clacks Canyon                              | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Crozier                                    | 0                               | \$1                                       | \$1                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Dolan Springs                              | 8                               | \$3,198                                   | \$3,198                                  | 1   | 12.50%                                  | \$400  | \$400                                       | \$80  |
| Hackberry                                  | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Kingman                                    | 544                             | \$354,617                                 | \$354,617                                | 18  | 3.31%                                   | \$11,734                                     | \$11,734                                    | \$2,347                                     |
| Meadview                                   | 1                               | \$394                                     | \$394                                    | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| New Kingman-Butler                         | 83                              | \$33,383                                  | \$33,383                                 | 2   | 2.41%                                   | \$804  | \$804                                       | \$161                                       |







**MOHAVE COUNTY  
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Table 5-11 - HAZUS Commercial Building Exposure and Loss Estimate for High Flood Hazard

| Community                             | Total Commercial Building Count | Total Commercial Building Value (x\$1000) | Total Commercial Content Value (x\$1000) | HIGH FLOOD HAZARD EXPOSURE AND LOSS ESTIMATES |   |  |   |   |
|---------------------------------------|---------------------------------|---|--|---|---|--|---|---|
|                                       |                                 |   |  | Commercial Building Count                     | Commercial Building Percent of Exposure | Commercial Building Value Exposure (x\$1000) | Commercial Content Value Exposure (x\$1000) | Commercial Building Loss Estimate (x\$1000) |
| Peach Springs                         | 15                              | \$11,291                                  | \$11,291                                 | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Pinion Pines                          | 0                               | \$32                                      | \$32                                     | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Truxton                               | 5                               | \$1,676                                   | \$1,676                                  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Unnamed Hualapai Res                  | 2                               | \$434                                     | \$434                                    | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Unnamed Mohave County                 | 115                             | \$69,290                                  | \$69,290                                 | 6   | 5.22%                                   | \$3,615                                      | \$3,615                                     | \$723                                       |
| Valentine                             | 0                               | \$6                                       | \$6                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Valle Vista                           | 10                              | \$3,760                                   | \$3,760                                  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| White Hills                           | 0                               | \$112                                     | \$112                                    | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| <b>Hualapai Wash Watershed Totals</b> | <b>783</b>                      | <b>\$478,192</b>                          | <b>\$478,192</b>                         | <b>27</b>                                     | <b>3.45%</b>                            | <b>\$16,489</b>                              | <b>\$16,489</b>                             | <b>\$3,298</b>                              |
| <b>Kanab Watershed</b>                |                                 |   |  |   |   |  |   |   |
| Fredonia                              | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Kaibab                                | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Moccasin                              | 4                               | \$4,275                                   | \$4,275                                  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Unnamed Kaibab Res                    | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Unnamed Mohave County                 | 2                               | \$1,094                                   | \$1,094                                  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| <b>Kanab Watershed Totals</b>         | <b>6</b>                        | <b>\$5,369</b>                            | <b>\$5,369</b>                           | <b>0</b>                                      | <b>0.00%</b>                            | <b>\$0</b>                                   | <b>\$0</b>                                  | <b>\$0</b>                                  |
| <b>Lake Mead Watershed</b>            |                                 |   |  |   |   |  |   |   |
| Grand Canyon West                     | 3                               | \$3,315                                   | \$3,315                                  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Meadview                              | 27                              | \$10,463                                  | \$10,463                                 | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Unnamed Hualapai Res                  | 0                               | \$112                                     | \$112                                    | 0   | 0.00%                                   | \$0  | \$0   | \$0   |





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Table 5-11 - HAZUS Commercial Building Exposure and Loss Estimate for High Flood Hazard

| Community                            | Total Commercial Building Count | Total Commercial Building Value (x\$1000) | Total Commercial Content Value (x\$1000) | HIGH FLOOD HAZARD EXPOSURE AND LOSS ESTIMATES |   |  |   |   |
|--------------------------------------|---------------------------------|---|--|---|---|--|---|---|
|                                      |                                 |   |  | Commercial Building Count                     | Commercial Building Percent of Exposure | Commercial Building Value Exposure (x\$1000) | Commercial Content Value Exposure (x\$1000) | Commercial Building Loss Estimate (x\$1000) |
| Unnamed Mohave County                | 9                               | \$2,907                                   | \$2,907                                  | 1   | 11.11%                                  | \$323  | \$323                                       | \$65  |
| <b>Lake Mead Watershed Totals</b>    | <b>39</b>                       | <b>\$16,798</b>                           | <b>\$16,798</b>                          | <b>1</b>                                      | <b>2.56%</b>                            | <b>\$431</b>                                 | <b>\$431</b>                                | <b>\$86</b>                                 |
| <b>Lower Virgin Watershed</b>        |                                 |   |  |   |   |  |   |   |
| Beaver Dam                           | 1                               | \$846                                     | \$846                                    | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Littlefield                          | 1                               | \$278                                     | \$278                                    | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Scenic                               | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Unnamed Mohave County                | 1                               | \$244                                     | \$244                                    | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| <b>Lower Virgin Watershed Totals</b> | <b>3</b>                        | <b>\$1,368</b>                            | <b>\$1,368</b>                           | <b>1</b>                                      | <b>33.33%</b>                           | <b>\$456</b>                                 | <b>\$456</b>                                | <b>\$91</b>                                 |
| <b>Sacramento Watershed</b>          |                                 |   |  |   |   |  |   |   |
| Chloride                             | 1                               | \$184                                     | \$184                                    | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Clacks Canyon                        | 1                               | \$971                                     | \$971                                    | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Golden Valley                        | 114                             | \$37,102                                  | \$37,102                                 | 19  | 16.67%                                  | \$6,184                                      | \$6,184                                     | \$1,237                                     |
| Kingman                              | 154                             | \$72,497                                  | \$72,497                                 | 13  | 8.44%                                   | \$6,120                                      | \$6,120                                     | \$1,224                                     |
| Lazy Y U                             | 3                               | \$1,055                                   | \$1,055                                  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| McConnico                            | 2                               | \$730                                     | \$730                                    | 1   | 50.00%                                  | \$365  | \$365                                       | \$73  |
| Pinion Pines                         | 0                               | \$2                                       | \$2                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| So-Hi                                | 6                               | \$3,266                                   | \$3,266                                  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Topock                               | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Unnamed Fort Mojave Res              | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Unnamed Mohave County                | 41                              | \$14,577                                  | \$14,577                                 | 5   | 12.20%                                  | \$1,778                                      | \$1,778                                     | \$356                                       |





**MOHAVE COUNTY**  
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Table 5-11 - HAZUS Commercial Building Exposure and Loss Estimate for High Flood Hazard

| Community  | Total Commercial Building Count | Total Commercial Building Value (x\$1000) | Total Commercial Content Value (x\$1000) |  | HIGH FLOOD HAZARD EXPOSURE AND LOSS ESTIMATES |   |  |   |   |
|--|---------------------------------|---|--|--|---|---|--|---|---|
|  |                                 |   |  |  | Commercial Building Count                     | Commercial Building Percent of Exposure | Commercial Building Value Exposure (x\$1000) | Commercial Content Value Exposure (x\$1000) | Commercial Building Loss Estimate (x\$1000) |
| Walnut Creek   | 0                               | \$0                                       | \$0                                      |  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Yucca  | 2                               | \$1,222                                   | \$1,222                                  |  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| <b>Sacramento Wash Watershed Totals</b>  | <b>324</b>                      | <b>\$131,607</b>                          | <b>\$131,607</b>                         |  | <b>38</b>                                     | <b>11.73%</b>                           | <b>\$15,435</b>                              | <b>\$15,435</b>                             | <b>\$3,087</b>                              |
| <b>Santa Maria Watershed</b>   |                                 |   |  |  |   |   |  |   |   |
| Unnamed Mohave County  | 0                               | \$0                                       | \$0                                      |  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| <b>Santa Maria Watershed Totals</b>  | <b>0</b>                        | <b>\$0</b>                                | <b>\$0</b>                               |  | <b>0</b>                                      | <b>0.00%</b>                            | <b>\$0</b>                                   | <b>\$0</b>                                  | <b>\$0</b>                                  |
| <b>Notes:</b><br>* Total building and exposed building count derived from 2015 FRMP. Newer data not available as of January 2022.<br>** Building and content value derived from 2015 FRMP and increased to account for inflation from January 2015 to January 2022 (18.62%). |                                 |   |  |  |   |   |  |   |   |





**MOHAVE COUNTY  
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Table 5-12 - HAZUS Industrial Building Exposure and Loss Estimates for High Flood Hazard

| Community                      | Total Industrial Building Count | Total Industrial Building Value (x\$1000) | Total Industrial Content Value (x\$1000) |  | HIGH FLOOD HAZARD EXPOSURE AND LOSS ESTIMATES |   |  |   |   |
|--------------------------------|---------------------------------|---|--|--|---|---|--|---|---|
|                                |                                 |   |  |  | Industrial Building Count                     | Industrial Building Percent of Exposure | Industrial Building Value Exposure (x\$1000) | Industrial Content Value Exposure (x\$1000) | Industrial Building Loss Estimate (x\$1000) |
| Big Sandy Watershed            |                                 |   |  |  |   |   |  |   |   |
| Pine Lake                      | 0                               | \$7                                       | \$7                                      |  | 0   | 0.00%                                   | 0  | \$0   | \$0   |
| Unnamed Hualapai Res           | 0                               | \$0                                       | \$0                                      |  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Unnamed Mohave County          | 3                               | \$712                                     | \$712                                    |  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Wikieup                        | 0                               | \$0                                       | \$0                                      |  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Big Sandy Watershed Totals     | 3                               | \$719                                     | \$719                                    |  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Bill Williams Watershed        |                                 |   |  |  |   |   |  |   |   |
| Unnamed Mohave County          | 0                               | \$9                                       | \$9                                      |  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Bill Williams Watershed Totals | 0                               | \$9                                       | \$9                                      |  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Burro Watershed                |                                 |   |  |  |   |   |  |   |   |
| Unnamed Mohave County          | 2                               | \$404                                     | \$404                                    |  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Burro Watershed Totals         | 2                               | \$404                                     | \$404                                    |  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Detrital Wash Watershed        |                                 |   |  |  |   |   |  |   |   |
| Dolan Springs                  | 5                               | \$1,537                                   | \$1,537                                  |  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Unnamed Mohave County          | 4                               | \$1,531                                   | \$1,531                                  |  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| White Hills                    | 0                               | \$0                                       | \$0                                      |  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Detrital Wash Watershed Totals | 9                               | \$3,069                                   | \$3,069                                  |  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Fort Pierce Watershed          |                                 |   |  |  |   |   |  |   |   |
| Cane Beds                      | 0                               | \$0                                       | \$0                                      |  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |





**MOHAVE COUNTY  
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Table 5-12 - HAZUS Industrial Building Exposure and Loss Estimates for High Flood Hazard

| Community                            | Total Industrial Building Count | Total Industrial Building Value (x\$1000) | Total Industrial Content Value (x\$1000) | HIGH FLOOD HAZARD EXPOSURE AND LOSS ESTIMATES |   |  |   |   |
|--------------------------------------|---------------------------------|---|--|---|---|--|---|---|
|                                      |                                 |   |  | Industrial Building Count                     | Industrial Building Percent of Exposure | Industrial Building Value Exposure (x\$1000) | Industrial Content Value Exposure (x\$1000) | Industrial Building Loss Estimate (x\$1000) |
| Centennial Park                      | 10                              | \$5,145                                   | \$5,145                                  | 1   | 10.00%                                  | \$514  | \$514                                       | \$103                                       |
| Colorado City                        | 18                              | \$7,023                                   | \$7,023                                  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Unnamed Kaibab Res                   | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Unnamed Mohave County                | 3                               | \$1,734                                   | \$1,734                                  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| <b>Fort Pierce Watershed Totals</b>  | <b>31</b>                       | <b>\$13,902</b>                           | <b>\$13,902</b>                          | <b>2</b>                                      | <b>6.45%</b>                            | <b>\$897</b>                                 | <b>\$897</b>                                | <b>\$179</b>                                |
| <b>Grand Canyon Watershed</b>        |                                 |   |  |   |   |  |   |   |
| Peach Springs                        | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Unnamed Hualapai Res                 | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Unnamed Mohave County                | 0                               | \$32                                      | \$32                                     | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| <b>Grand Canyon Watershed Totals</b> | <b>0</b>                        | <b>\$32</b>                               | <b>\$32</b>                              | <b>0</b>                                      | <b>0.00%</b>                            | <b>\$0</b>                                   | <b>\$0</b>                                  | <b>\$0</b>                                  |
| <b>Grand Wash Watershed</b>          |                                 |   |  |   |   |  |   |   |
| Unnamed Mohave County                | 2                               | \$509                                     | \$509                                    | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| <b>Grand Wash Watershed Totals</b>   | <b>2</b>                        | <b>\$509</b>                              | <b>\$509</b>                             | <b>0</b>                                      | <b>0.00%</b>                            | <b>\$0</b>                                   | <b>\$0</b>                                  | <b>\$0</b>                                  |
| <b>Havasu-Mohave Lakes Watershed</b> |                                 |   |  |   |   |  |   |   |
| Arizona Village                      | 1                               | \$186                                     | \$186                                    | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Bullhead City                        | 116                             | \$35,893                                  | \$35,893                                 | 14  | 12.07%                                  | \$4,332                                      | \$4,332                                     | \$866                                       |
| Crystal Beach                        | 1                               | \$1,292                                   | \$1,292                                  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Desert Hills                         | 17                              | \$7,962                                   | \$7,962                                  | 3   | 17.65%                                  | \$1,405                                      | \$1,405                                     | \$281                                       |
| Fort Mohave                          | 79                              | \$30,376                                  | \$30,376                                 | 8   | 10.13%                                  | \$3,076                                      | \$3,076                                     | \$615                                       |
| Golden Shores                        | 2                               | \$528                                     | \$528                                    | 0   | 0.00%                                   | \$0  | \$0   | \$0   |







**MOHAVE COUNTY**  
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Table 5-12 - HAZUS Industrial Building Exposure and Loss Estimates for High Flood Hazard

| Community                                  | Total Industrial Building Count | Total Industrial Building Value (x\$1000) | Total Industrial Content Value (x\$1000) | HIGH FLOOD HAZARD EXPOSURE AND LOSS ESTIMATES |   |  |   |   |
|--|---------------------------------|---|--|---|---|--|---|---|
|  |                                 |   |  | Industrial Building Count                     | Industrial Building Percent of Exposure | Industrial Building Value Exposure (x\$1000) | Industrial Content Value Exposure (x\$1000) | Industrial Building Loss Estimate (x\$1000) |
| Katherine                                  | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Lake Havasu City                           | 405                             | \$198,369                                 | \$198,369                                | 6   | 1.48%                                   | \$2,939                                      | \$2,939                                     | \$588                                       |
| Mesquite Creek                             | 2                               | \$971                                     | \$971                                    | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Mohave Valley                              | 12                              | \$3,282                                   | \$3,282                                  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Mojave Ranch Estates                       | 1                               | \$243                                     | \$243                                    | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Oatman                                     | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Topock                                     | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Unnamed Fort Mojave Res                    | 3                               | \$600                                     | \$600                                    | 1   | 33.33%                                  | \$200  | \$200                                       | \$40  |
| Unnamed Mohave County                      | 21                              | \$7,193                                   | \$7,193                                  | 2   | 9.52%                                   | \$685  | \$685                                       | \$137                                       |
| Willow Valley                              | 8                               | \$2,347                                   | \$2,347                                  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| <b>Havas-Mohave Lakes Watershed Totals</b> | <b>668</b>                      | <b>\$289,244</b>                          | <b>\$289,244</b>                         | <b>34</b>                                     | <b>5.09%</b>                            | <b>\$14,722</b>                              | <b>\$14,722</b>                             | <b>\$2,944</b>                              |
| <b>Hualapai Wash Watershed</b>             |                                 |   |  |   |   |  |   |   |
| Antares                                    | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Clacks Canyon                              | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Crozier                                    | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Dolan Springs                              | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Hackberry                                  | 1                               | \$154                                     | \$154                                    | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Kingman                                    | 102                             | \$47,263                                  | \$47,263                                 | 3   | 2.94%                                   | \$1,390                                      | \$1,390                                     | \$278                                       |
| Meadview                                   | 1                               | \$108                                     | \$108                                    | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| New Kingman-Butler                         | 33                              | \$9,437                                   | \$9,437                                  | 1   | 3.03%                                   | \$286  | \$286                                       | \$57  |





**MOHAVE COUNTY  
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Table 5-12 - HAZUS Industrial Building Exposure and Loss Estimates for High Flood Hazard

| Community                             | Total Industrial Building Count | Total Industrial Building Value (x\$1000) | Total Industrial Content Value (x\$1000) | HIGH FLOOD HAZARD EXPOSURE AND LOSS ESTIMATES |   |  |   |   |
|---------------------------------------|---------------------------------|---|--|---|---|--|---|---|
|                                       |                                 |   |  | Industrial Building Count                     | Industrial Building Percent of Exposure | Industrial Building Value Exposure (x\$1000) | Industrial Content Value Exposure (x\$1000) | Industrial Building Loss Estimate (x\$1000) |
| Peach Springs                         | 1                               | \$2,219                                   | \$2,219                                  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Pinion Pines                          | 0                               | \$6                                       | \$6                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Truxton                               | 1                               | \$274                                     | \$274                                    | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Unnamed Hualapai Res                  | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Unnamed Mohave County                 | 80                              | \$94,438                                  | \$94,438                                 | 3   | 3.75%                                   | \$3,541                                      | \$3,541                                     | \$708                                       |
| Valentine                             | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Valle Vista                           | 7                               | \$1,306                                   | \$1,306                                  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| White Hills                           | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| <b>Hualapai Wash Watershed Totals</b> | <b>226</b>                      | <b>\$155,205</b>                          | <b>\$155,205</b>                         | <b>7</b>                                      | <b>3.10%</b>                            | <b>\$4,807</b>                               | <b>\$4,807</b>                              | <b>\$961</b>                                |
| <b>Kanab Watershed</b>                |                                 |   |  |   |   |  |   |   |
| Fredonia                              | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Kaibab                                | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Moccasin                              | 1                               | \$121                                     | \$121                                    | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Unnamed Kaibab Res                    | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Unnamed Mohave County                 | 0                               | \$256                                     | \$256                                    | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| <b>Kanab Watershed Totals</b>         | <b>1</b>                        | <b>\$377</b>                              | <b>\$377</b>                             | <b>0</b>                                      | <b>0.00%</b>                            | <b>\$0</b>                                   | <b>\$0</b>                                  | <b>\$0</b>                                  |
| <b>Lake Mead Watershed</b>            |                                 |   |  |   |   |  |   |   |
| Grand Canyon West                     | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Meadview                              | 6                               | \$3,101                                   | \$3,101                                  | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Unnamed Hualapai Res                  | 1                               | \$230                                     | \$230                                    | 0   | 0.00%                                   | \$0  | \$0   | \$0   |





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Table 5-12 - HAZUS Industrial Building Exposure and Loss Estimates for High Flood Hazard

| Community                            | Total Industrial Building Count | Total Industrial Building Value (x\$1000) | Total Industrial Content Value (x\$1000) | HIGH FLOOD HAZARD EXPOSURE AND LOSS ESTIMATES |   |  |   |   |
|--------------------------------------|---------------------------------|---|--|---|---|--|---|---|
|                                      |                                 |   |  | Industrial Building Count                     | Industrial Building Percent of Exposure | Industrial Building Value Exposure (x\$1000) | Industrial Content Value Exposure (x\$1000) | Industrial Building Loss Estimate (x\$1000) |
| Unnamed Mohave County                | 0                               | \$34                                      | \$34                                     | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| <b>Lake Mead Watershed Totals</b>    | <b>7</b>                        | <b>\$3,365</b>                            | <b>\$3,365</b>                           | <b>0</b>                                      | <b>0.00%</b>                            | <b>\$0</b>                                   | <b>\$0</b>                                  | <b>\$0</b>                                  |
| <b>Lower Virgin Watershed</b>        |                                 |   |  |   |   |  |   |   |
| Beaver Dam                           | 1                               | \$310                                     | \$310                                    | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Littlefield                          | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Scenic                               | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Unnamed Mohave County                | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| <b>Lower Virgin Watershed Totals</b> | <b>1</b>                        | <b>\$310</b>                              | <b>\$310</b>                             | <b>0</b>                                      | <b>0.00%</b>                            | <b>\$0</b>                                   | <b>\$0</b>                                  | <b>\$0</b>                                  |
| <b>Sacramento Watershed</b>          |                                 |   |  |   |   |  |   |   |
| Chloride                             | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Clacks Canyon                        | 1                               | \$128                                     | \$128                                    | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Golden Valley                        | 24                              | \$13,151                                  | \$13,151                                 | 3   | 12.50%                                  | \$1,644                                      | \$1,644                                     | \$329                                       |
| Kingman                              | 21                              | \$4,276                                   | \$4,276                                  | 2   | 9.52%                                   | \$407  | \$407                                       | \$81  |
| Lazy Y U                             | 0                               | \$94                                      | \$94                                     | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| McConnico                            | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Pinion Pines                         | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| So-Hi                                | 1                               | \$644                                     | \$644                                    | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Topock                               | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Unnamed Fort Mojave Res              | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Unnamed Mohave County                | 11                              | \$8,972                                   | \$8,972                                  | 1   | 9.09%                                   | \$816  | \$816                                       | \$163                                       |





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Table 5-12 - HAZUS Industrial Building Exposure and Loss Estimates for High Flood Hazard

| Community  | Total Industrial Building Count | Total Industrial Building Value (x\$1000) | Total Industrial Content Value (x\$1000) | HIGH FLOOD HAZARD EXPOSURE AND LOSS ESTIMATES |   |  |   |   |
|--|---------------------------------|---|--|---|---|--|---|---|
|  |                                 |   |  | Industrial Building Count                     | Industrial Building Percent of Exposure | Industrial Building Value Exposure (x\$1000) | Industrial Content Value Exposure (x\$1000) | Industrial Building Loss Estimate (x\$1000) |
| Walnut Creek   | 0                               | \$82                                      | \$82                                     | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| Yucca  | 2                               | \$692                                     | \$692                                    | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| <b>Sacramento Wash Watershed Totals</b>  | <b>60</b>                       | <b>\$28,041</b>                           | <b>\$28,041</b>                          | <b>6</b>                                      | <b>10.00%</b>                           | <b>\$2,804</b>                               | <b>\$2,804</b>                              | <b>\$561</b>                                |
| <b>Santa Maria Watershed</b>   |                                 |   |  |   |   |  |   |   |
| Unnamed Mohave County  | 0                               | \$0                                       | \$0                                      | 0   | 0.00%                                   | \$0  | \$0   | \$0   |
| <b>Santa Maria Watershed Totals</b>  | <b>0</b>                        | <b>\$0</b>                                | <b>\$0</b>                               | <b>0</b>                                      | <b>0.00%</b>                            | <b>\$0</b>                                   | <b>\$0</b>                                  | <b>\$0</b>                                  |
| <b>Notes:</b><br>* Total building and exposed building count derived from 2015 FRMP. Newer data not available as of January 2022.<br>** Building and content value derived from 2015 FRMP and increased to account for inflation from January 2015 to January 2022 (18.62%). |                                 |   |  |   |   |  |   |   |





## SECTION 6: FLOOD MITIGATION STRATEGY

### 6.1 2015 Flood Risk Management Planning Goals

The 2015 planning team formulated specific goals for this FRMP during the second Advisory Committee meeting. The first step in the goal setting process was to review the stated goals of other planning documents and efforts to ensure that goals set for the FRMP will be consistent with other Mohave County efforts. The current MJHMP has only one stated goal with four clarifying objectives as follows:

**MJHMP GOAL:** Reduce or eliminate the risk to people and property from natural hazards.

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

The 2015 Advisory Committee also reviewed the list of public involvement related goals developed by the Outreach Projects Strategy Advisory Committee (OPSAC) in 2014, as follows:

- **OPSAC Goal 1:** Address transportation problems during flood events.
- **OPSAC Goal 2:** Keep children out washes during both dry and flooding conditions.
- **OPSAC Goal 3:** Better inform the community of flood insurance options. Target the communities that are not currently within a mapped FEMA Special Flood Hazard Area (SFHA), but may be at risk of flooding.
- **OPSAC Goal 4:** Educate the public on the importance of flood hazards, flood preparedness, and proper response.
- **OPSAC Goal 5:** Maintain, enhance, and develop regional inter-jurisdictional communication, coordination, and education in San Bernardino County (CA), Clark County (NV), and Washington County (UT) for flooding and other emergencies.

After reviewing the above, the 2015 Advisory Committee then performed an exercise wherein each person was provided sticky notes upon which they were to write down a minimum of three problem statements (one per sticky note) relating to flooding and flood risk in the county. The problem statements were collected and then grouped into common themes or topics. The groupings of problem statements then served as a basis for formulating the goals for this FRMP. The common group topics included: flood response, interagency coordination, education and outreach, funding sources,



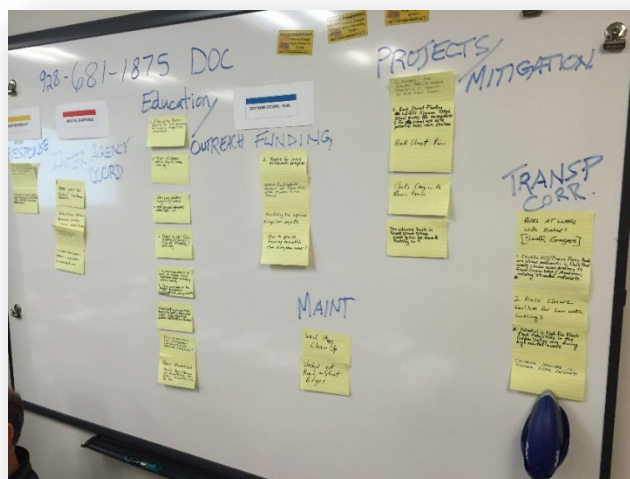


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maintenance, projects and mitigation, and transportation flooding. Using the results of the sticky-note exercise, the Advisory Committee formulated the following goals:

- **GOAL 1:** Pursue continued coordination and cooperation among agencies and jurisdictions with floodplain management responsibilities and interest in Mohave County.
- **GOAL 2:** Identify and pursue all reasonable avenues of funding for implementing flood risk reduction activities.
- **GOAL 3:** Actively identify and implement projects and activities that reduce or eliminate flood risk in Mohave County.
- **GOAL 4:** Coordinate with and support emergency management with data and services to aid in effective flood hazard related emergency response.
- **GOAL 5:** Perform and strategize public outreach and involvement activities and projects per the CRS Activity 330 Program for Public Information (PPI) Committee recommendations.



### 6.1.1 2022 Update

The 2022 Advisory Committee reviewed the 2015 FRMP goals during the third meeting and discussed the need to make any modifications. The committee unanimously determined that the goals were still relevant and no modifications were needed.

## 6.2 Flood Risk Management Activity Review

FEMA has established six general categories of activities that a community may choose to pursue as a part of its flood risk management programs and process. Each of the six categories are discussed in the following sections.

### 6.2.1 Preventive

Preventive activities usually involve planning or regulatory measures and are usually administered by building, zoning, planning, and/or code enforcement departments and officials. The goal of preventive activities is to keep flood problems from getting worse through purposeful limitation of land use and development of flood-prone areas.

Mohave County has implemented and enforces several preventive activities, with a majority of the effort being accomplished through the Development Services Department and







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its various divisions and officials including: Building Inspector's Office, Emergency Management, Environmental Quality, Flood Control District, Planning, Permitting, and Planning & Zoning Commission. The Public Works Department also plays a role in flood mitigation through some of the programs it administers. Table 6-1 provides a listing of the administrative and regulatory capabilities currently being offered by the County.

**Table 6-1 - Mohave County administrative and regulatory tools**

| <b>Regulatory Tools for Flood Risk Reduction</b> | <b>Description</b>  | <b>Responsible Department/Agency</b>   |
|--|---|--|
| CODES  | <ul style="list-style-type: none"><li>• 2018 International Building Codes (IBC, IRC, IPC, IMC, etc.)</li></ul>  | <ul style="list-style-type: none"><li>• Development Services – Building Inspector</li></ul>  |
| ORDINANCES                                       | <ul style="list-style-type: none"><li>• Mohave County Flood Control Ordinance – 2014-01</li><li>• Subdivision/Zoning Ordinance - 9/65</li><li>• Mohave County Building Ordinance – 2015-04</li></ul>  | <ul style="list-style-type: none"><li>• Development Services – Flood Control</li><li>• Development Services – Planning &amp; Zoning</li></ul>  |
| PLANS, MANUALS, and/or GUIDELINES                | <ul style="list-style-type: none"><li>• Mohave County General Plan</li><li>• Mohave County Area Plans (21 areas specific attachments to the General Plan)</li><li>• Capital Improvement Project Plan (updated annually)</li><li>• Mohave County Land Division Regulations</li><li>• Mohave County Drainage Design Manual</li><li>• Community Wildfire Protection Plan</li><li>• Mohave County MJHMP</li></ul> | <ul style="list-style-type: none"><li>• Development Services – Flood Control</li><li>• Development Services – Planning &amp; Zoning</li><li>• Finance Dept.</li><li>• Development Services - Emergency Management</li><li>• Public Works</li></ul> |

### 6.2.2 Property Protection

Property protection activities are typically done on an individual lot or structure basis and are usually implemented by the property owners. Activities in this category may include acquisition and relocation, elevation and/or flood-proofing of a building, purchase of flood insurance, or small, very localized flood protection measures such as floodwalls, embankments, or armoring measures.

In Mohave County, most of these measures and/or activities are performed by the property owners. The only possible exception might be an acquisition and relocation project, however, to date, no acquisition and relocation projects have been implemented by the county. As a part of its Program for Public Information, MCFCFD is continuously and actively





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promoting the purchase of NFIP flood insurance for all flood-prone properties regardless of their FEMA SFHA delineation status and will continue to do so. MCFCD also provides individual one-on-one assistance to individual property owners seeking advice on pursuing some type of flood mitigation on a requested, as needed basis.

### 6.2.3 *Natural Resources Protection*

Natural resource protection activities preserve or restore natural functions of floodplain and watershed areas. Typical areas of application may include: wetlands protection, water quality improvement, erosion and sediment control, and natural area/function preservation, restoration, and/or protection.

Preservation of open space and the natural function of floodplains is promoted in Mohave County through the use of appropriate zoning and land use planning. This is aided with the fact that over 80 percent of Mohave County is composed of public or State Trust Lands, with the Bureau of Land Management (BLM) having the largest footprint. BLM lands occupy a significant portion of the county's valley areas, where the highest potential exists for preserving the natural function of floodplains.

Preservation of the few wetlands located within the county is a high priority on the county's land use planning. Known wetlands that have been identified in the BLM's Resource Management Plans include Topock Marsh and small miscellaneous wetlands located adjacent to the county's rivers. Development in wetlands is regulated by the U.S. Army Corps of Engineers and the Environmental Protection Agency, and county drainage design manuals require compliance with Clean Water Act Sections 401 and 404.

Past Mohave County activities in this category predominantly include the construction of multiple projects that provided some form of erosion protections and sediment control. Erosion and transport of sediment is normally a prominent consideration in any flood control project implemented in Mohave County and is often a significant component of flood risks. Recent projects constructed by Mohave County with significant erosion and sediment control elements are listed in Table 6-3 of Section 6.2.5.

Regarding water quality improvement, MCFCD developed a stormwater management plan and ordinance in 2017 to fulfill requirements in the Arizona Small Municipal Separate Storm Sewer System (MS4) General Permit (AZG2002-002), which is administered by the Arizona Department of Environmental Quality (ADEQ).

### 6.2.4 *Emergency Services Measures*

Emergency services measures are taken during an emergency to minimize its impact. These measures are usually the responsibility of city or county emergency management staff and the owners or operators of major or critical facilities. Typical activities may include: hazard threat recognition, critical facilities protection, hazard warning, health and safety maintenance, hazard response operations, and post-disaster mitigation actions.





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The MCFCD and Public Works Department (PWD) work closely with the Mohave County Emergency Management (MCEM) group before, during and after flooding events to minimize the health and safety risk of flooding events to county citizens.

MCFCFCD operates and maintains a flood threat recognition system called ALERT (Automated Local Evaluation in Real Time), which is composed of a network of rain and stream gages strategically located throughout Mohave County and in neighboring areas that share watersheds with the county. The gage data is sent by radio wave back to a base station at MCFCFCD, where it is stored and analyzed instantaneously. MCFCFCD staff members are able to relay the gage readings to the National Weather Service and MCEM, to provide real-time reporting of flooding or flooding potential.

MCFCFCD and MCEM have jointly developed flood response plans for the Beaver Dam and Golden Valley areas to guide the county in making emergency management decisions regarding flood warning and response to those areas. The response planning, coupled with the results from the vulnerability analysis presented in Section 5.5, helps county staff to identify evacuation routes, emergency shelter locations and needs, and assess the need for aid to those with access and functional needs. MCFCFCD, PWD and MCEM personnel also participate in regular emergency operations scenarios and desk-top exercises to check and validate the effectiveness of the emergency response procedures and planning.

Protection of critical facilities always carries a high priority when county staff consider mitigation opportunities or projects for implementation. Each of the CFI identified as exposed to high hazard flooding in Section 5.5 are listed in Table 6-2 below and will be carefully examined by MCFCFCD and MCEM staff to validate the risk and pursue mitigation options.

**Table 6-2 - Critical and non-critical facilities potentially exposed to high flood hazard**

| HUC-8 Watershed     | Community             | Facility Name                 | Facility Type           | Facility Class |
|---------------------|-----------------------|-------------------------------|-------------------------|----------------|
| Grand Canyon        | Unnamed Mohave County | Grand Canyon Bar Ten Airstrip | Transportation Networks | Critical       |
| Havasú-Mohave Lakes | Bullhead City         | Section 10 WWTP               | Water Supply Systems    | Critical       |
| Havasú-Mohave Lakes | Bullhead City         | Edgewater Lift Station        | Water Supply Systems    | Critical       |
| Havasú-Mohave Lakes | Bullhead City         | Pass Canyon Lift Station      | Water Supply Systems    | Critical       |
| Havasú-Mohave Lakes | Desert Hills          | Mohave County Sheriff         | Emergency Services      | Critical       |
| Havasú-Mohave Lakes | Fort Mohave           | Excel Education Center        | Educational             | Non-Critical   |
| Havasú-Mohave Lakes | Fort Mohave           | FMMFD Fire Station            | Emergency Services      | Critical       |
| Havasú-Mohave Lakes | Oatman                | OFD Fire Station              | Emergency Services      | Critical       |
| Sacramento Wash     | Chloride              | CFD Fire Station              | Emergency Services      | Critical       |





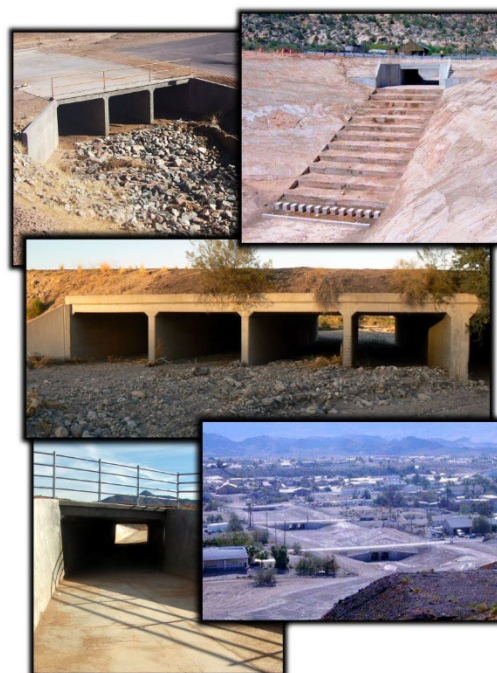
*Table 6-2 - Critical and non-critical facilities potentially exposed to high flood hazard*

| HUC-8 Watershed | Community | Facility Name            | Facility Type            | Facility Class |
|-----------------|-----------|--------------------------|--------------------------|----------------|
| Sacramento Wash | Kingman   | Animal Control           | Government Services      | Critical       |
| Sacramento Wash | Kingman   | Calvary Christian School | Educational              | Non-Critical   |
| Sacramento Wash | Kingman   | Concession Original      | Recreational             | Non-Critical   |
| Sacramento Wash | Kingman   | Powerhouse               | Electrical Power Systems | Critical       |
| Sacramento Wash | McConnico | South Treatment Plant    | Water Supply Systems     | Critical       |

### 6.2.5 Structural Projects

Structural projects are physical facilities that are generally constructed to convey, divert, detain, or retain flood waters in a manner that reduces or alleviates flood risk to adjacent properties and areas. These projects are typically large in scope and provide flood mitigation to multiple properties or may even have a regional impact. These types of facilities are often constructed by government agencies or major land developments and may be maintained by either government agencies or private associations. Facility types may include: channels, culverts, storm drains, bridges, levees/floodwalls, diversion structures, detention/retention basins, and dams.

As stated previously, Mohave County, and particularly MCFCD and PWD have actively funded and constructed several structural drainage projects over the last ten-plus years. A listing of those projects is provided in Table 6-3 and the reader is referred to the MCFCD website<sup>7</sup> for more detailed listings and information of these projects. Future projects have and will continue to be identified by Mohave County and constructed as funds become available. Several of the targeted projects are discussed further in Section 6.3 below.



<sup>7</sup> URL at: <https://www.mohave.gov/ContentPage.aspx?id=124&cid=392&page=5&rid=1155>





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*Table 6-3 - List of drainage and flood control projects constructed in Mohave County*

| Project Name     | Year of Completion | Project Description   | Description of Flood Mitigation Benefit   |
|------------------|--------------------|---|---|
| El Rodeo Channel | 1990               | The Channel project included an elevated roadway embankment and installation of five corrugated metal pipe culverts. The trapezoidal-shaped channel was constructed approximately 250 feet downstream to approximately 7,100 feet upstream of SR 95 and is 1.5 miles long. The channel has a natural-material bottom with a width that ranges from 120 to 165 feet. The 4:1 sloped banks are lined with soil-cement protection; and, twelve 12'x8' concrete box culverts were installed at State Route 95 along the Mohave Washes.  | More than 850 parcels were removed from Special Flood Hazard Areas post construction with a LOMR Effective April 26, 2001.          |
| Mohave Channel   | 2006               | The Mohave Wash flowing through the Kingman area created a wide floodplain which was designated as a Special Flood Hazard Area, Zone AH. The Mohave Wash watershed drains 65 square miles to the downstream limit of a study near the Kingman Airport. Elevations range from 5,800 to 3,260 feet Mean Sea Level (MSL). The Mohave Wash runs directly through some of the most populated areas within the City of Kingman and well into one of the adjacent unincorporated areas of Mohave County and historically has caused serious damage to residential and commercial areas nearby during periods of intense flooding. These areas were isolated during flooding which severely limited emergency response. This had been occurring on a regular basis for many years and had become the focus of a major renovation project for the entire community. The Mohave Wash Project was a joint effort between Mohave County, the City of Kingman and the Arizona Department of Transportation. It realigned and developed an efficient flood control channel with the capacity to handle the 15,000 cubic feet per second (cfs) which may be expected during a 100-year event. The cooperative effort resulted in the elimination of damage caused by flooding, as experienced in the past, and the subsequent removal of the impacted areas from the Special Flood Hazard Area. The Mohave Wash Project also took the opportunity to construct a multi-use trail system, funded by a grant, along the alignment of the new channel which connected to the northern most parts of the community with the City of Kingman's commercial and recreational areas. | Construction of the project removed 650 homes from the SFHA and defined a safe flowpath for flooding through the hearth of Kingman. |







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*Table 6-3 - List of drainage and flood control projects constructed in Mohave County*

| <b>Project Name</b> | <b>Year of Completion</b> | <b>Project Description</b>   | <b>Description of Flood Mitigation Benefit</b>  |
|---------------------|---------------------------|--|---|
| Tierra Verde        | 2010                      | The Tierra Verde subdivision is located in the Fort Mohave area, south of Bullhead City, Az. North of the intersection of E. La Entrada Drive and S. Calle Del Media is a channel that was constructed on the east side of private property by the developer when the subdivision was built. An inspection in 2010 found that the natural bottom channel was in need of maintenance. The wash had undergone erosion in some areas while other areas were experiencing large vegetation growth. As the result of the conditions found during the inspection, a project was initiated to bring the channel back to its intended structural condition. The channel was cleared of as much vegetation as possible and there was some excavation to allow more water to flow in the channel. For some increased protection, the county installed rip-rap along the west side of the channel.  | Mitigation of erosion hazards and potential flooding of adjacent subdivision due to lack of conveyance capacity |
| Beaver Dam Bridge   | 2011                      | In January 2005, a major flood on Beaver Dam Wash washed out the south approach and bridge abutment. The county secured FHWA grant funding to rebuild the bridge to 500-year standards.  | Provide safe access for residents and community.  |
| Wikieup Dike        | 2011                      | A portion of the Town of Wikieup is protected from flood flows by a dike approximately 4,700 feet in length, located about 0.8 miles west of Highway 93 and just south of the Wikieup landing strip. According to Mohave County historical records, the dike was constructed in the early to mid 1960's. In addition to the dike structure itself, a channel and series of reservoirs were initially constructed on the upstream side of the dike, presumably to work together in order to provide the necessary flood protection. In late 2007, an evaluation of the structures was completed in order to determine the adequacy and extent of protection the dike, channel and reservoirs were providing at the time. The evaluation determined the need for the following improvements: 1) A rehabilitation of the channel, dike and reservoirs. 2) Reconstruction of the downstream wash left bank at a historic flow split. Mohave County partnered with the Arizona Department of Transportation in order to complete the improvements in June 2011. | Reduce the risk of flooding to downstream infrastructure.   |







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*Table 6-3 - List of drainage and flood control projects constructed in Mohave County*

| Project Name   | Year of Completion | Project Description   | Description of Flood Mitigation Benefit  |
|----------------|--------------------|---|--|
| Antelope Drain | 2012               | <p>Antelope Drain begins east of Antelope Drive and ends at Mountain View Road in the Fort Mohave area. The Antelope Drain channel was designed within three separate subdivisions: Sun Valley in May 1983, Valley Springs Estates in December 2007, and Everglades Estates in August 2009.</p> <p>October 2007 was the first recorded inspection of the channel by Mohave County Flood Control District. The District found the channel within in the Sun Valley subdivision to be in a poor condition, filled sporadically with vegetation and medium sized mesquite trees. The dikes protecting the homes were in need of repair and the channel base requiring leveling. The District's first project at Antelope Drain was within the channel in Sun Valley; clearing all vegetation, repairing the training dikes and, in one area, building up the south side and confining the flow the center of the channel so water was no longer a threat to several homes.</p> <p>The portion of the channel located in Valley Springs Estates was inspected and found to be in good condition. The rip-rap along the channel walls was well constructed by the subdivision developer and only some maintenance of the five- foot drop structure near the southwest corner of the subdivision was needed. This maintenance was completed in early 2011.</p> <p>Following a storm event that impacted neighboring subdivisions, the portion of the channel within Everglades Estates was constructed by the developer. The Everglades channel included three drop structures which would clean and slow the flow of the floodwaters. The Mohave County Flood Control District, after inspection and evaluation of the channel, accepted that portion of the channel into the maintenance system program but determined that additional mitigation was necessary. Two culverts were constructed to slow and divert water to Everglades Blvd., where an overflow was constructed to direct water into an existing culvert within a neighboring subdivision. This was completed in May 2012.</p> | Reduce repetitive flooding in the Sun Valley, Valley Springs Estates, and Everglades Estates subdivisions. |





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*Table 6-3 - List of drainage and flood control projects constructed in Mohave County*

| Project Name                          | Year of Completion | Project Description   | Description of Flood Mitigation Benefit  |
|---------------------------------------|--------------------|---|--|
| Horizon Six Detention Basin           | 2013               | Horizon Six is located in the south east part of the Lake Havasu City area and is bisected by a major drainage course, Mockingbird Wash. Flooding and sediment transport have caused significant problems over the years. The MCFCD constructed two major elements, a channel system and offline detention basin, to address flooding through the area.   | LOMR in process to remove nearly 89 parcels from the FEMA Special Flood Hazard Area  |
| Quail Run Basin Expansion             | 2013               | Provided two small basins for water to collect, relieving some of the flooding potential. The north basin will be expanded to provide additional capacity.  | Reduce repetitive flooding.  |
| Tierra Del Rio                        | 2013               | The design of a flood control facility incorporated three elements: 1) Construction of five basins to retain or detain storm runoff upstream of the impacted homes. These basins will intercept soil and debris as well as reduce the 100-year event runoff by half. 2) Concrete lining of two existing drainage easements which have seriously eroded in the past and lead to damage of adjacent walls and other private property. 3) Construction of curb and gutter in the worst hit downstream streets to confine flows to the street in sections where the adjacent homes are below street level.  | Reduce repetitive flooding in the Tierra Del Rio Subdivision and adjacent developments that have been impacted by flooding and debris flows for several decades. |
| Camp Mohave Elementary School Channel | 2014               | The joint project consisted of grading a new shallow channel starting from an existing channel in the Calle del Media right-of-way, easterly across the right of way to the school facility, across the soccer field within the county right-of-way for Vista del Sol Drive and thence southeasterly across the school property to the low points in the playground that pond water. Mohave County Flood Control District constructed the portion of the channel in the public rights-of-way and the School District constructed the portion on their property. The county portion of this project is necessary in order to drain the upstream low points in the school playground. | Reduce repetitive flooding at the Camp Mohave Elementary School.   |





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*Table 6-3 - List of drainage and flood control projects constructed in Mohave County*

| <b>Project Name</b>                                   | <b>Year of Completion</b> | <b>Project Description</b>  | <b>Description of Flood Mitigation Benefit</b>   |
|---|---------------------------|---|--|
| Girard Avenue Detention Basin/County Park             | 2014                      | This detention basin is to protect the Mohave Valley Junior High from historic flooding problems originating from rainfall in the mountains around Oatman. The detention basin will also include room for ball fields and a park for school and public use. This project is a joint project with the school district and Mohave Valley Park.  | Reduce repetitive flooding at the Mohave Valley Junior High School.                              |
| Moccasin Wash Culvert                                 | 2014                      | The community of Moccasin, Arizona is located in the northeast corner of the county. In July of 2013, several large storms caused erosive flows in the wash that crosses the only access road into the community and into the nearby Paiute Reservation farms. The storm runoff in the wash eroded a 50-foot-deep canyon that worked its way upstream to Main Street and destroyed the concrete box culvert that has served the community for many years. Using emergency funds approved by the Board of Supervisors, the project was redesigned to meet the new conditions on the ground, and the contractor, Perco Rock, was given notice to proceed with the construction of a 10-foot high, 20-foot-wide concrete box culvert and a large soil cement drop structure and energy dissipation structure. The construction cost was split between Mohave County Public Works and the Mohave County Flood Control District. The project utilized 9,000 cubic yards of soil cement, 15,000 cubic yards of excavation, 900 tons of cement, waterline replacement and a 1,200-foot-long temporary detour road. | Restore critical roadway crossing and mitigate further upstream migration of a sizeable headcut. |
| Beaver Dam Channel Restoration and Erosion Protection | 2015                      | The community of Beaver Dam experienced severe flooding and erosion damage during two winter storms in January 2005 and again in December 2010. In 2013, Mohave County was able to secure a grant from the State of Arizona to reconstruct a low-flow pilot channel and install erosion protection along the western bank of the watercourse. A small area of eroded development was also backfilled to smooth the bank line. The construction was completed in mid-2015.   | Mitigate lateral bank migration and restore main channel conveyance                              |





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*Table 6-3 - List of drainage and flood control projects constructed in Mohave County*

| <b>Project Name</b>              | <b>Year of Completion</b> | <b>Project Description</b>  | <b>Description of Flood Mitigation Benefit</b>  |
|----------------------------------|---------------------------|---|---|
| Sunrise Vistas Drainage Channels | 2016                      | Diversion channels on the north and east sides of this development were constructed to provide limited flood protection on State Trust lands without obtaining drainage easements. The system is undersized and requires modification. Design and ROW acquisition are complete, and the project is moving through the FY2014 PDM grant process with anticipated construction beginning in late 2015 - early 2016. | Reduce repetitive flooding in Sunrise Vistas subdivision.   |
| Grace Neal Channel Phase 1       | 2019                      | Phase I of the Grace Neal Channel captures runoff flows through the Eagle View subdivision, located approximately 2.5 miles north of the City of Kingman along Bank Street, before they impact the New Kingman/Butler area. Flows are channelized for one mile before being released to natural conditions and eventually conveyed into the existing Mohave Wash Channel.   | Reduce repetitive flooding in North Kingman/Butler.   |
| Bison Drain Channel Improvements | 2021                      | A system of reinforced concrete drop structures was built to replace a damaged structure in the Bison Channel.  | Reduce repetitive flooding within the Fort Mohave area.   |
| Valle Vista Detention Basin      | 2021                      | Channelization of runoff flows from the north Peacock Mountains into a new retention basin on 7.5 acres of MCFCD land was built to mitigate historic damage to downstream county roads. An infiltration trench was constructed in 2021 to drain retained water into the ground.   | The new basin greatly reduces the potential erosion damage to California Drive and Painted Rock Road just north of Valle Vista. |





6.2.6 *Public Information*

Public information activities are designed to advise and educate existing and future property owners and the general citizenry about the hazards and risks associated with flooding (and other hazards), and ways to build resilience through protecting people and property from flood damage and losses. Typical activities include but are not limited to: communicating flood risk through map information and publications, using social media outlets, websites, and traditional media to disseminate messages and information, creating and maintaining a library of resources and information, conducting outreach projects, providing technical assistance, and developing real estate disclosure documents.

Mohave County has developed a Program for Public Involvement (PPI) and organized a PPI Committee to define, implement, monitor and evaluate a detailed public involvement strategy for the county following the CRS Activity 330 guidelines. Each of the above-mentioned typical activities, and more, are addressed in the PPI outreach plan, including targeted audiences, message types, mechanisms, and frequency of outreach efforts, and other strategies for maintaining a successful public information campaign. See Section 4 of this FRMP for a more detailed and thorough discussion on this topic. The county is committed to an active and effective public information campaign and will continue to commit resources and funding to this effort.

### 6.3 Flood Risk Mitigation Action Plan

Upon review of each of the Section 6.2 activities, the Advisory Committee met for a third time to discuss and organize a flood risk mitigation action plan. The Advisory Committee started with the list of identified problem areas brainstormed during the first and second meetings, and also considered the results of the vulnerability analysis, the Areas of Mitigation Interest (AOMIs) compiled during the Discovery studies, currently identified CIP projects, and the recommended action alternatives identified in each of the four watershed strategic planning studies, to develop a list of mitigation actions and projects (A/Ps) for this FRMP. For each A/P, the following elements were identified:

- **ID No.** – a unique alpha-numeric identification number for the A/P.
- **Goals Addressed** – a list of the FRMP goals that are addressed by the A/P.
- **Description** – a brief description of the A/P.
- **Estimated Costs** – concept level cost estimates that may be a dollar amount or estimated as staff time.

Once the full list of A/Ps was completed, the Advisory Committee then evaluated each A/P and assigned a ranking factor. The evaluation considered the following characteristics in the context of being either “Favorable”, “Neutral”, or “Less Favorable”:

- |                                    |                                   |
|------------------------------------|-----------------------------------|
| ✓ <b>Technical Feasibility</b>     | ✓ <b>Public/Political Support</b> |
| ✓ <b>Regulatory Administration</b> | ✓ <b>Environmental Impact</b>     |
| ✓ <b>Cost/Benefit</b>              |                                   |

Each A/P was then ranked using the criteria developed by MCFCD for use in the watershed strategic planning studies and summarized below in Table 6-4





*Table 6-4 - Priority ranking criteria for MCFCD projects*

| Project Priority Ranking | Project Priority Criteria Description  |
|--------------------------|--|
| <b>A</b>                 | <b>Highest priority project:</b> Areas of significant flooding and/or sedimentation problems. MCFCD has all the information needed to proceed with this study design or construction project. The projects are either underway or will begin typically within the next fiscal year depending on available budget.  |
| <b>B</b>                 | <b>High priority project:</b> Areas of significant flooding and/or sedimentation problems. MCFCD considers this to be an important project but is actively gathering information. These projects are planned to begin in the next 2-5 fiscal years (depending on available budget) and include projects such as aerial mapping, hydrology studies, and design concept reports (DCR). |
| <b>C</b>                 | <b>Medium priority project:</b> Areas of moderate flooding and/or sedimentation problems. These represent projects in which MCFCD will continue to gather information. Based on that information, these projects may become higher priority in the future. The timeline for these projects is typically 3-10 fiscal years  |
| <b>D</b>                 | <b>Low priority project:</b> These projects benefit a limited number of individual residents. In some cases these projects will be driven by development and would be generally funded by developers.  |
| <b>E</b>                 | <b>Lowest priority project:</b> These projects either offer minor benefit to the residents of Mohave County or they are outside the jurisdiction of the MCFCD. Some of these projects may be a higher priority to other jurisdictions such as cities or Indian communities. No timeline is projected for these projects.   |

Finally, each of the A/Ps were evaluated for implementation and assigned the following attributes:

- **Anticipated Completion Date** – a realistic and general timeframe for completing the A/P. Examples may include a specific target date, a timeframe contingent upon other processes, or recurring timeframes.
- **Primary Agency Responsible for Implementation** – this would be the agency, department, office, or other entity and corresponding job title that will have responsibility for the A/P and its implementation.
- **Funding Source** – the source or sources of anticipated funding for the A/P.

Table 6-5 below summarizes the resultant list of FRMP A/Ps developed, evaluated and ranked by the FRMP team, and Table 6-6 presents the associated implementation plan for each A/P.







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*Table 6-5. Flood Risk Management Plan actions/projects list for Mohave County*

| ID No. | Goals Addressed | Description   | Estimated Cost   | Favorable = F<br>Neutral = N<br>Less Favorable = L |                              |              |                             |                         | Action/<br>Project<br>Priority<br>Rank | 2022<br>Update |
|--------|-----------------|---|------------------|--|------------------------------|--------------|-----------------------------|-------------------------|--|----------------|
|        |                 |   |                  | Technical<br>Feasibility                           | Regulatory<br>Administration | Cost/Benefit | Public/Political<br>Support | Environmental<br>Impact |  |                |
| 1      | 1, 3            | Install flashing signage for key low water crossings on county-maintained highways at identified locations. | \$8,000/location | F  | N                            | F            | F                           | F                       | A                                      | No Change      |
| 2      | 1, 3            | Identify, preliminarily size and prioritize drainage crossings along Stockton Hill Road                     | Staff Time       | F  | N                            | F            | F                           | F                       | B                                      | No Change      |
| 3      | 1, 3            | Identify, preliminarily size and prioritize drainage crossings along Pierce Ferry Road                      | Staff Time       | F  | N                            | F            | F                           | F                       | B                                      | No Change      |
| 4      | 1, 2, 3         | Pursue flood risk mapping and study funding through FEMA CTP program  | Staff Time       | F  | N                            | F            | F                           | F                       | A                                      | No Change      |
| 5      | 1, 2            | Pursue mitigation project funding through FEMA HMA programs (HMGP, BRIC, FMA)                               | Staff Time       | F  | N                            | F            | F                           | F                       | A                                      | No Change      |





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| ID No. | Goals Addressed | Description   | Estimated Cost | Favorable = F<br>Neutral = N<br>Less Favorable = L |                              |              |                             |                         | Action/<br>Project<br>Priority<br>Rank | 2022<br>Update |
|--------|-----------------|---|----------------|--|------------------------------|--------------|-----------------------------|-------------------------|--|----------------|
|        |                 |   |                | Technical<br>Feasibility                           | Regulatory<br>Administration | Cost/Benefit | Public/Political<br>Support | Environmental<br>Impact |  |                |
| 6      | 4               | Provide real time data to emergency management personnel during a response event  | Staff Time     | F  | N                            | F            | F                           | F                       | A                                      | No Change      |
| 7      | 4               | Facilitate opening and operation of the EOC/DOC and participate in both real time and practice exercises.               | Staff Time     | F  | N                            | F            | F                           | F                       | A                                      | No Change      |
| 8      | 1, 4            | Support Public Works Road Department with real time data for potential road closures.                                   | Staff Time     | F  | N                            | F            | F                           | F                       | A                                      | No Change      |
| 9      | 1, 3, 4         | Provide hydrologic analysis for flooding issues associated with post-wildfire related floods during the wildfire event. | Staff Time     | F  | N                            | F            | F                           | F                       | A                                      | No Change      |
| 10     | 1, 3            | Maintain stormwater management plan/ordinance to satisfy the MS4 designation for Unincorporated areas of Mohave County. | Staff Time     | F  | N                            | N            | N                           | F                       | A                                      | No Change      |
| 11     | 1, 3, 4         | Provide continued floodplain management assistance and help to incorporated communities.                                | Staff Time     | F  | N                            | F            | F                           | N                       | A                                      | No Change      |





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| ID No. | Goals Addressed | Description  | Estimated Cost            | Favorable = F<br>Neutral = N<br>Less Favorable = L |                              |              |                             |                         | Action/<br>Project<br>Priority<br>Rank | 2022<br>Update |
|--------|-----------------|--|---------------------------|--|------------------------------|--------------|-----------------------------|-------------------------|--|----------------|
|        |                 |  |                           | Technical<br>Feasibility                           | Regulatory<br>Administration | Cost/Benefit | Public/Political<br>Support | Environmental<br>Impact |  |                |
| 12     | 1, 2, 3         | Work with incorporated cities to pursue grant funds for flood control projects.  | Staff Time                | F  | N                            | F            | F                           | N                       | A                                      | No Change      |
| 13     | 1, 2, 3         | Collaborate with FEMA on a regional and national level regarding working with local jurisdictions.   | Staff Time                | F  | N                            | F            | F                           | N                       | A                                      | No Change      |
| 14     | 1, 3, 4         | Continued expansion and refinement of the county ALERT system by cooperating with Federal, Tribal, State and local agencies and officials.   | \$8K to \$10K per Station | F  | F                            | N            | F                           | N                       | A                                      | No Change      |
| 15     | 3               | Perform a DCR to analyze the drainage at Hillcrest and Stockton Hill Road. Known issues include undersized culverts, sediment deposition on the roads, and inadequate upstream drainage control. | \$50K                     | F  | F                            | F            | F                           | N                       | E                                      | No Change      |





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| ID No. | Goals Addressed | Description  | Estimated Cost | Favorable = F<br>Neutral = N<br>Less Favorable = L |                              |              |                             |                         | Action/<br>Project<br>Priority<br>Rank | 2022<br>Update     |
|--------|-----------------|--|----------------|--|------------------------------|--------------|-----------------------------|-------------------------|--|--------------------|
|        |                 |  |                | Technical<br>Feasibility                           | Regulatory<br>Administration | Cost/Benefit | Public/Political<br>Support | Environmental<br>Impact |  |                    |
| 16     | 3               | <p>Perform a DCR to analyze the drainage at the intersection of Stockton Hill Road near the Shadow Mountain alignment. Known issues include a large box culvert that is not hydraulically connected to flood flows it is intended to convey.</p> <p>Partially complete, we have analyzed the downstream channel needs and have added another pipe at the culvert crossing.</p> | \$50K          | F  | F                            | F            | F                           | N                       | E                                      | Partially complete |
| 17     | 3               | <p>Perform a DCR to analyze the drainage at the intersection of Western and Airway. Known drainage issues include a retention basin that is not hydraulically connected to flood flows.</p> <p>Partially complete, we have some conceptual designs, but may need to change due to R/W issues.</p>  | \$30K          | F  | F                            | F            | F                           | N                       | E                                      | Partially complete |





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| ID No. | Goals Addressed | Description   | Estimated Cost | Favorable = F<br>Neutral = N<br>Less Favorable = L |                              |              |                             |                         | Action/<br>Project<br>Priority<br>Rank | 2022<br>Update |
|--------|-----------------|---|----------------|--|------------------------------|--------------|-----------------------------|-------------------------|--|----------------|
|        |                 |   |                | Technical<br>Feasibility                           | Regulatory<br>Administration | Cost/Benefit | Public/Political<br>Support | Environmental<br>Impact |  |                |
| 18     | 3               | Perform a DCR to analyze the drainage in the area of Lead Street and Stockton Hill Avenue. Known issues include frequent flooding of homes, flooding of high school downstream, and the need for upstream retention basins.               | \$50K          | F  | F                            | F            | F                           | N                       | E                                      | No Change      |
| 19     | 3               | Perform floodplain analysis for the Golden Shores watershed. Known issues include widespread, unanalyzed drainage problems, a need for mapping, floodplain analysis, and a ROW acquisition program. Soils in the area are highly erosive. | \$355K         | F  | N                            | F            | F                           | N                       | B                                      | No Change      |
| 20     | 3               | Design and construct American Business Park retention basins.   | \$150K         | F  | N                            | N            | F                           | N                       | B                                      | No Change      |





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| ID No. | Goals Addressed | Description  | Estimated Cost     | Favorable = F<br>Neutral = N<br>Less Favorable = L |                              |              |                             |                         | Action/<br>Project<br>Priority<br>Rank | 2022<br>Update |
|--------|-----------------|--|--------------------|--|------------------------------|--------------|-----------------------------|-------------------------|--|----------------|
|        |                 |  |                    | Technical<br>Feasibility                           | Regulatory<br>Administration | Cost/Benefit | Public/Political<br>Support | Environmental<br>Impact |  |                |
| 21     | 1, 3            | Design and construction project for infiltration basins on Rattlesnake Wash, West Kingman, and Grace Neal Channel/Mohave Wash. Project would be a joint venture between Mohave County and BLM or ASLD. | Varies by Location | F  | N                            | N            | F                           | N                       | B                                      | New project    |
| 22     | 3               | Perform floodplain mapping for Havasu Heights.   | \$183              | F  | F                            | F            | F                           | N                       | B                                      | No Change      |
| 23     | 3               | Perform floodplain mapping for Meadview.   | \$211              | F  | F                            | F            | F                           | N                       | B                                      | No Change      |
| 24     | 3               | Perform floodplain remapping in the unincorporated county portion of the North Kingman area (Stockton Hill Road project). Two-dimensional is recommended. Distributary flow patterns.                  | \$337              | F  | F                            | F            | F                           | N                       | A                                      | No Change      |







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| ID No. | Goals Addressed | Description   | Estimated Cost | Favorable = F<br>Neutral = N<br>Less Favorable = L |                              |              |                             |                         | Action/<br>Project<br>Priority<br>Rank | 2022<br>Update |
|--------|-----------------|---|----------------|--|------------------------------|--------------|-----------------------------|-------------------------|--|----------------|
|        |                 |   |                | Technical<br>Feasibility                           | Regulatory<br>Administration | Cost/Benefit | Public/Political<br>Support | Environmental<br>Impact |  |                |
| 25     | 3               | Perform floodplain remapping in the unincorporated county portion of the Valle Vista area including the Kingman Airport area. Two-dimensional is recommended. Distributary flow patterns. | \$314          | F  | F                            | F            | F                           | N                       | A                                      | New Project    |
| 26     | 1, 3            | Perform DCR for the Latigo Lane drainage issues in area in the City of Kingman.   | \$50K          | F  | F                            | F            | F                           | N                       | E                                      | No Change      |





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| ID No. | Goals Addressed | Description  | Estimated Cost | Favorable = F<br>Neutral = N<br>Less Favorable = L |                              |              |                             |                         | Action/<br>Project<br>Priority<br>Rank | 2022<br>Update |
|--------|-----------------|--|----------------|--|------------------------------|--------------|-----------------------------|-------------------------|--|----------------|
|        |                 |  |                | Technical<br>Feasibility                           | Regulatory<br>Administration | Cost/Benefit | Public/Political<br>Support | Environmental<br>Impact |  |                |
| 27     | 3               | The Railroad Channel Project would benefit from a HAZUS analysis to prepare for grant applications. This project involves the design and construction of approximately 6 miles of channels along US 66 and the Burlington Northern Santa Fe (BNSF) Railroad alignment to intercept runoff on the south side of the elevated BNSF Railroad tracks and convey it to the Rattlesnake Wash Bridge near the airport. Flow will then be conveyed under US 66, and then through existing drainage rights of way to Mohave Wash. | \$75K          | F  | N                            | F            | F                           | N                       | C                                      | No<br>Change   |





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| ID No. | Goals Addressed | Description  | Estimated Cost | Favorable = F<br>Neutral = N<br>Less Favorable = L |                              |              |                             |                         | Action/<br>Project<br>Priority<br>Rank | 2022<br>Update                 |
|--------|-----------------|--|----------------|--|------------------------------|--------------|-----------------------------|-------------------------|--|--------------------------------|
|        |                 |  |                | Technical<br>Feasibility                           | Regulatory<br>Administration | Cost/Benefit | Public/Political<br>Support | Environmental<br>Impact |  |                                |
| 28     | 3               | Jagerson Suffock: The purpose of this project is to widen Jagerson Avenue to improve access in the area while also providing drainage improvements. The portion of Jagerson Avenue from the Kingman City Limits to just past Bond Street will be widened and curb, gutter and sidewalk will be added to the north side of Jagerson Avenue in the area fronting Mohave Community College. | \$2.1M         | F  | N                            | F            | F                           | N                       | A                                      | Replaced by Grace Neal project |





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| ID No. | Goals Addressed | Description  | Estimated Cost | Favorable = F<br>Neutral = N<br>Less Favorable = L |                              |              |                             |                         | Action/<br>Project<br>Priority<br>Rank | 2022<br>Update |
|--------|-----------------|--|----------------|--|------------------------------|--------------|-----------------------------|-------------------------|--|----------------|
|        |                 |  |                | Technical<br>Feasibility                           | Regulatory<br>Administration | Cost/Benefit | Public/Political<br>Support | Environmental<br>Impact |  |                |
| 29     | 3               | Grace Neal Channel: Grace Neal Parkway is bordered on the north and south by undeveloped land, although subdivisions are being developed at the western side of the intersection of Banks St. and Grace Neal Parkway and another near Township 17 and Section 19 line called Eagle View. There are several washes crossing the existing alignment. Flooding issues in the north portion of Kingman will be reduced by intercepting the flows and conveying them the Mohave Wash in an improved channel | \$4.0M         | F  | N                            | N            | F                           | N                       | A                                      | No<br>Change   |
| 30     | 3               | Obtain topographic mapping for Golden Shores, Dolan Springs, Meadview, and Havasu Heights. Mapping could be used for future floodplain mapping and DCR analyses.   | \$0            | F  | F                            | F            | F                           | N                       | A                                      | No<br>Change   |





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*Table 6-6. Flood Risk Management Plan actions/projects implementation strategy*

| ID No. | Goals Addressed | Description   | Anticipated Completion Schedule | Primary Agency Responsible for Implementation | Funding Source(s) | 2022 Update |
|--------|-----------------|---|---------------------------------|---|-------------------|-------------|
| 1      | 1, 3            | Install flashing signage for key low water crossings on county-maintained highways at identified locations.             | by Year 2027                    | Public Works / FCD                            | HURF/FCD          | No Change   |
| 2      | 1, 3            | Identify, preliminarily size and prioritize drainage crossings along Stockton Hill Road                                 | by Year 2027                    | Public Works / FCD                            | HURF              | No Change   |
| 3      | 1, 3            | Identify, preliminarily size and prioritize drainage crossings along Pierce Ferry Road                                  | by Year 2027                    | Public Works / FCD                            | HURF              | No Change   |
| 4      | 1, 2, 3         | Pursue flood risk mapping and study funding through FEMA CTP program  | Annually                        | FCD   | FCD               | No Change   |
| 5      | 1, 2            | Pursue mitigation project funding through FEMA HMA programs (HMGP, BRIC, FMA)   | Annually                        | FCD   | FCD               | No Change   |
| 6      | 4               | Provide real time data to emergency management personnel during a response event  | On-going or As-Needed           | FCD / EM                                      | FCD               | No Change   |
| 7      | 4               | Facilitate opening and operation of the EOC/DOC and participate in both real time and practice exercises.               | On-going or As-Needed           | FCD / EM                                      | FCD               | No Change   |
| 8      | 1, 4            | Support Public Works Road Department with real time data for potential road closures.                                   | On-going or As-Needed           | FCD / EM / PW                                 | FCD               | No Change   |
| 9      | 1, 3, 4         | Provide hydrologic analysis for flooding issues associated with post-wildfire related floods during the wildfire event. | On-going or As-Needed           | FCD / EM                                      | FCD               | No Change   |
| 10     | 1, 3            | Maintain stormwater management plan/ordinance to satisfy the MS4 designation for Unincorporated areas of Mohave County. | On-going                        | FCD   | FCD               | No Change   |





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| ID No. | Goals Addressed | Description   | Anticipated Completion Schedule | Primary Agency Responsible for Implementation | Funding Source(s)                  | 2022 Update |
|--------|-----------------|---|---------------------------------|---|------------------------------------|-------------|
| 11     | 1, 3, 4         | Provide continued floodplain management assistance and help to incorporated communities.  | On-going or As-Needed           | FCD   | FCD                                | No Change   |
| 12     | 1, 2, 3         | Work with incorporated cities to pursue grant funds for flood control projects.   | On-going or As-Needed           | FCD   | FCD                                | No Change   |
| 13     | 1, 2, 3         | Collaborate with FEMA on a regional and national level regarding working with local jurisdictions.  | On-going or As-Needed           | FCD   | FCD                                | No Change   |
| 14     | 1, 3, 4         | Continued expansion and refinement of the county ALERT system by cooperating with Federal, Tribal, State and local agencies and officials.  | On-going or As-Needed           | FCD   | FCD with cost sharing as available | No Change   |
| 15     | 3               | Perform a DCR to analyze the drainage at Hillcrest and Stockton Hill Road. Known issues include undersized culverts, sediment deposition on the roads, and inadequate upstream drainage control.  | by Year 2027                    | City of Kingman                               | City of Kingman                    | No Change   |
| 16     | 3               | Perform a DCR to analyze the drainage at the intersection of Stockton Hill Road near the Shadow Mountain alignment. Known issues include a large box culvert that is not hydraulically connected to flood flows it is intended to convey. | by Year 2025                    | City of Kingman                               | City of Kingman                    | No Change   |
| 17     | 3               | Perform a DCR to analyze the drainage at the intersection of Western and Airway. Known drainage issues include a retention basin that is not hydraulically connected to flood flows .   | by Year 2027                    | City of Kingman                               | City of Kingman                    | No Change   |
| 18     | 3               | Perform a DCR to analyze the drainage in the area of Lead Street and Stockton Hill Avenue. Known issues include frequent flooding of homes, flooding of high school downstream, and the need for upstream retention basins.               | by Year 2027                    | City of Kingman                               | City of Kingman                    | No Change   |







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| ID No. | Goals Addressed | Description   | Anticipated Completion Schedule | Primary Agency Responsible for Implementation | Funding Source(s) | 2022 Update |
|--------|-----------------|---|---------------------------------|---|-------------------|-------------|
| 19     | 3               | Perform floodplain analysis for the Golden Shores watershed. Known issues include widespread, unanalyzed drainage problems, a need for mapping, floodplain analysis, and a ROW acquisition program. Soils in the area are highly erosive. | As funded by FEMA CTP           | FCD   | FCD               | No Change   |
| 20     | 3               | Design and construct American Business Park retention basins.   | by Year 2027                    | FCD   | FCD               | No Change   |
| 21     | 1, 3            | Design and construction project for infiltration basins on Rattlesnake Wash, West Kingman, and Grace Neal Channel/Mohave Wash. Project would be a joint venture between Mohave County and BLM or ASLD.                                    | by Year 2027                    | FCD   | FCD / HMGP / BRIC | No Change   |
| 22     | 3               | Perform floodplain mapping for Havasu Heights.  | by Year 2026                    | FCD   | FCD / CTP grant.  | No Change   |
| 23     | 3               | Perform floodplain mapping for Meadview.  | by Year 2027                    | FCD   | FCD / CTP grant.  | New Project |
| 24     | 3               | Perform floodplain remapping in the unincorporated county portion of the North Kingman area (Stockton Hill Road project). Two-dimensional is recommended. Distributary flow patterns.   | by Year 2025                    | FCD   | FCD / CTP grant.  | No Change   |
| 25     | 3               | Perform floodplain remapping in the unincorporated county portion of the Valle Vista area including the Kingman Airport area. Two-dimensional is recommended. Distributary flow patterns.   | by Year 2025                    | FCD   | FCD / CTP grant.  | New Project |
| 26     | 1, 3            | Perform DCR for the Latigo Lane drainage issues in area in the City of Kingman.   | by Year 2027                    | City of Kingman                               | City of Kingman   | No Change   |





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| ID No. | Goals Addressed | Description  | Anticipated Completion Schedule | Primary Agency Responsible for Implementation | Funding Source(s) | 2022 Update |
|--------|-----------------|--|---------------------------------|---|-------------------|-------------|
| 27     | 3               | The Railroad Channel Project would benefit from a HAZUS analysis to prepare for grant applications. This project involves the design and construction of approximately 6 miles of channels along US 66 and the Burlington Northern Santa Fe (BNSF) Railroad alignment to intercept runoff on the south side of the elevated BNSF Railroad tracks and convey it to the Rattlesnake Wash Bridge near the airport. Flow will then be conveyed under US 66, and then through existing drainage rights of way to Mohave Wash. | by Year 2027                    | FCD   | FCD               | No Change   |
| 28     | 3               | Jagerson Suffock: The purpose of this project is to widen Jagerson Avenue to improve access in the area while also providing drainage improvements. The portion of Jagerson Avenue from the Kingman City Limits to just past Bond Street will be widened and curb, gutter and sidewalk will be added to the north side of Jagerson Avenue in the area fronting Mohave Community College.   | by Year 2027                    | FCD   | FCD / PDM         | No Change   |
| 29     | 3               | Grace Neal Channel: Grace Neal Parkway is bordered on the north and south by undeveloped land, although subdivisions are being developed at the western side of the intersection of Banks St. and Grace Neal Parkway and another near Township 17 and Section 19 line called Eagle View. There are several washes crossing the existing alignment. Flooding issues in the north portion of Kingman will be reduced by intercepting the flows and conveying them the Mohave Wash in an improved channel                   | by Year 2027                    | FCD   | FCD / Grants      | No Change   |





**MOHAVE COUNTY  
FLOOD RISK MANAGEMENT PLAN**

2022

| <b>ID No.</b> | <b>Goals Addressed</b> | <b>Description</b>   | <b>Anticipated Completion Schedule</b> | <b>Primary Agency Responsible for Implementation</b> | <b>Funding Source(s)</b> | <b>2022 Update</b> |
|---------------|------------------------|--|--|--|--------------------------|--------------------|
| 30            | 3                      | Obtain topographic mapping for Golden Shores, Dolan Springs, Meadview, and Havasu Heights. Mapping could be used for future floodplain mapping and DCR analyses. | by Year 2023                           | FCD  | FCD / FEMA Grants        | No Change          |





## SECTION 7: REVIEW AND UPDATE STRATEGY

### 7.1 Annual Reviews

Mohave County recognizes that the FRMP is intended to be “living” document, which will require regular monitoring, evaluation and revisions as needed to keep the FRMP effective, relevant, and reflective of the flood risk management within the county. It is also understood that FEMA CRS requires this FRMP to be evaluated on at least an annual basis, with a full revision of the FRMP every five years. Accordingly, the county has established the following monitoring and evaluation procedures for the annual reviews of the FRMP:

- **Schedule** – The FRMP shall be reviewed on at least an annual basis or following a major flood related disaster. Mohave County Flood Control District will take the lead in initiating the annual review and will work to reconvene the Advisory Committee in or around the month of August. The Advisory Committee will perform an annual review of the FRMP per the scope listed below. MCFCD will document the meeting discussions in a report that will be completed by the end of September. The report will also be included in Appendix E for future reference at the five year update.
- **Review Content** – The reconvened Advisory Committee will methodically evaluate each section of FRMP with a focus on answering the following questions:
  - **Flood Hazard Identification:**
    - *Have the flood risks and hazard areas changed significantly since the last evaluation?*
    - *Has there been any significant flooding events over the last year? If so, describe the event and note the effectiveness of any existing drainage facilities were impacted.*
  - **Goals and objectives:**
    - *Are the goals and objectives still able to address current and expected conditions?*
  - **Mitigation Projects and Actions:**
    - *Has the project status changed since the last review? If so, please note the A/P progress and describe any details of the implementation to date.*
    - *Tables 6.5 and 6.6 will be updated to reflect:*
      - *Changes in priority, schedule, funding or other considerations to A/Ps already listed.*
      - *Addition of new A/Ps*
      - *Deletion of A/Ps that are no longer valid or have been completed by the county.*

The report from the review meeting will be provided to Board of Supervisors for information and approval, posted to MCFCD website, and a press release announcement of the reports availability will be made.





## **7.2 Five Year Update**

The FRMP will be completely updated once every five years. The following steps will be taken to perform that update:

- Nine months before the FRMP expiration date, MCFCD will reconvene the Advisory Committee and coordinate the scheduling of at least three planning meetings to work through the 10 Step planning process.
- Public notices and press releases announcing the start of the FRMP update process will be issued using the social and traditional media outlets. The public notice will also be included on the Mohave County website. The public will be invited to review the existing FRMP and provide comment to MCFCD.
- MCFCD will take the lead in preparing the updated FRMP document and coordinating the planning effort with other jurisdictions and agencies as appropriate.
- The updated FRMP will be presented to the Board of Supervisors for approval and official adoption via resolution.
- The updated FRMP will be uploaded to the MCFCD website for public viewing and comment.





## SECTION 8: RESOURCES

### 8.1 Bibliography

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

FEMA, 2013, *National Flood Insurance Program Community Rating System Coordinator's Manual*, FIA-15/2017, OMB No. 1660-0022, Expires: March 31, 2020.

FEMA, 2021, *National Flood Hazard Layer*. Accessed January 2022.  
<https://msc.fema.gov/portal/advanceSearch>

Mohave County, 2015, *Mohave County, Arizona General Plan*, original text by Freilich, Leitner & Carlisle, March 1995.

Mohave County, 2022, *Mohave County Multi-Jurisdictional Hazard Mitigation Plan*, prepared by Mohave County

Mohave County, 2012, *Drainage Design Manual for Mohave County*, second edition.

Mohave County Flood Control District, 2015, *Flood Awareness*

### 8.2 Resources

The following are resources for flood related information:

Arizona Department of Water Resources

<http://www.azwater.gov/azdwr/default.aspx>

Arizona Division of Emergency Management

<http://www.dem.azdema.gov/>

Federal Emergency Management Agency Coordinated Needs Management Strategy

<http://www.fema.gov/library/viewRecord.do?id=4628>

Federal Emergency Management Agency Grant Programs

<http://www.fema.gov/grants>

Federal Emergency Management Agency Hazard Mitigation Grant Program

<http://www.fema.gov/hazard-mitigation-grant-program>

Federal Emergency Management Agency Multi-Hazard Mitigation Program

<http://www.fema.gov/multi-hazard-mitigation-planning>

Federal Emergency Management Agency National Flood Insurance Program

<http://www.fema.gov/national-flood-insurance-program>







## MOHAVE COUNTY FLOOD RISK MANAGEMENT PLAN

2022

Federal Emergency Management Agency Risk Mapping, Assessment, and Planning  
<http://www.fema.gov/risk-mapping-assessment-planning>

United States Code of Federal Regulation – Title 44  
<http://www.gpo.gov/fdsys/pkg/CFR-2002-title44-vol1/content-detail.html>

### 8.3 Plan Acronyms

|                |  |
|----------------|--|
| A/P .....      | Mitigation Action/Project                            |
| ADEM .....     | Arizona Division of Emergency Management             |
| ADEQ .....     | Arizona Department of Environmental Quality          |
| ADWR .....     | Arizona Department of Water Resources                |
| AGFD .....     | Arizona Game and Fish Department                     |
| AOMI.....      | Area of Mitigation Interest                          |
| 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                         |
| CFI .....      | Critical Facilities and Infrastructure               |
| CFR .....      | Code of Federal Regulations                          |
| CIAO.....      | Critical Infrastructure Assurance Office             |
| CIP .....      | Capital Improvement Program                          |
| CRS .....      | Community Rating System                              |
| CWPP .....     | Community Wildfire Protection Plan                   |
| DCR .....      | Design Concept Report                                |
| 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   |
| FEMA .....     | Federal Emergency Management Agency                  |
| FMA.....       | Flood Mitigation Assistance Grant Program            |
| FRMP.....      | Flood Risk Management Plan                           |
| GIS .....      | Geographic Information System                        |
| HAZMAT .....   | Hazardous Material                                   |
| HAZUS-MH ..... | Hazards United States Multi-Hazard                   |





## MOHAVE COUNTY FLOOD RISK MANAGEMENT PLAN

2022

|             |   |
|-------------|---|
| HUC .....   | Hydrologic Unit Code                            |
| IFCI .....  | International Fire Code Institute               |
| LEPC .....  | Local Emergency Planning Committee              |
| MCEM.....   | Mohave County Emergency Management              |
| MCFCD.....  | Mohave County Flood Control District            |
| MJHMP ..... | Multi-Jurisdictional Hazard Mitigation Plan     |
| MS4 .....   | Municipal Separate Storm Sewer System           |
| NCDC .....  | National Climate Data Center                    |
| NFIP .....  | National Flood Insurance Program                |
| NFPA .....  | National Fire Protection Association            |
| NIBS .....  | National Institute of Building Services         |
| NID .....   | National Inventory of Dams                      |
| NSF .....   | National Science Foundation                     |
| NOAA .....  | National Oceanic and Atmospheric Administration |
| NWS .....   | National Weather Service                        |
| PPI .....   | Program for Public Involvement                  |
| PWD .....   | Mohave County Public Works Department           |
| RL .....    | Repetitive Loss                                 |
| SFHA.....   | Special Flood Hazard Area                       |
| 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                        |

**Appendix A: Official Board of Supervisors Adoption**

**Appendix B: Planning Process Documentation**

**Appendix C: Detailed Historic Hazard Records**

**Appendix D: Flood Hazard and Problem Area Maps**

**Appendix E: Annual FRMP Review Reports**





## **APPENDIX A**

### **Official Board of Supervisors Adoption**

# MOHAVE COUNTY REQUEST FOR BOARD ACTION FORM

FROM: Timothy M. Walsh Jr., P.E., Development Services Director  
CONTACT/EXT: Kat Fish, Floodplain Programs Manager, Ext. 5851

DATE: April 5, 2022

BOS MEETING DATE: ~~April 18, 2022~~

May 2, 2022

FORMAL ACTION: ☐  
CONSENT ☒  
RESOLUTION ☐  
OTHER ☐  
INFORMATION ONLY ☐

## SUMMARIZE THE ISSUE & DESIRED ACTION CLEARLY/ATTACH BACKUP MATERIAL:

Request to set a Public Hearing for May 2, 2022, to consider the approval and adoption of the Flood Risk Management Plan (FRMP) document.

## RECOMMENDED MOTION:

**Sitting as the Board of Directors for the Mohave County Flood Control District:** set a Public Hearing for May 2, 2022, to consider the approval and adoption of the Flood Risk Management Plan (FRMP) update document as an overall strategy of programs, projects, and measures that will reduce the adverse impact of flood related hazards on the community and increase the community resilience to future flooding events.

## Reviewed and Approved By:

County Attorney ☒

Human Resources ☐

Finance ☐

County Manager ☒

## Board Action Taken:

Approved as Requested ☒

No Action Taken ☐

Disapproved ☐

Continued to May 2, 2022

☐ Approved with the following changes:

Acknowledged receipt and referred to: \_\_\_\_\_

## Filing Information and Retrieval

|   |                                   |
|---|-----------------------------------|
| Filed Bid _____                                 | Filed Agreement <u>2717A</u>      |
| BOS Resolution _____                            | Filed Yearly Correspondence _____ |
| Filed Petition _____                            | Filed Dedication _____            |
| Filed Land Sold _____                           | Filed Land Acquired _____         |
| Filed Franchise _____                           | ID Resolution _____               |
| Filed Improvement District <u>Flood Control</u> | Filed Other _____                 |

Date Routed: 4-19-22

Additional Information:

XC:

**X 40**

# MOHAVE COUNTY REQUEST FOR BOARD ACTION FORM

NSH

FROM: Nicholas S. Hont, P.E., Development Services Director  
 CONTACT/EXT: Shannon Summers, C.F.M. EX 5851  
 DATE: February 22, 2016  
 BOS MEETING DATE: March 21, 2016

FORMAL ACTION: ☒  
 CONSENT ☐  
 RESOLUTION ☐  
 OTHER ☐  
 INFORMATION ONLY ☐

## SUMMARIZE THE ISSUE & DESIRED ACTION CLEARLY/ATTACH BACKUP MATERIAL:

The Mohave County Flood Control District has determined that the development of a Flood Risk Management Plan that defines and documents our overall strategy of programs, projects, and measures aimed at reducing the adverse impact of flood related hazards and increasing community resilience to future flooding events, would further our goals of flood risk management.

As a participant in FEMA's Community Rating System (CRS), one of the benefits of this planning process and resulting plan is the receipt of additional credit under Section 510 of the CRS program, which will help to achieve recertification of Mohave County's Class 6 rating. This recertification will help to maintain the benefit County residents currently receive of a 20% discount on their flood insurance premiums if they are located in a FEMA high-risk area and a 10% discount if they are located in a FEMA moderate-to-low-risk area.

## RECOMMENDED MOTION:

**Sitting as the Board of Directors for the Mohave County Flood Control District:** Approve and adopt the Flood Risk Management Plan (FRMP) document as an overall strategy of programs, projects, and measures that will reduce the adverse impact of flood related hazards on the community and increase the community resilience to future flooding events. According to the draft Community Rating System (CRS) verification report received from the FEMA Insurance Services Office (ISO) on March 7th, 2016, Mohave County has a possible total of 2196 points contingent on the adoption of the FRMP (CRS Activity 510). The plan will provide 215 points toward Mohave County's CRS recertification, assuring that Mohave County will maintain our CRS Class 6 rating, which requires a minimum of 2000 points. The Class 6 rating provides a 20% discount on flood insurance premiums for County residents located in a FEMA high-risk area and a 10% discount if they are located in a FEMA moderate-to-low-risk area.

## Reviewed and Approved By:

County Attorney ☒ Human Resources ☐ Finance ☐ County Administrator ☒

## Board Action Taken:

Approved as Requested ☒ No Action Taken ☐ Disapproved ☐  
 Continued to \_\_\_\_\_ ☐ Approved with the following changes:

Acknowledged receipt and referred to: \_\_\_\_\_

## Filing Information and Retrieval

|   |                                   |
|---|-----------------------------------|
| Filed Bid _____                                 | Filed Agreement _____             |
| BOS Resolution _____                            | Filed Yearly Correspondence _____ |
| Filed Petition _____                            | Filed Dedication _____            |
| Filed Land Sold _____                           | Filed Land Acquired _____         |
| Filed Franchise _____                           | ID Resolution _____               |
| Filed Improvement District <u>Flood Control</u> | Filed Other _____                 |

Date Routed: 3-22-16  
 Additional Information:

XC:

CS Perez



## **APPENDIX B**

### **Planning Process Documentation**





# MOHAVE COUNTY FLOOD CONTROL DISTRICT

## DEPARTMENT OF DEVELOPMENT SERVICES

P. O. Box 7000, Kingman, Arizona 86402-7000 3250 E Kino Ave, Kingman, AZ 86409 Telephone (928) 757-0925

FAX (928) 757-0912

[www.mohavecounty.us](http://www.mohavecounty.us)

**Paul Baughman, P.E.**  
**Flood Control District Engineer**

**Sam Elters, P.E.**  
**County Manager**

### **Mohave County Flood Risk Management Plan Update Planning Team Meeting Notes November 3, 2021**

## **MEETING NO. 1**

**FROM:** Mike Kellogg – JE Fuller

**MEETING TIME:** 9:00 am to 10:20 am

**MEETING TYPE:** Virtual via Zoom

#### **ATTENDEES:**

|                  |  |
|------------------|--|
| Phillip Allred   | City of Kingman                        |
| Katherine Fish   | Mohave County Flood Control District   |
| Randall Gremlich | Mohave County Engineering              |
| Sergio Gudino    | Mohave County Public Works             |
| Jon Ortman       | Mohave County Flood Control District   |
| Kathy Ortman     | Realtor                                |
| Cullin Patillo   | Mohave County Environmental Protection |
| Gilbert Smaby    | Mohave County Building Department      |
| Byron Steward    | Mohave County Emergency Management     |
| Mike Kellogg     | JE Fuller, Inc. (Project Consultant)   |
| Cole Cooper      | JE Fuller, Inc. (Project Consultant)   |





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**Sam Elters, P.E.**  
County Manager

### AGENDA

#### 1. INTRODUCTIONS

#### 2. CRS 510 PLANNING PROCESS OVERVIEW

- Step 1. Organize
- Step 2. Involve the public
- Step 3. Coordinate
- Step 4. Assess the hazard
- Step 5. Assess the problem
- Step 6. Set goals
- Step 7. Review possible activities
- Step 8. Draft an action plan
- Step 9. Adopt the plan
- Step 10. Implement, evaluate, revise

#### 3. PUBLIC INVOLVEMENT STRATEGY (STEP 2)

- a. **Public Outreach Mechanisms (Digital, Public Notification)**
  - i. “Public” defined by FEMA as: residents, businesses, property owners, tenants, contractors, civic groups, academia, non-profits in the floodplain or involved with activities within the floodplain.

#### 4. AGENCY COORDINATION (STEP 3)

- a. **Identify Non-Mohave County organizations and agencies**
  - i. Kingman, Bullhead City, Lake Havasu City, Colorado City
  - ii. Others?
- b. **Solicit flood information**

#### 5. FLOOD HAZARD MANAGEMENT DATA REVIEW / ASSESSMENT (PRE STEP 4)

- a. **Studies / Plans / Hazard Mapping**
  - i. FEMA FIS Studies, Risk MAP Discovery, Watershed Plans, USBR Dam Failure, Mohave County MJHMP, Others?
- b. **Programs / Regulatory / Outreach**





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**County Manager**

- i. MCFCFCD Website, Development Review / Permitting Process, ALERT / Gage Information, PMR Meetings, Others?

**c. Major Flood Control Projects (last 5-years)**

**6. NEXT MEETING PREPARATION**

**a. GIS tour of Mohave County**

- i. Incidents that have occurred during the last plan cycle
- ii. Less frequent flood assessments
- iii. Assessment of areas most likely to flood
- iv. Assessment of other natural hazards that have a nexus with flooding such as drought, dam and levee failures, and wildfire





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### DISCUSSION NOTES:

#### **Agenda Item 1 (Introductions):**

After brief introductions, Mike Kellogg of JE Fuller provided a general overview of the CRS 510 planning process, the Community Rating System (CRS) program, and each of the 10 planning process steps. Mike then explained how the steps fit into the Planning Team's meeting agenda.

#### **Agenda Item 2 (CRS 510 Planning Process Overview):**

Mike Kellogg provided an overview of CRS Section 510 as being a plan to reduce flood risk by providing a series of strategies and plans throughout the CRS community. FEMA requirements for the CRS 510 plan were also discussed.

The CRS program rankings and community benefits were then explained in detail by Mike.

#### **Agenda Item 3 (Public Involvement Strategy):**

An overview of the Public Involvement elements and strategies were presented by Mike. The planning team then reviewed and discussed the overall public involvement strategy pertaining to the planning process and brainstormed the various opportunities.

Mohave County provided a run-down of their current efforts and programs in place for engaging the public as it relates to community flood risk, floodplain mapping, planning updates, etc. These efforts include:

- Leveraging advertisements and display ads in newspapers throughout the County
- An active mailing list for notifications
- Announcements via the Mohave County Flood Control District's website

Gilbert Smaby mentioned that the community BCEGS (Building Code Effectiveness Grading Schedule) rating is expected to drop to either a 2 or 3 and is wondering if this would have any impact on the CRS rating.

#### ***Action Items:***

- *Mohave County Flood Control to issue an announcement on their website regarding the current plan update.*
- *JE Fuller to verify if the expected BCEGS rating reduction provides any benefit to overall CRS ranking.*





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### **Agenda Item 4 (Agency Coordination):**

The team discussed non-Mohave County agencies and organizations that could be contacted for potential coordination related to flood risk mitigation and planning.

New agencies and organizations recommended by the planning team include the following:

- Fort Mohave Indian Tribe
- Arizona Dept. of Transportation
- State Dept. of Real Estate
- Arizona State Land Dept.
- Bureau of Land Management
- Army Corps of Engineers
- Bureau of Reclamation
- Virgin River Domestic Wastewater Improvement District
- Washington County

Other items to note:

- Kingman is its own NFIP community. However, floodplain management in Kingman is moderated by Mohave County Flood Control District.
- Fort Mohave Indian Community recently became their own NFIP community.

### ***Action Items:***

- *JE Fuller to contact adjacent communities (listed above) and discuss possible partnering opportunities / working relationships with Mohave County Flood Control District.*

### **Agenda Item 5 (Flood Hazard Management Data Review / Assessment (Pre-Step 4)):**

Mike explained some of the steps involved in identifying flood risk areas, floodplains, and determining the need for flood control projects and how this relates to the CRS Section 510 efforts. The group discussed the types of data being sought under this category (see bullet 5 above) for future phases of this update.

Mike solicited feedback from group pertaining to studies, projects, or programs that should be included in the update. The Cooperating Technical Partners (CTP) program was mentioned, and the group discussed whether that should be included separately (outside of FIS program) in the update to the Flood Risk Management Plan (FRMP). The group agreed to keep them lumped together but plan to add a section to the FRMP detailing the CTP program itself.

Jon Ortman and Kat Fish discussed the possible funding of the Grace Neal Channel and Colorado City culvert projects through FEMA BRIC grants. The group determined that these projects should be included in the FRMP update.





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Mike explained to the group that JE Fuller will be contacting adjacent agencies about their active or anticipated regulatory/outreach programs for flood risk mitigation and planning that may benefit or impact Mohave County.

The group also generally discussed the County's flood map web viewer, what resources are available through it, and how it benefits the community and Mohave County residents.

The group also briefly discussed physical map revisions (PMRs), and how the public is affected by map revisions. The group also discussed how the public is involved in and notified about PMRs within Mohave County.

### ***Action Items:***

- *JE Fuller will coordinate with adjacent communities to identify their major projects or programs that would ultimately have an impact on the flooding risk in Mohave County.*
- *JE Fuller will coordinate with adjacent communities to inquire about how they are interacting with their residents as it relates to PMRs.*
- *City of Kingman to provide information relating to flood projects and project data from the last 5 years, not currently included in the effective (2015) FRMP.*

### **Agenda Item 6 (Next Meeting Preparation):**

Mike gave an overview of the structure for the next planning meeting. The next meeting will include a GIS tour of the spatial data sets depicted in the current FRMP. During the tour the group will review and discuss the relevance of the 2015 data, remove areas that no longer apply, and add areas where necessary.

Mike requested that everyone familiarize themselves with the items listed under bullet 6 (above) prior to the next meeting. It was recommended that any findings (data, pictures, etc.) to be considered during the next meeting be sent to Mike ahead of time so they can be incorporated into the GIS tour and discussion agenda beforehand.

Kat Fish brought to the group's attention that the FEMA flood insurance program is changing. Instead of using FIRM maps, they are going to implement a system where flood risk is determined by flood source distance, structure height, etc. and asked if this is something that needs to be mentioned in the plan update. The group agreed that this does need to be integrated into the plan update.

Meeting frequency was discussed, and the group agreed on convening every 2 to 3 weeks.

### ***Action Items:***

- *JE Fuller to send out email poll for next meeting data and time.*
- *All to be familiar with categories listed under agenda item 6 for next meeting.*







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**Sam Elters, P.E.**  
**County Manager**

### **Mohave County Flood Risk Management Plan Update Planning Team Meeting Agenda December 1, 2021, 1:00pm**

## **MEETING NO. 2**

**FROM:** Mike Kellogg – JE Fuller

**MEETING TIME:** 1:00pm to 2:08 pm

**MEETING TYPE:** Virtual via Zoom

#### **ATTENDEES:**

|                  |  |
|------------------|--|
| Phillip Allred   | City of Kingman                        |
| Katherine Fish   | Mohave County Flood Control District   |
| Roger Galloway   | Mohave County Public Information       |
| Randall Gremlich | Mohave County Engineering              |
| Sergio Gudino    | Mohave County Public Works             |
| Scott Holtry     | Mohave County Planning/Zoning          |
| David Martin     | Fire Chief                             |
| Jon Ortman       | Mohave County Flood Control District   |
| Kathy Ortman     | Realtor                                |
| Cullin Patillo   | Mohave County Environmental Protection |
| Pete Proffit     | Engineer                               |
| Gilbert Smaby    | Mohave County Building Department      |
| Michael Smith    | Mohave County Community Services       |
| Byron Steward    | Mohave County Emergency Management     |
| Kathy Zach       | Title Company                          |
| Mike Kellogg     | JE Fuller, Inc. (Project Consultant)   |
| Cole Cooper      | JE Fuller, Inc. (Project Consultant)   |





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Sam Elters, P.E.  
County Manager

### 1. REVIEW STEPS

- a. Step 1. Organize ✓
- b. Step 2. Involve the public ✓
- c. Step 3. Coordinate ✓
- d. Step 4. Assess the hazard
- e. Step 5. Assess the problem
- f. Step 6. Set goals
- g. Step 7. Review possible activities
- h. Step 8. Draft an action plan
- i. Step 9. Adopt the plan
- j. Step 10. Implement, evaluate, revise

### 2. FLOOD HAZARD PROFILE ASSESSMENT (STEP 4)

- a. GIS Tour
  - i. Review previous flood risk areas
    - 1. Have the risks been mitigated to-date?
  - ii. Incidents that have occurred during the last plan cycle
  - iii. Assessment of areas most likely to flood
    - 1. SFHAs
      - a. FEMA Effective
      - b. Pending Effective
    - 2. Any others?
  - iv. Repetitive loss areas
  - v. Assessment of other natural hazards that have a nexus with flooding:
    - 1. Dams
    - 2. Levees
    - 3. Wildfire





# MOHAVE COUNTY FLOOD CONTROL DISTRICT

## DEPARTMENT OF DEVELOPMENT SERVICES

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FAX (928) 757-0912

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**Paul Baughman, P.E.**  
**Flood Control District Engineer**

**Sam Elters, P.E.**  
**County Manager**

### **Mohave County Flood Risk Management Plan Update Planning Team Meeting Agenda January 5, 2022. 1:00pm**

## **MEETING NO. 3**

**FROM:** Mike Kellogg – JE Fuller

**MEETING TIME:** 1:00pm to 2:10 pm

**MEETING TYPE:** Virtual via Zoom

#### **ATTENDEES:**

|                  |  |
|------------------|--|
| Phillip Allred   | City of Kingman                        |
| Katherine Fish   | Mohave County Flood Control District   |
| Randall Gremlich | Mohave County Engineering              |
| Sergio Gudino    | Mohave County Public Works             |
| Scott Holtry     | Mohave County Planning/Zoning          |
| Jon Ortman       | Mohave County Flood Control District   |
| Kathy Ortman     | Realtor                                |
| Cullin Patillo   | Mohave County Environmental Protection |
| Gilbert Smaby    | Mohave County Building Department      |
| Michael Smith    | Mohave County Community Services       |
| Byron Steward    | Mohave County Emergency Management     |
| Kathy Zach       | Title Company                          |
| Mike Kellogg     | JE Fuller, Inc. (Project Consultant)   |
| Cole Cooper      | JE Fuller, Inc. (Project Consultant)   |





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County Manager

### 1. REVIEW STEPS

- a. Step 1. Organize ✓
- b. Step 2. Involve the public ✓
- c. Step 3. Coordinate ✓
- d. Step 4. Assess the hazard ✓
- e. Step 5. Assess the problem ✓
- f. Step 6. Set goals
- g. Step 7. Review possible activities
- h. Step 8. Draft an action plan
- i. Step 9. Adopt the plan
- j. Step 10. Implement, evaluate, revise

### 2. FLOOD HAZARD PROFILE ASSESSMENT (STEP 4)

- a. GIS Tour Cont.
  - i. Incidents that have occurred during the last plan cycle
  - ii. Assessment of areas most likely to flood
    - 1. SFHAs
      - a. FEMA Effective
      - b. Pending Effective
    - 2. Any others?
  - iii. Repetitive loss areas

### 3. REVIEW AND REVISE GOALS (STEP 6)

- a. GOAL 1: Pursue continued coordination and cooperation among agencies and jurisdictions with floodplain management responsibilities and interest in Mohave County.
  - i. Strong coordination between Mohave County FC and agencies/cities to share and evaluate flood risk since 2015.
- b. GOAL 2: Identify and pursue all reasonable avenues of funding for implementing flood risk reduction activities.
  - i. Funding avenues that have been investigated:
    - 1. FEMA BRIC grants (design and construction projects)
    - 2. FEMA CTP Program (studies)





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3. HMGP (design and construction projects)
4. Disaster Declaration (State or Federal) grants
- c. **GOAL 3: Actively identify and implement projects and activities that reduce or eliminate flood risk in Mohave County.**
  - i. Keep as-is
- d. **GOAL 4: Coordinate with and support emergency management with data and services to aid in effective flood hazard related emergency response.**
  - i. High-level of coordination between FC and DEM. Past examples:
    1. Beaver Dam Wash
    2. Golden Valley
    3. Flag Fire area
  - ii. FC continues to maintain and expand the flood warning network to help DEM decision making.
  - iii. Low water crossing real-time warning/road closure.
- e. **GOAL 5: Perform and strategize public outreach and involvement activities and projects per the CRS Activity 330 Program for Public Information (PPI) Committee recommendations.**
  - i. Keep as-is

**DISCUSSION NOTES:**





# MOHAVE COUNTY FLOOD CONTROL DISTRICT

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### **Agenda Item 1 (Review Steps):**

After a brief review of the CRS section 510 Planning Process, Mike Kellogg of JE Fuller directed the conversation to discuss agenda item 2, being the flood hazard profile assessment.

### **Agenda Item 2 (Flood Hazard Profile Assessment):**

Mike Kellogg facilitated a virtual GIS tour showcasing several digital databases depicting areas of concern and possible flood hazard areas throughout Mohave County. Feedback was solicited from the Planning Team to confirm the validity and status of known and suspected hazard areas documented in the 2015 FRMP. New flood hazards were identified, and pertinent information is listed below:

- Holy Moses Wash
  - Hazard area located near Shinarump Road and the Oatman Highway.
  - The current crossing is a 5-barreled CMP culvert. 2 years ago, a storm occurred, overtopping the culvert and washed a vehicle off the road resulting in a fatality.
  - Mohave County desires to set up warning signals in addition to the camera that was recently installed.
  - Mohave County noted that the watershed isn't gaged well, and that the watershed is currently being studied to identify new strategic ALERT station locations.
- Pine Lake
  - Community recently impacted by the Flag Fire.
  - Mohave County is looking to upgrade dozens of culverts in this community to accommodate the post-fire flow rates.
- Dakota Road (east of Cherokee St/Kingman city limits)
  - Flooding occurs in this area originating east of Cherokee St and south (upstream) of Dakota Rd.
  - Properties north of Southern Ave have been flooded as recently as Fall of 2021.
  - Water has been observed to flow down Diamond Spur St and enters Rawhide Dr after Louise Ave.

### **Agenda Item 3 (Review and Revise Goals):**







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The goals listed under Agenda Item 3 were discussed and no changes were recommended for goals 1, 3, 4, and 5. The Planning Team agreed to update goal 2 to include additional funding avenues (listed under bullet 3.b.i. ).

### **Action Items:**

Jon Ortman to provide JE Fuller with Mohave County service request document.





## **APPENDIX C**

### **Detailed Historic Hazard Records**

| Event Date | Hazard      | Description   | Location         | Fatalities | Injuries | Damage Estimates |       |          |
|------------|-------------|---|------------------|------------|----------|------------------|-------|----------|
|            |             |   |                  |            |          | Property         | Crops | Total    |
| 11/22/1996 | Flash Flood | Heavy rain created flash flooding in Kingman causing street closures and some road damage. A few cars were abandoned but no injuries were reported. Also, the combination of rain and hail produced slippery roads resulting in numerous automobile accidents.  | Kingman          | 0          | 0        | \$50,000         | \$0   | \$50,000 |
| 11/22/1996 | Flash Flood | Thunderstorms 10 to 20 miles west of Kingman, Az, produced heavy rains which caused flash flooding in the Golden Valley. Some roads were made impassable by the flooding.   | Kingman          | 0          | 0        | \$0              | \$0   | \$0      |
| 8/7/1997   | Flash Flood | A cluster of severe thunderstorms raked Lake Havasu City between 5:50 and 6:25 PM MST. Wind from the storms reportedly ripped trees out of the ground, downed power lines, and tore tiles from roofs. The city was also pelted with heavy rain and 3/4 inch diameter hail on the south side of town and up to one inch diameter hail on the north side. Subsequent flash flooding of washes swept away several vehicles and required swift water rescues of the occupants. No serious injuries were reported. | Lake Havasu City | 0          | 0        | \$30,000         | \$0   | \$30,000 |

| Event Date | Hazard      | Description   | Location | Fatalities | Injuries | Damage Estimates |       |           |
|------------|-------------|---|----------|------------|----------|------------------|-------|-----------|
|            |             |   |          |            |          | Property         | Crops | Total     |
| 8/9/1997   | Flash Flood | Severe thunderstorms with very heavy rain began over central Mohave County around 12:30 am and ended around 2:30 am MST. Washes rapidly filled in the vicinity of Kingman and several roads were washed out. At least two cars were caught in a flooded wash and their four occupants had to be rescued by helicopter. Also, one woman was found dead hours later in a sewer drainage pond. It is unknown how she was caught in the flood waters. Another serious result occurred a few hours after the storms ended when a passenger train derailed while crossing a small bridge damaged and weakened by flood waters. Of the 302 passengers and crew members aboard, 116 were injured and of those eight sustained serious injuries. | Kingman  | 1          | 4        | \$100,000        | \$0   | \$100,000 |
| 8/9/1997   | Flash Flood | Severe thunderstorms with very heavy rain began over central Mohave County around 12:30 am and ended around 2:30 am MST. Washes rapidly filled in the vicinity of Kingman and several roads were washed out. At least two cars were caught in a flooded wash and their four occupants had to be rescued by helicopter. Also, one woman was found dead hours later in a sewer drainage pond. It is unknown how she was caught in the flood waters. Another serious result occurred a few hours after the storms ended when a passenger train derailed while crossing a small bridge damaged and weakened by flood waters. Of the 302 passengers and crew members aboard, 116 were injured and of those eight sustained serious injuries. | Kingman  | 0          | 0        | \$10,000         | \$0   | \$10,000  |

| Event Date | Hazard      | Description   | Location   | Fatalities | Injuries | Damage Estimates |       |          |
|------------|-------------|---|------------|------------|----------|------------------|-------|----------|
|            |             |   |            |            |          | Property         | Crops | Total    |
| 8/9/1997   | Flash Flood | Severe thunderstorms with very heavy rain began over central Mohave County around 12:30 am and ended around 2:30 am MST. Washes rapidly filled in the vicinity of Kingman and several roads were washed out. At least two cars were caught in a flooded wash and their four occupants had to be rescued by helicopter. Also, one woman was found dead hours later in a sewer drainage pond. It is unknown how she was caught in the flood waters. Another serious result occurred a few hours after the storms ended when a passenger train derailed while crossing a small bridge damaged and weakened by flood waters. Of the 302 passengers and crew members aboard, 116 were injured and of those eight sustained serious injuries. | Kingman    | 0          | 116      | \$0              | \$0   | \$0      |
| 8/27/1997  | Flash Flood | A Skywarn Spotter reported several roads around Kingman eroded and damaged and one road completely washed out. Many locations around the city had up to a foot of standing water.   | Kingman    | 0          | 0        | \$10,000         | \$0   | \$10,000 |
| 8/27/1997  | Flash Flood | Significant flash flooding was observed between Peach Springs and Truxton by personnel at the Bureau of Indian Affairs. Truxton wash was filling rapidly and considerable water was running in Yampai and Peach Springs Canyons. The Forest Service estimated that up to three inches of rain had fallen.   | Peach Spgs | 0          | 0        | \$0              | \$0   | \$0      |
| 9/1/1997   | Flash Flood | A storm spotter reported that washes near Truxton were filling with water after an hour of heavy rain.  | Truxton    | 0          | 0        | \$0              | \$0   | \$0      |

| Event Date | Hazard      | Description  | Location           | Fatalities | Injuries | Damage Estimates |       |       |
|------------|-------------|--|--------------------|------------|----------|------------------|-------|-------|
|            |             |  |                    |            |          | Property         | Crops | Total |
| 9/1/1997   | Flash Flood | The Bureau of Indian Affairs reported flooding between Truxton and Valentine with Valentine wash running quite full. The cemetery road in Valentine was flooded but no major damage was observed.  | Valentine          | 0          | 0        | \$0              | \$0   | \$0   |
| 9/1/1997   | Flash Flood | Heavy rain produced flooding at Katherine's Landing, a marina on Lake Mohave.  | Bullhead City Arpt | 0          | 0        | \$0              | \$0   | \$0   |
| 9/2/1997   | Flash Flood | Heavy rain and flooding was reported in Golden Valley, just west of Kingman. The same storm spotter also reported 1.6 inches of rain in less than an hour and washes running full on the east side of Kingman.   | Kingman            | 0          | 0        | \$0              | \$0   | \$0   |
| 8/8/1998   | Flood       | Strong thunderstorms rolled through Mohave County in the vicinity of Kingman producing continuous lightning and brief heavy rain. A Skywarn spotter reported local street flooding around Kingman and water running in the washes. Several transformers were struck by lightning resulting in loss of electricity throughout the city for a few hours. | Kingman            | 0          | 0        | \$0              | \$0   | \$0   |
| 8/15/1998  | Flash Flood | A Skywarn spotter recorded 1.85 inches of rain in less than one hour on the south side of Lake Havasu City. Washes were reportedly running bank-to-bank and several roads around the city were blocked by water.   | Lake Havasu City   | 0          | 0        | \$0              | \$0   | \$0   |
| 9/10/1998  | Flash Flood | Flash flooding washed out roads in Peach Springs Canyon. The impassable roads left several people stranded for a few hours.  | Peach Spgs         | 0          | 0        | \$0              | \$0   | \$0   |
| 9/11/1998  | Flood       | Minor flooding of roadways and yards was reported with three-quarters (0.75) of an inch of rainfall occurring overnight.   | Colorado City      | 0          | 0        | \$0              | \$0   | \$0   |



| Event Date | Hazard      | Description  | Location   | Fatalities | Injuries | Damage Estimates |       |       |
|------------|-------------|--|------------|------------|----------|------------------|-------|-------|
|            |             |  |            |            |          | Property         | Crops | Total |
| 9/11/1998  | Flash Flood | The Tribal Police reported major flash flooding on Diamond Creek Road and over the southern half of the Hualapai Indian Reservation. No damage reports were received.  | Peach Spgs | 0          | 0        | \$0              | \$0   | \$0   |
| 9/11/1998  | Flash Flood | Thunderstorms produced dime size hail and heavy rain across northwest Arizona. Flash flooding was reported in the vicinity of Kingman, but no damage reports were received.  | Kingman    | 0          | 0        | \$0              | \$0   | \$0   |
| 7/9/1999   | Flash Flood | The Dolan Springs Fire Department reported washes filled with water and some roadways blocked. The water quickly receded however.  | Dolan Spgs | 0          | 0        | \$0              | \$0   | \$0   |
| 7/11/1999  | Flash Flood | Heavy rain producing thunderstorms produced flash flooding around Dolan Springs for a couple hours during the early afternoon. The Dolan Springs Fire Department reported some boulders washing across a secondary road and several roads around town were impassable. No significant damage was reported. | Dolan Spgs | 0          | 0        | \$0              | \$0   | \$0   |
| 7/12/1999  | Flood       | Minor flooding from thunderstorms was reported around Dolan Springs with water flowing across some roads.  | Dolan Spgs | 0          | 0        | \$0              | \$0   | \$0   |

| Event Date | Hazard      | Description   | Location   | Fatalities | Injuries | Damage Estimates |       |       |
|------------|-------------|---|------------|------------|----------|------------------|-------|-------|
|            |             |   |            |            |          | Property         | Crops | Total |
| 7/15/1999  | Flash Flood | Heavy rain producing thunderstorms, some severe, formed along a line in southwest Mohave County extending from Kingman to Lake Havasu City. The storms formed in the vicinity of Kingman and Golden Valley then quickly spread to the southeast dumping heavy rain across the entire area. The Mohave County Sheriff's Office reported widespread street flooding in Kingman, Golden Valley, Mohave Valley and Lake Havasu in roughly the same period of time. Local washes were flowing almost at full capacity and Interstate 40 near Topock was blocked for a short period by two feet of water and mud flowing over the road. No significant flood damage was reported. | Kingman    | 0          | 0        | \$0              | \$0   | \$0   |
| 7/25/1999  | Flash Flood | The Mohave County Sheriff reported three feet of water carrying mud and boulders over Pierce Ferry Road between Dolan Springs and Meadview. There were no reports of significant damage.  | Dolan Spgs | 0          | 0        | \$0              | \$0   | \$0   |
| 7/28/1999  | Flash Flood | Severe thunderstorms unleashed damaging winds and torrential rain from Mohave Valley to near Oatman along Route 66. Flood waters blocked Route 66 around 3:15 p.m. MST, but the height of the storm struck around 3:45 p.m. producing winds which damaged 45 residential properties and tore the roof completely off a duplex. Several carports and numerous trees and power lines were blown down. The roofless duplex was quickly drenched by the heavy downpour and was condemned by authorities. Streets were filled with water and many were impassable until around 6:00 p.m. MST.  | Oatman     | 0          | 0        | \$0              | \$0   | \$0   |

| Event Date | Hazard      | Description  | Location         | Fatalities | Injuries | Damage Estimates |       |           |
|------------|-------------|--|------------------|------------|----------|------------------|-------|-----------|
|            |             |  |                  |            |          | Property         | Crops | Total     |
| 9/18/1999  | Flash Flood | Heavy rainfall in the Kingman area caused area washes to flood. Several cars were caught in flood waters and at least one swift water rescue was performed.  | Kingman          | 0          | 0        | \$15,000         | \$0   | \$15,000  |
| 8/27/2000  | Flash Flood | Flash flooding from a heavy thunderstorm closed Peach Springs Canyon Road for about 2 hours.   | Peach Spgs       | 0          | 0        | \$0              | \$0   | \$0       |
| 8/29/2000  | Flash Flood | Strong thunderstorms caused numerous roads to be closed in Kingman due to flooding, severely impacting travel. Washes in and around town were running 5-6 feet deep.   | Kingman          | 0          | 0        | \$0              | \$0   | \$0       |
| 8/29/2000  | Flash Flood | Flash flooding from thunderstorms closed route 66 from Peach Springs to Seligman causing several tourists to be stranded.  | Peach Spgs       | 0          | 0        | \$0              | \$0   | \$0       |
| 10/21/2000 | Flash Flood | Heavy rain and thunderstorms moved through Bullhead City, AZ producing minor flooding that left rocks and debris across Bullhead Highway". "   | Bullhead City    | 0          | 0        | \$0              | \$0   | \$0       |
| 7/25/2003  | Flash Flood | Flash flooding in Peach Springs from a stationary thunderstorm. Route 66 under debris and mud. Trailers moved off foundations and cars floating in flood waters. All washes reported flooded with Santa Fe railroad tracks under water. SR 18 also under water and closed. | Peach Spgs       | 0          | 0        | \$500,000        | \$0   | \$500,000 |
| 8/26/2003  | Flash Flood | Moderate to intense rain caused flash flooding in Kingman. Two people became trapped in their vehicles after becoming stuck under a bridge.  | Kingman          | 0          | 0        | \$50,000         | \$0   | \$50,000  |
| 9/3/2003   | Flash Flood | Runoff from heavy rain caused a car to be swept off the road into a wash. One woman inside the car was rescued and taken to a local hospital with undisclosed injuries.  | Lake Havasu City | 0          | 1        | \$15,000         | \$0   | \$15,000  |
| 10/20/2004 | Flash Flood | Heavy rain caused flash flooding in parts of Kingman. A local spotter reported water to curb high in several locations in Kingman.   | Kingman          | 0          | 0        | \$0              | \$0   | \$0       |

| Event Date | Hazard      | Description   | Location             | Fatalities | Injuries | Damage Estimates |       |       |
|------------|-------------|---|----------------------|------------|----------|------------------|-------|-------|
|            |             |   |                      |            |          | Property         | Crops | Total |
| 10/25/2004 | Flash Flood | Several spotters reported that washes were flowing throughout town and that several streets were closed due to flash flooding.  | Kingman              | 0          | 0        | \$0              | \$0   | \$0   |
| 12/29/2004 | Flash Flood | A spotter reported that washes were overflowing on Highway 68. The road has been closed.  | East Central Portion | 0          | 0        | \$0              | \$0   | \$0   |
| 12/29/2004 | Flash Flood | Mohave County Sheriff reported that several washes leading to Kingman were running full with several roads washed out. Several people were also trapped in their cars between washes. | Kingman              | 0          | 0        | \$0              | \$0   | \$0   |
| 7/26/2005  | Flash Flood | Water over the access road to Willow Beach.   | Willow Beach         | 0          | 0        | \$0              | \$0   | \$0   |
| 7/28/2005  | Flash Flood | Washes overflowing with large rocks and debris over many roads.   | Kingman              | 0          | 0        | \$0              | \$0   | \$0   |
| 7/31/2005  | Flash Flood | Streets flooded.  | Chloride             | 0          | 0        | \$0              | \$0   | \$0   |
| 8/1/2005   | Flash Flood | Several homes knocked off their foundations in Fort Mohave and Mohave Valley.   | Bullhead City        | 0          | 0        | \$0              | \$0   | \$0   |
| 8/3/2005   | Flash Flood | 2.5 feet of water over roads. One driver rescued.   | Bullhead City        | 0          | 0        | \$0              | \$0   | \$0   |
| 8/8/2005   | Flash Flood | Washes overflowed their banks.  | Chloride             | 0          | 0        | \$0              | \$0   | \$0   |
| 8/9/2005   | Flash Flood | Water into the first floor of some buildings in both Chloride and Dolan Springs.  | Chloride             | 0          | 0        | \$0              | \$0   | \$0   |
| 8/11/2005  | Flash Flood | Flooding at the intersection of Highways 68 and 93, and at mile marker 66 on Interstate 40.   | Kingman              | 0          | 0        | \$0              | \$0   | \$0   |
| 8/12/2005  | Flash Flood | Heavy" flooding in Golden Valley."  | Kingman              | 0          | 0        | \$0              | \$0   | \$0   |
| 8/14/2005  | Flash Flood | Flooding also reported in Desert Hills and Mohave Valley.   | Lake Havasu City     | 0          | 0        | \$0              | \$0   | \$0   |
| 7/28/2006  | Flash Flood | Moderate street flooding in New Kingman.  | Kingman              | 0          | 0        | \$0              | \$0   | \$0   |
| 8/11/2006  | Flash Flood | Roads were washed out near the community of Tuweep.   | Mt Trumbull          | 0          | 0        | \$0              | \$0   | \$0   |
| 10/14/2006 | Flash Flood | A cold upper level low moved across the Mojave Desert, tapping into unseasonably moist air to produce strong thunderstorms.   | Willow Beach         | 0          | 0        | \$0              | \$0   | \$0   |

| Event Date | Hazard      | Description  | Location            | Fatalities | Injuries | Damage Estimates |       |          |
|------------|-------------|--|---------------------|------------|----------|------------------|-------|----------|
|            |             |  |                     |            |          | Property         | Crops | Total    |
| 7/24/2007  | Flash Flood | A push of monsoon moisture brought thunderstorms with flash flooding and severe weather to the Mojave Desert and Southern Great Basin from July 24th through the 30th. | (Igm)Mojave Co Arpt | 2          | 0        | \$20,000         | \$0   | \$20,000 |
| 7/24/2007  | Flash Flood | A push of monsoon moisture brought thunderstorms with flash flooding and severe weather to the Mojave Desert and Southern Great Basin from July 24th through the 30th. | Peach Spgs          | 0          | 0        | \$0              | \$0   | \$0      |
| 7/25/2007  | Flash Flood | A push of monsoon moisture brought thunderstorms with flash flooding and severe weather to the Mojave Desert and Southern Great Basin from July 24th through the 30th. | Kingman             | 0          | 0        | \$0              | \$0   | \$0      |
| 7/25/2007  | Flash Flood | A push of monsoon moisture brought thunderstorms with flash flooding and severe weather to the Mojave Desert and Southern Great Basin from July 24th through the 30th. | Dolan Spgs          | 0          | 0        | \$0              | \$0   | \$0      |
| 7/25/2007  | Flash Flood | A push of monsoon moisture brought thunderstorms with flash flooding and severe weather to the Mojave Desert and Southern Great Basin from July 24th through the 30th. | (Igm)Mojave Co Arpt | 0          | 0        | \$0              | \$0   | \$0      |
| 7/27/2007  | Flash Flood | A push of monsoon moisture brought thunderstorms with flash flooding and severe weather to the Mojave Desert and Southern Great Basin from July 24th through the 30th. | Dolan Spgs          | 0          | 0        | \$0              | \$0   | \$0      |
| 7/27/2007  | Flash Flood | A push of monsoon moisture brought thunderstorms with flash flooding and severe weather to the Mojave Desert and Southern Great Basin from July 24th through the 30th. | Willow Beach        | 0          | 0        | \$0              | \$0   | \$0      |
| 7/29/2007  | Flash Flood | A push of monsoon moisture brought thunderstorms with flash flooding and severe weather to the Mojave Desert and Southern Great Basin from July 24th through the 30th. | Kingman             | 0          | 0        | \$0              | \$0   | \$0      |

| Event Date | Hazard      | Description  | Location            | Fatalities | Injuries | Damage Estimates |       |             |
|------------|-------------|--|---------------------|------------|----------|------------------|-------|-------------|
|            |             |  |                     |            |          | Property         | Crops | Total       |
| 7/30/2007  | Flash Flood | A push of monsoon moisture brought thunderstorms with flash flooding and severe weather to the Mojave Desert and Southern Great Basin from July 24th through the 30th. | Willow Beach        | 0          | 0        | \$0              | \$0   | \$0         |
| 8/1/2007   | Flash Flood | Subtropical moisture over the Desert Southwest fueled thunderstorms which brought heavy rain and flooding.   | Kingman             | 0          | 0        | \$2,000,000      | \$0   | \$2,000,000 |
| 9/22/2007  | Flash Flood | A strong low pressure system brought thunderstorms and heavy rain to the Mojave Desert.  | Temple Bar Marina   | 0          | 0        | \$0              | \$0   | \$0         |
| 7/10/2008  | Flash Flood | A push of monsoon moisture from the southeast brought severe storms and flash flooding to portions of the Mojave Desert and southern Great Basin.                      | Kingman             | 0          | 0        | \$0              | \$0   | \$0         |
| 7/12/2008  | Flash Flood | A push of monsoon moisture from the southeast brought severe storms and flash flooding to portions of the Mojave Desert and southern Great Basin.                      | Harris              | 0          | 0        | \$0              | \$0   | \$0         |
| 7/12/2008  | Flash Flood | A push of monsoon moisture from the southeast brought severe storms and flash flooding to portions of the Mojave Desert and southern Great Basin.                      | Santa Claus         | 0          | 0        | \$0              | \$0   | \$0         |
| 7/20/2008  | Flash Flood | Monsoon moisture brought thunderstorms to southeast California and northwest Arizona, resulting in a few occurrences of flooding.                                      | Oatman              | 0          | 0        | \$0              | \$0   | \$0         |
| 7/26/2008  | Flash Flood | Monsoon moisture triggered thunderstorms which brought isolated flooding to the Mojave Desert and southern Great Basin.  | (Igm)Mojave Co Arpt | 0          | 0        | \$0              | \$0   | \$0         |
| 8/6/2008   | Flash Flood | Another push of monsoon moisture led to thunderstorms over the Mojave Desert, some of which produced severe weather and flash flooding.                                | Dolan Spgs          | 0          | 0        | \$0              | \$0   | \$0         |
| 8/8/2008   | Flash Flood | Another push of monsoon moisture led to thunderstorms over the Mojave Desert, some of which produced severe weather and flash flooding.                                | Peach Spgs          | 0          | 0        | \$0              | \$0   | \$0         |

| Event Date | Hazard      | Description   | Location             | Fatalities | Injuries | Damage Estimates |       |       |
|------------|-------------|---|----------------------|------------|----------|------------------|-------|-------|
|            |             |   |                      |            |          | Property         | Crops | Total |
| 8/8/2008   | Flash Flood | Another push of monsoon moisture led to thunderstorms over the Mojave Desert, some of which produced severe weather and flash flooding.       | Mohave Valley        | 0          | 0        | \$0              | \$0   | \$0   |
| 8/17/2008  | Flash Flood | Monsoon moisture continued to produce thunderstorms over the Mojave Desert. One storm caused flash flooding in a remote area.                 | Meadview             | 0          | 0        | \$0              | \$0   | \$0   |
| 8/25/2008  | Flash Flood | Another push of monsoon moisture brought severe thunderstorms and flash flooding to the Mojave Desert.  | Mohave Valley        | 0          | 0        | \$0              | \$0   | \$0   |
| 8/30/2008  | Flash Flood | Monsoon moisture triggered thunderstorms which produced severe weather and flash flooding in the Mojave Desert.                               | (Igm)Mojave Co Arpt  | 0          | 0        | \$0              | \$0   | \$0   |
| 8/31/2008  | Flash Flood | Monsoon moisture triggered thunderstorms which produced severe weather and flash flooding in the Mojave Desert.                               | (Lhu)Lake Havasu Cit | 0          | 0        | \$0              | \$0   | \$0   |
| 11/27/2008 | Flash Flood | A Pacific storm system brought valley rain and mountain snow to the Mojave Desert and southern Great Basin.                                   | Riviera              | 0          | 0        | \$0              | \$0   | \$0   |
| 7/3/2009   | Flash Flood | A push of monsoon moisture triggered scattered thunderstorms over the Mojave Desert. A few storms produced severe weather and flash flooding. | Dolan Spgs           | 0          | 0        | \$0              | \$0   | \$0   |
| 7/18/2009  | Flash Flood | Monsoon moisture continued to fuel scattered thunderstorms over the Mojave Desert. One storm produced flash flooding.                         | Meadview             | 0          | 0        | \$0              | \$0   | \$0   |
| 7/20/2009  | Flash Flood | Monsoon moisture fueled an outbreak of thunderstorms over the Mojave Desert. Several storms produced high winds and flash flooding.           | Dolan Spgs           | 0          | 0        | \$0              | \$0   | \$0   |
| 7/24/2009  | Flash Flood | Monsoon moisture continued to fuel scattered thunderstorms over the Mojave Desert. One storm produced flash flooding.                         | Meadview             | 0          | 0        | \$0              | \$0   | \$0   |
| 8/23/2009  | Flash Flood | An upper level disturbance and monsoon moisture combined to trigger an outbreak of thunderstorms across the Mojave Desert.                    | Golden Shores        | 0          | 0        | \$0              | \$0   | \$0   |



| Event Date | Hazard      | Description   | Location      | Fatalities | Injuries | Damage Estimates |       |           |
|------------|-------------|---|---------------|------------|----------|------------------|-------|-----------|
|            |             |   |               |            |          | Property         | Crops | Total     |
| 9/4/2009   | Flash Flood | A Pacific cold front helped lift deep subtropical moisture seeping north from the remnants of Hurricane Jimena, triggering severe storms and flash flooding in the Mojave Desert.                     | Walapai       | 0          | 0        | \$0              | \$0   | \$0       |
| 9/5/2009   | Flash Flood | A Pacific cold front helped lift deep subtropical moisture seeping north from the remnants of Hurricane Jimena, triggering severe storms and flash flooding in the Mojave Desert.                     | Mohave Valley | 0          | 0        | \$600,000        | \$0   | \$600,000 |
| 9/12/2009  | Flash Flood | A Pacific storm system triggered a few thunderstorms over the Mojave Desert. One storm produced flash flooding.   | Meadview      | 0          | 0        | \$0              | \$0   | \$0       |
| 7/23/2010  | Flash Flood | Monsoon moisture fueled isolated thunderstorms over Mohave County. One storm produced hail and flooding.  | Harris        | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 7/29/2010  | Flash Flood | Monsoon moisture fueled more thunderstorms over Mohave County. One storm produced brief flooding.   | Wikieup       | 0          | 0        | \$0              | \$0   | \$0       |
| 8/17/2010  | Flash Flood | Monsoon moisture fueled scattered thunderstorms over the Mojave Desert. A few storms produced severe weather and flash flooding.  | Meadview      | 0          | 0        | \$10,000         | \$0   | \$10,000  |
| 8/17/2010  | Flash Flood | Monsoon moisture fueled scattered thunderstorms over the Mojave Desert. A few storms produced severe weather and flash flooding.  | Meadview      | 0          | 0        | \$5,000          | \$0   | \$5,000   |
| 8/26/2010  | Flash Flood | Monsoon moisture fueled several rounds of thunderstorms over the Mojave Desert, with the greatest coverage of storms on the 26th and 27th. Several storms produced severe weather and flash flooding. | Golden Valley | 0          | 0        | \$0              | \$0   | \$0       |
| 8/26/2010  | Flash Flood | Monsoon moisture fueled several rounds of thunderstorms over the Mojave Desert, with the greatest coverage of storms on the 26th and 27th. Several storms produced severe weather and flash flooding. | Oatman        | 0          | 0        | \$0              | \$0   | \$0       |

| Event Date | Hazard      | Description   | Location     | Fatalities | Injuries | Damage Estimates |       |             |
|------------|-------------|---|--------------|------------|----------|------------------|-------|-------------|
|            |             |   |              |            |          | Property         | Crops | Total       |
| 8/27/2010  | Flash Flood | Monsoon moisture fueled several rounds of thunderstorms over the Mojave Desert, with the greatest coverage of storms on the 26th and 27th. Several storms produced severe weather and flash flooding.                                     | Riviera      | 0          | 0        | \$15,000         | \$0   | \$15,000    |
| 10/4/2010  | Flash Flood | An upper level low pressure system dug all the way down to Baja California, bringing a very late season push of monsoon moisture which fueled thunderstorms in the Mojave Desert. Some storms produced flash flooding and severe weather. | Meadview     | 0          | 0        | \$2,000          | \$0   | \$2,000     |
| 10/4/2010  | Flash Flood | An upper level low pressure system dug all the way down to Baja California, bringing a very late season push of monsoon moisture which fueled thunderstorms in the Mojave Desert. Some storms produced flash flooding and severe weather. | Meadview     | 0          | 0        | \$1,000          | \$0   | \$1,000     |
| 10/16/2010 | Flash Flood | Another very strong upper level low pressure system brought more severe thunderstorms and flash flooding to the Mojave Desert.  | Kingman      | 0          | 0        | \$100            | \$0   | \$100       |
| 12/21/2010 | Flood       | A series of storms fueled by a tropical moisture tap pounded the Mojave Desert and southern Great Basin for several days. Extremely heavy snow and widespread flooding resulted.  | Beaver Dam   | 0          | 0        | \$4,000,000      | \$0   | \$4,000,000 |
| 12/22/2010 | Flash Flood | A series of storms fueled by a tropical moisture tap pounded the Mojave Desert and southern Great Basin for several days. Extremely heavy snow and widespread flooding resulted.  | Riviera      | 0          | 0        | \$5,000          | \$0   | \$5,000     |
| 12/22/2010 | Flash Flood | A series of storms fueled by a tropical moisture tap pounded the Mojave Desert and southern Great Basin for several days. Extremely heavy snow and widespread flooding resulted.  | Willow Beach | 0          | 0        | \$0              | \$0   | \$0         |

| Event Date | Hazard      | Description   | Location             | Fatalities | Injuries | Damage Estimates |       |          |
|------------|-------------|---|----------------------|------------|----------|------------------|-------|----------|
|            |             |   |                      |            |          | Property         | Crops | Total    |
| 7/3/2011   | Flash Flood | A strong push of monsoon moisture brought thunderstorms to much of the Mojave Desert and southern Great Basin. Several storms produced severe weather and flash flooding.                         | Meadview             | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 7/6/2011   | Flash Flood | A strong push of monsoon moisture brought thunderstorms to much of the Mojave Desert and southern Great Basin. Several storms produced severe weather and flash flooding.                         | (Lhu)Lake Havasu Cit | 0          | 0        | \$20,000         | \$0   | \$20,000 |
| 7/8/2011   | Flash Flood | Monsoon moisture lingered over the Mojave Desert and southern Great Basin, continuing to fuel thunderstorms. Some storms produced severe weather and flash flooding.                              | Moccasin             | 0          | 0        | \$2,000          | \$0   | \$2,000  |
| 7/9/2011   | Flash Flood | Monsoon moisture lingered over the Mojave Desert and southern Great Basin, continuing to fuel thunderstorms. Some storms produced severe weather and flash flooding.                              | Dolan Spgs           | 0          | 0        | \$5,000          | \$0   | \$5,000  |
| 7/26/2011  | Flash Flood | A few thunderstorms developed along the leading edge of a dry air mass as it pushed into monsoon moisture. One storm produced flash flooding.   | Colorado City        | 0          | 0        | \$50,000         | \$0   | \$50,000 |
| 7/31/2011  | Flash Flood | Another push of monsoon moisture fueled more thunderstorms across the Mojave Desert and southern Great Basin. Several storms produced flash flooding, and there was also isolated severe weather. | Hualapai             | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 9/13/2011  | Flash Flood | A slow moving upper level low and monsoon moisture fueled thunderstorms over the Mojave Desert. Many storms produced flash flooding and severe weather.   | Topock               | 0          | 0        | \$5,000          | \$0   | \$5,000  |
| 9/13/2011  | Flash Flood | A slow moving upper level low and monsoon moisture fueled thunderstorms over the Mojave Desert. Many storms produced flash flooding and severe weather.   | Davis Dam            | 0          | 0        | \$1,000          | \$0   | \$1,000  |

| Event Date | Hazard      | Description  | Location             | Fatalities | Injuries | Damage Estimates |       |             |
|------------|-------------|--|----------------------|------------|----------|------------------|-------|-------------|
|            |             |  |                      |            |          | Property         | Crops | Total       |
| 10/4/2011  | Flash Flood | A cold storm moved from the Gulf of Alaska through the Mojave Desert and southern Great Basin, bringing thunderstorms and strong winds, with spotty damage reported. Heavy snow also likely fell on the unpopulated high mountain peaks. | Temple Bar Marina    | 0          | 0        | \$1,000          | \$0   | \$1,000     |
| 7/13/2012  | Flash Flood | A strong push of monsoon moisture fueled a five-day outbreak of thunderstorms over the Mojave Desert and southern Great Basin. Numerous storms produced flash flooding and/or severe weather.  | (Lhu)Lake Havasu Cit | 1          | 0        | \$5,000,000      | \$0   | \$5,000,000 |
| 7/13/2012  | Flash Flood | A strong push of monsoon moisture fueled a five-day outbreak of thunderstorms over the Mojave Desert and southern Great Basin. Numerous storms produced flash flooding and/or severe weather.  | Golden Shores        | 0          | 0        | \$5,000          | \$0   | \$5,000     |
| 7/13/2012  | Flash Flood | A strong push of monsoon moisture fueled a five-day outbreak of thunderstorms over the Mojave Desert and southern Great Basin. Numerous storms produced flash flooding and/or severe weather.  | (lgm)Mojave Co Arpt  | 0          | 0        | \$1,000          | \$0   | \$1,000     |
| 7/14/2012  | Flash Flood | A strong push of monsoon moisture fueled a five-day outbreak of thunderstorms over the Mojave Desert and southern Great Basin. Numerous storms produced flash flooding and/or severe weather.  | Oatman               | 0          | 0        | \$100,000        | \$0   | \$100,000   |
| 7/14/2012  | Flash Flood | A strong push of monsoon moisture fueled a five-day outbreak of thunderstorms over the Mojave Desert and southern Great Basin. Numerous storms produced flash flooding and/or severe weather.  | Willow Beach         | 0          | 0        | \$20,000         | \$0   | \$20,000    |
| 7/14/2012  | Flash Flood | A strong push of monsoon moisture fueled a five-day outbreak of thunderstorms over the Mojave Desert and southern Great Basin. Numerous storms produced flash flooding and/or severe weather.  | Colorado City        | 0          | 0        | \$10,000         | \$0   | \$10,000    |

| Event Date | Hazard      | Description   | Location      | Fatalities | Injuries | Damage Estimates |       |           |
|------------|-------------|---|---------------|------------|----------|------------------|-------|-----------|
|            |             |   |               |            |          | Property         | Crops | Total     |
| 7/14/2012  | Flash Flood | A strong push of monsoon moisture fueled a five-day outbreak of thunderstorms over the Mojave Desert and southern Great Basin. Numerous storms produced flash flooding and/or severe weather. | Mohave Valley | 0          | 0        | \$5,000          | \$0   | \$5,000   |
| 7/14/2012  | Flash Flood | A strong push of monsoon moisture fueled a five-day outbreak of thunderstorms over the Mojave Desert and southern Great Basin. Numerous storms produced flash flooding and/or severe weather. | Kingman Arpt  | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 7/14/2012  | Flash Flood | A strong push of monsoon moisture fueled a five-day outbreak of thunderstorms over the Mojave Desert and southern Great Basin. Numerous storms produced flash flooding and/or severe weather. | Dolan Spgs    | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 7/16/2012  | Flash Flood | A strong push of monsoon moisture fueled a five-day outbreak of thunderstorms over the Mojave Desert and southern Great Basin. Numerous storms produced flash flooding and/or severe weather. | Colorado City | 0          | 0        | \$100,000        | \$0   | \$100,000 |
| 7/24/2012  | Flash Flood | Another push of monsoon moisture led to more thunderstorms over the Mojave Desert and southern Great Basin. A few storms produced severe weather and/or flash flooding.                       | Littlefield   | 0          | 0        | \$100,000        | \$0   | \$100,000 |
| 7/31/2012  | Flash Flood | A strong push of monsoon moisture fueled another outbreak of thunderstorms over the Mojave Desert and southern Great Basin. Widespread flash flooding and isolated severe weather occurred.   | Davis Dam     | 0          | 0        | \$100,000        | \$0   | \$100,000 |
| 7/31/2012  | Flash Flood | A strong push of monsoon moisture fueled another outbreak of thunderstorms over the Mojave Desert and southern Great Basin. Widespread flash flooding and isolated severe weather occurred.   | Mohave Valley | 0          | 0        | \$50,000         | \$0   | \$50,000  |

| Event Date | Hazard      | Description   | Location            | Fatalities | Injuries | Damage Estimates |       |          |
|------------|-------------|---|---------------------|------------|----------|------------------|-------|----------|
|            |             |   |                     |            |          | Property         | Crops | Total    |
| 8/9/2012   | Flash Flood | Monsoon moisture began to return from the southeast, fueling strong thunderstorms over the eastern Mojave Desert. Several storms produced severe weather and/or flash flooding.       | Dolan Spgs          | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 8/9/2012   | Flash Flood | Monsoon moisture began to return from the southeast, fueling strong thunderstorms over the eastern Mojave Desert. Several storms produced severe weather and/or flash flooding.       | Peach Spgs          | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 8/9/2012   | Flash Flood | Monsoon moisture began to return from the southeast, fueling strong thunderstorms over the eastern Mojave Desert. Several storms produced severe weather and/or flash flooding.       | Hualapai            | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 8/9/2012   | Flash Flood | Monsoon moisture began to return from the southeast, fueling strong thunderstorms over the eastern Mojave Desert. Several storms produced severe weather and/or flash flooding.       | (Igm)Mojave Co Arpt | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 8/11/2012  | Flash Flood | Monsoon moisture fueled another round of thunderstorms over the Mojave Desert and southern Great Basin. Several storms produced severe weather and flash flooding.                    | New Kingman-Butler  | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 8/20/2012  | Flash Flood | Another surge of monsoon moisture led to an outbreak of thunderstorms over the Mojave Desert and southern Great Basin. A low pressure system further enhanced the storms on the 22nd. | Mt Trumbull         | 0          | 0        | \$50,000         | \$0   | \$50,000 |
| 8/20/2012  | Flash Flood | Another surge of monsoon moisture led to an outbreak of thunderstorms over the Mojave Desert and southern Great Basin. A low pressure system further enhanced the storms on the 22nd. | Wikieup             | 0          | 0        | \$2,000          | \$0   | \$2,000  |
| 8/20/2012  | Flash Flood | Another surge of monsoon moisture led to an outbreak of thunderstorms over the Mojave Desert and southern Great Basin. A low pressure system further enhanced the storms on the 22nd. | (Igm)Mojave Co Arpt | 0          | 0        | \$2,000          | \$0   | \$2,000  |

| Event Date | Hazard      | Description   | Location            | Fatalities | Injuries | Damage Estimates |       |           |
|------------|-------------|---|---------------------|------------|----------|------------------|-------|-----------|
|            |             |   |                     |            |          | Property         | Crops | Total     |
| 8/20/2012  | Flash Flood | Another surge of monsoon moisture led to an outbreak of thunderstorms over the Mojave Desert and southern Great Basin. A low pressure system further enhanced the storms on the 22nd. | Walapai             | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 8/21/2012  | Flash Flood | Another surge of monsoon moisture led to an outbreak of thunderstorms over the Mojave Desert and southern Great Basin. A low pressure system further enhanced the storms on the 22nd. | Peach Spgs          | 0          | 0        | \$250,000        | \$0   | \$250,000 |
| 8/22/2012  | Flash Flood | Another surge of monsoon moisture led to an outbreak of thunderstorms over the Mojave Desert and southern Great Basin. A low pressure system further enhanced the storms on the 22nd. | (Igm)Mojave Co Arpt | 0          | 0        | \$5,000          | \$0   | \$5,000   |
| 8/22/2012  | Flash Flood | Another surge of monsoon moisture led to an outbreak of thunderstorms over the Mojave Desert and southern Great Basin. A low pressure system further enhanced the storms on the 22nd. | Temple Bar Marina   | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 8/22/2012  | Flash Flood | Another surge of monsoon moisture led to an outbreak of thunderstorms over the Mojave Desert and southern Great Basin. A low pressure system further enhanced the storms on the 22nd. | Kingman             | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 9/4/2012   | Flash Flood | Monsoon moisture fueled another outbreak of thunderstorms over the Mojave Desert. Some storms produced flash flooding and/or severe weather.  | Mohave Valley       | 0          | 0        | \$25,000         | \$0   | \$25,000  |
| 9/5/2012   | Flash Flood | Monsoon moisture fueled another outbreak of thunderstorms over the Mojave Desert. Some storms produced flash flooding and/or severe weather.  | Kingman Arpt        | 0          | 0        | \$5,000          | \$0   | \$5,000   |
| 9/9/2012   | Flash Flood | Monsoon moisture fueled another round of thunderstorms over the Mojave Desert. A few storms produced flash flooding and severe weather.   | Golden Valley       | 0          | 0        | \$20,000         | \$0   | \$20,000  |



| Event Date | Hazard      | Description  | Location            | Fatalities | Injuries | Damage Estimates |       |           |
|------------|-------------|--|---------------------|------------|----------|------------------|-------|-----------|
|            |             |  |                     |            |          | Property         | Crops | Total     |
| 9/10/2012  | Flash Flood | Monsoon moisture fueled another round of thunderstorms over the Mojave Desert. A few storms produced flash flooding and severe weather.                        | Peach Spgs          | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 9/11/2012  | Flash Flood | A low pressure system interacted with deep monsoon moisture to produce widespread thunderstorms and flash flooding. A few storms also produced severe weather. | Mohave Valley       | 0          | 0        | \$2,000          | \$0   | \$2,000   |
| 10/11/2012 | Flash Flood | A strong low pressure system combined with lingering monsoon moisture to produce flash flooding and severe weather over the Mojave Desert.                     | Davis Dam           | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 7/1/2013   | Flash Flood | A small push of monsoon moisture fueled thunderstorms over Mohave County overnight.  | Oatman              | 0          | 0        | \$10,000         | \$0   | \$10,000  |
| 7/7/2013   | Flash Flood | Thunderstorm coverage increased a little over the Mojave Desert as dry air began to push in above low level monsoon moisture.                                  | Colorado City       | 0          | 0        | \$10,000         | \$0   | \$10,000  |
| 7/11/2013  | Flash Flood | Monsoon moisture fueled thunderstorms in northern Mohave County.   | Colorado City       | 0          | 0        | \$100,000        | \$0   | \$100,000 |
| 7/12/2013  | Flash Flood | A push of monsoon moisture fueled scattered thunderstorms over the Mojave Desert. Some storms produced flash flooding and severe weather.                      | Dolan Spgs          | 0          | 0        | \$10,000         | \$0   | \$10,000  |
| 7/12/2013  | Flash Flood | A push of monsoon moisture fueled scattered thunderstorms over the Mojave Desert. Some storms produced flash flooding and severe weather.                      | Temple Bar Marina   | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 7/12/2013  | Flash Flood | A push of monsoon moisture fueled scattered thunderstorms over the Mojave Desert. Some storms produced flash flooding and severe weather.                      | Cane Beds           | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 7/12/2013  | Flash Flood | A push of monsoon moisture fueled scattered thunderstorms over the Mojave Desert. Some storms produced flash flooding and severe weather.                      | Mohave Valley       | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 7/13/2013  | Flash Flood | A push of monsoon moisture fueled scattered thunderstorms over the Mojave Desert. Some storms produced flash flooding and severe weather.                      | (Igm)Mojave Co Arpt | 0          | 0        | \$1,000          | \$0   | \$1,000   |

| Event Date | Hazard      | Description   | Location            | Fatalities | Injuries | Damage Estimates |       |          |
|------------|-------------|---|---------------------|------------|----------|------------------|-------|----------|
|            |             |   |                     |            |          | Property         | Crops | Total    |
| 7/14/2013  | Flash Flood | A push of monsoon moisture fueled scattered thunderstorms over the Mojave Desert. Some storms produced flash flooding and severe weather.   | (Igm)Mojave Co Arpt | 0          | 0        | \$2,000          | \$0   | \$2,000  |
| 7/15/2013  | Flash Flood | A push of monsoon moisture fueled scattered thunderstorms over the Mojave Desert. Some storms produced flash flooding and severe weather.   | (Igm)Mojave Co Arpt | 0          | 0        | \$2,000          | \$0   | \$2,000  |
| 7/19/2013  | Flash Flood | A large push of monsoon moisture triggered an extended period of thunderstorms across the Mojave Desert and southern Great Basin. Many storms produced flash flooding and severe weather. | Colorado City       | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 7/20/2013  | Flash Flood | A large push of monsoon moisture triggered an extended period of thunderstorms across the Mojave Desert and southern Great Basin. Many storms produced flash flooding and severe weather. | (Igm)Mojave Co Arpt | 0          | 0        | \$2,000          | \$0   | \$2,000  |
| 7/20/2013  | Flash Flood | A large push of monsoon moisture triggered an extended period of thunderstorms across the Mojave Desert and southern Great Basin. Many storms produced flash flooding and severe weather. | (Igm)Mojave Co Arpt | 0          | 0        | \$2,000          | \$0   | \$2,000  |
| 7/24/2013  | Flash Flood | Remnant monsoon moisture continued to fuel scattered thunderstorms over the Mojave Desert and southern Great Basin, with isolated flash flooding.   | Harris              | 0          | 0        | \$2,000          | \$0   | \$2,000  |
| 7/26/2013  | Flash Flood | Remnant monsoon moisture continued to fuel scattered thunderstorms over the Mojave Desert and southern Great Basin, with isolated flash flooding.   | Colorado City       | 0          | 0        | \$50,000         | \$0   | \$50,000 |
| 7/26/2013  | Flash Flood | Remnant monsoon moisture continued to fuel scattered thunderstorms over the Mojave Desert and southern Great Basin, with isolated flash flooding.   | Pipe Spring         | 0          | 0        | \$25,000         | \$0   | \$25,000 |
| 7/26/2013  | Flash Flood | Remnant monsoon moisture continued to fuel scattered thunderstorms over the Mojave Desert and southern Great Basin, with isolated flash flooding.   | Colorado City       | 0          | 0        | \$1,000          | \$0   | \$1,000  |

| Event Date | Hazard      | Description   | Location            | Fatalities | Injuries | Damage Estimates |       |           |
|------------|-------------|---|---------------------|------------|----------|------------------|-------|-----------|
|            |             |   |                     |            |          | Property         | Crops | Total     |
| 7/27/2013  | Flash Flood | Mid level dry air pushed in above low level monsoon moisture, triggering widespread thunderstorms with flash flooding and severe weather.   | Dolan Spgs          | 0          | 0        | \$600,000        | \$0   | \$600,000 |
| 7/27/2013  | Flash Flood | Mid level dry air pushed in above low level monsoon moisture, triggering widespread thunderstorms with flash flooding and severe weather.   | Kingman             | 0          | 0        | \$50,000         | \$0   | \$50,000  |
| 7/27/2013  | Flash Flood | Mid level dry air pushed in above low level monsoon moisture, triggering widespread thunderstorms with flash flooding and severe weather.   | (Igm)Mojave Co Arpt | 0          | 0        | \$2,000          | \$0   | \$2,000   |
| 7/27/2013  | Flash Flood | Mid level dry air pushed in above low level monsoon moisture, triggering widespread thunderstorms with flash flooding and severe weather.   | Kaibab              | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 7/27/2013  | Flash Flood | Mid level dry air pushed in above low level monsoon moisture, triggering widespread thunderstorms with flash flooding and severe weather.   | Meadview            | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 7/28/2013  | Flash Flood | Mid level dry air pushed in above low level monsoon moisture, triggering widespread thunderstorms with flash flooding and severe weather.   | Colorado City       | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 8/23/2013  | Flash Flood | A strong push of monsoon moisture fueled thunderstorms over the Mojave Desert and southern Great Basin for several days, peaking on the 25th. Many storms produced flash flooding, and isolated severe weather also occurred. | Golden Valley       | 0          | 0        | \$2,000          | \$0   | \$2,000   |
| 8/24/2013  | Flash Flood | A strong push of monsoon moisture fueled thunderstorms over the Mojave Desert and southern Great Basin for several days, peaking on the 25th. Many storms produced flash flooding, and isolated severe weather also occurred. | Yucca               | 0          | 0        | \$5,000          | \$0   | \$5,000   |

| Event Date | Hazard      | Description   | Location             | Fatalities | Injuries | Damage Estimates |       |          |
|------------|-------------|---|----------------------|------------|----------|------------------|-------|----------|
|            |             |   |                      |            |          | Property         | Crops | Total    |
| 8/24/2013  | Flash Flood | A strong push of monsoon moisture fueled thunderstorms over the Mojave Desert and southern Great Basin for several days, peaking on the 25th. Many storms produced flash flooding, and isolated severe weather also occurred. | (Lhu)Lake Havasu Cit | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 8/24/2013  | Flash Flood | A strong push of monsoon moisture fueled thunderstorms over the Mojave Desert and southern Great Basin for several days, peaking on the 25th. Many storms produced flash flooding, and isolated severe weather also occurred. | Golden Valley        | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 8/24/2013  | Flash Flood | A strong push of monsoon moisture fueled thunderstorms over the Mojave Desert and southern Great Basin for several days, peaking on the 25th. Many storms produced flash flooding, and isolated severe weather also occurred. | Topock               | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 8/25/2013  | Flash Flood | A strong push of monsoon moisture fueled thunderstorms over the Mojave Desert and southern Great Basin for several days, peaking on the 25th. Many storms produced flash flooding, and isolated severe weather also occurred. | Golden Shores        | 0          | 0        | \$10,000         | \$0   | \$10,000 |
| 8/25/2013  | Flash Flood | A strong push of monsoon moisture fueled thunderstorms over the Mojave Desert and southern Great Basin for several days, peaking on the 25th. Many storms produced flash flooding, and isolated severe weather also occurred. | Bullhead City Arpt   | 0          | 0        | \$5,000          | \$0   | \$5,000  |
| 8/25/2013  | Flash Flood | A strong push of monsoon moisture fueled thunderstorms over the Mojave Desert and southern Great Basin for several days, peaking on the 25th. Many storms produced flash flooding, and isolated severe weather also occurred. | Topock               | 0          | 0        | \$5,000          | \$0   | \$5,000  |

| Event Date | Hazard      | Description   | Location             | Fatalities | Injuries | Damage Estimates |       |          |
|------------|-------------|---|----------------------|------------|----------|------------------|-------|----------|
|            |             |   |                      |            |          | Property         | Crops | Total    |
| 8/26/2013  | Flash Flood | A strong push of monsoon moisture fueled thunderstorms over the Mojave Desert and southern Great Basin for several days, peaking on the 25th. Many storms produced flash flooding, and isolated severe weather also occurred. | Colorado City        | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 8/29/2013  | Flash Flood | Another surge of monsoon moisture fueled widespread thunderstorms over the Mojave Desert and southern Great Basin. Many storms produced flash flooding, and isolated severe weather also occurred.                            | Golden Valley        | 0          | 0        | \$10,000         | \$0   | \$10,000 |
| 8/29/2013  | Flash Flood | Another surge of monsoon moisture fueled widespread thunderstorms over the Mojave Desert and southern Great Basin. Many storms produced flash flooding, and isolated severe weather also occurred.                            | (Lhu)Lake Havasu Cit | 0          | 0        | \$2,000          | \$0   | \$2,000  |
| 8/29/2013  | Flash Flood | Another surge of monsoon moisture fueled widespread thunderstorms over the Mojave Desert and southern Great Basin. Many storms produced flash flooding, and isolated severe weather also occurred.                            | New Kingman-Butler   | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 8/29/2013  | Flash Flood | Another surge of monsoon moisture fueled widespread thunderstorms over the Mojave Desert and southern Great Basin. Many storms produced flash flooding, and isolated severe weather also occurred.                            | Berry                | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 8/29/2013  | Flash Flood | Another surge of monsoon moisture fueled widespread thunderstorms over the Mojave Desert and southern Great Basin. Many storms produced flash flooding, and isolated severe weather also occurred.                            | Oatman               | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 8/30/2013  | Flash Flood | Another surge of monsoon moisture fueled widespread thunderstorms over the Mojave Desert and southern Great Basin. Many storms produced flash flooding, and isolated severe weather also occurred.                            | Golden Valley        | 0          | 0        | \$10,000         | \$0   | \$10,000 |

| Event Date | Hazard      | Description  | Location            | Fatalities | Injuries | Damage Estimates |       |           |
|------------|-------------|--|---------------------|------------|----------|------------------|-------|-----------|
|            |             |  |                     |            |          | Property         | Crops | Total     |
| 8/30/2013  | Flash Flood | Another surge of monsoon moisture fueled widespread thunderstorms over the Mojave Desert and southern Great Basin. Many storms produced flash flooding, and isolated severe weather also occurred. | (Igm)Mojave Co Arpt | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 8/30/2013  | Flash Flood | Another surge of monsoon moisture fueled widespread thunderstorms over the Mojave Desert and southern Great Basin. Many storms produced flash flooding, and isolated severe weather also occurred. | Dolan Spgs          | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 8/30/2013  | Flash Flood | Another surge of monsoon moisture fueled widespread thunderstorms over the Mojave Desert and southern Great Basin. Many storms produced flash flooding, and isolated severe weather also occurred. | Hualapai            | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 8/31/2013  | Flash Flood | Another surge of monsoon moisture fueled widespread thunderstorms over the Mojave Desert and southern Great Basin. Many storms produced flash flooding, and isolated severe weather also occurred. | (Igm)Mojave Co Arpt | 0          | 0        | \$2,000          | \$0   | \$2,000   |
| 9/1/2013   | Flash Flood | Lingering monsoon moisture from a strong push in late August continued to fuel thunderstorms over the Mojave Desert through early September. Several storms produced flash flooding.               | Topock              | 0          | 0        | \$500,000        | \$0   | \$500,000 |
| 9/2/2013   | Flash Flood | Lingering monsoon moisture from a strong push in late August continued to fuel thunderstorms over the Mojave Desert through early September. Several storms produced flash flooding.               | (Igm)Mojave Co Arpt | 0          | 0        | \$10,000         | \$0   | \$10,000  |
| 9/3/2013   | Flash Flood | Lingering monsoon moisture from a strong push in late August continued to fuel thunderstorms over the Mojave Desert through early September. Several storms produced flash flooding.               | (Igm)Mojave Co Arpt | 0          | 0        | \$10,000         | \$0   | \$10,000  |

| Event Date | Hazard      | Description  | Location             | Fatalities | Injuries | Damage Estimates |       |          |
|------------|-------------|--|----------------------|------------|----------|------------------|-------|----------|
|            |             |  |                      |            |          | Property         | Crops | Total    |
| 9/4/2013   | Flash Flood | Lingering monsoon moisture from a strong push in late August continued to fuel thunderstorms over the Mojave Desert through early September. Several storms produced flash flooding.       | Dolan Spgs           | 0          | 0        | \$10,000         | \$0   | \$10,000 |
| 9/4/2013   | Flash Flood | Lingering monsoon moisture from a strong push in late August continued to fuel thunderstorms over the Mojave Desert through early September. Several storms produced flash flooding.       | Dolan Spgs           | 0          | 0        | \$2,000          | \$0   | \$2,000  |
| 9/9/2013   | Flash Flood | Lingering monsoon moisture continued to fuel thunderstorms over the Mojave Desert. A few storms produced flash flooding.   | (Lhu)Lake Havasu Cit | 0          | 0        | \$5,000          | \$0   | \$5,000  |
| 9/9/2013   | Flash Flood | Lingering monsoon moisture continued to fuel thunderstorms over the Mojave Desert. A few storms produced flash flooding.   | New Kingman-Butler   | 0          | 0        | \$2,000          | \$0   | \$2,000  |
| 9/9/2013   | Flash Flood | Lingering monsoon moisture continued to fuel thunderstorms over the Mojave Desert. A few storms produced flash flooding.   | Kingman              | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 9/10/2013  | Flash Flood | Lingering monsoon moisture continued to fuel thunderstorms over the Mojave Desert. A few storms produced flash flooding.   | Getz                 | 0          | 0        | \$2,000          | \$0   | \$2,000  |
| 9/11/2013  | Flash Flood | Lingering monsoon moisture continued to fuel thunderstorms over the Mojave Desert. A few storms produced flash flooding.   | Wikieup              | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 11/21/2013 | Flash Flood | A strong area of low pressure sat over the Desert Southwest for two days, bringing heavy rain and snow to portions of the Mojave Desert and southern Great Basin.                          | Willow Beach         | 0          | 0        | \$5,000          | \$0   | \$5,000  |
| 7/6/2014   | Flash Flood | The first seasonal push of monsoon moisture fueled an outbreak of thunderstorms across the Mojave Desert and southern Great Basin. Many storms produced severe weather and flash flooding. | Topock               | 0          | 0        | \$2,000          | \$0   | \$2,000  |



| Event Date | Hazard      | Description  | Location      | Fatalities | Injuries | Damage Estimates |       |         |
|------------|-------------|--|---------------|------------|----------|------------------|-------|---------|
|            |             |  |               |            |          | Property         | Crops | Total   |
| 7/6/2014   | Flash Flood | The first seasonal push of monsoon moisture fueled an outbreak of thunderstorms across the Mojave Desert and southern Great Basin. Many storms produced severe weather and flash flooding. | Bullhead City | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 7/8/2014   | Flash Flood | The first seasonal push of monsoon moisture fueled an outbreak of thunderstorms across the Mojave Desert and southern Great Basin. Many storms produced severe weather and flash flooding. | Kingman       | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 7/8/2014   | Flash Flood | The first seasonal push of monsoon moisture fueled an outbreak of thunderstorms across the Mojave Desert and southern Great Basin. Many storms produced severe weather and flash flooding. | Golden Shores | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 7/8/2014   | Flash Flood | The first seasonal push of monsoon moisture fueled an outbreak of thunderstorms across the Mojave Desert and southern Great Basin. Many storms produced severe weather and flash flooding. | Mohave Valley | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 7/8/2014   | Flash Flood | The first seasonal push of monsoon moisture fueled an outbreak of thunderstorms across the Mojave Desert and southern Great Basin. Many storms produced severe weather and flash flooding. | Kingman       | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 7/8/2014   | Flash Flood | The first seasonal push of monsoon moisture fueled an outbreak of thunderstorms across the Mojave Desert and southern Great Basin. Many storms produced severe weather and flash flooding. | Peach Spgs    | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 7/8/2014   | Flash Flood | The first seasonal push of monsoon moisture fueled an outbreak of thunderstorms across the Mojave Desert and southern Great Basin. Many storms produced severe weather and flash flooding. | Golden Shores | 0          | 0        | \$1,000          | \$0   | \$1,000 |

| Event Date | Hazard      | Description   | Location          | Fatalities | Injuries | Damage Estimates |       |           |
|------------|-------------|---|-------------------|------------|----------|------------------|-------|-----------|
|            |             |   |                   |            |          | Property         | Crops | Total     |
| 7/10/2014  | Flash Flood | Monsoon moisture fueled another round of thunderstorms over northwest Arizona.  | Meadview          | 0          | 0        | \$5,000          | \$0   | \$5,000   |
| 7/10/2014  | Flash Flood | Monsoon moisture fueled another round of thunderstorms over northwest Arizona.  | Temple Bar Marina | 0          | 0        | \$2,000          | \$0   | \$2,000   |
| 7/10/2014  | Flash Flood | Monsoon moisture fueled another round of thunderstorms over northwest Arizona.  | Kingman Arpt      | 0          | 0        | \$2,000          | \$0   | \$2,000   |
| 7/10/2014  | Flash Flood | Monsoon moisture fueled another round of thunderstorms over northwest Arizona.  | Dolan Spgs        | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 7/14/2014  | Flash Flood | Lingering monsoon moisture brought isolated severe weather and flash flooding to the eastern Mojave Desert and southern Great Basin.  | Kingman           | 0          | 0        | \$300,000        | \$0   | \$300,000 |
| 7/25/2014  | Flash Flood | After a short dry spell, another push of monsoon moisture fueled more thunderstorms over the Mojave Desert, some of which produced flash flooding.  | Kingman           | 0          | 0        | \$2,000          | \$0   | \$2,000   |
| 7/28/2014  | Flash Flood | After a short dry spell, another push of monsoon moisture fueled more thunderstorms over the Mojave Desert, some of which produced flash flooding.  | Willow Beach      | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 8/1/2014   | Flash Flood | A major surge of monsoon moisture brought an outbreak of thunderstorms to the Mojave Desert and southern Great Basin, with the most activity on the 3rd and 4th. Widespread flash flooding and severe weather occurred. | Peach Spgs        | 0          | 0        | \$2,000          | \$0   | \$2,000   |
| 8/3/2014   | Flash Flood | A major surge of monsoon moisture brought an outbreak of thunderstorms to the Mojave Desert and southern Great Basin, with the most activity on the 3rd and 4th. Widespread flash flooding and severe weather occurred. | Golden Valley     | 0          | 0        | \$100,000        | \$0   | \$100,000 |

| Event Date | Hazard      | Description   | Location             | Fatalities | Injuries | Damage Estimates |       |         |
|------------|-------------|---|----------------------|------------|----------|------------------|-------|---------|
|            |             |   |                      |            |          | Property         | Crops | Total   |
| 8/3/2014   | Flash Flood | A major surge of monsoon moisture brought an outbreak of thunderstorms to the Mojave Desert and southern Great Basin, with the most activity on the 3rd and 4th. Widespread flash flooding and severe weather occurred. | Willow Beach         | 0          | 0        | \$5,000          | \$0   | \$5,000 |
| 8/3/2014   | Flash Flood | A major surge of monsoon moisture brought an outbreak of thunderstorms to the Mojave Desert and southern Great Basin, with the most activity on the 3rd and 4th. Widespread flash flooding and severe weather occurred. | Getz                 | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 8/3/2014   | Flash Flood | A major surge of monsoon moisture brought an outbreak of thunderstorms to the Mojave Desert and southern Great Basin, with the most activity on the 3rd and 4th. Widespread flash flooding and severe weather occurred. | New Kingman-Butler   | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 8/3/2014   | Flash Flood | A major surge of monsoon moisture brought an outbreak of thunderstorms to the Mojave Desert and southern Great Basin, with the most activity on the 3rd and 4th. Widespread flash flooding and severe weather occurred. | Willow Beach         | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 8/3/2014   | Flash Flood | A major surge of monsoon moisture brought an outbreak of thunderstorms to the Mojave Desert and southern Great Basin, with the most activity on the 3rd and 4th. Widespread flash flooding and severe weather occurred. | (Lhu)Lake Havasu Cit | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 8/3/2014   | Flash Flood | A major surge of monsoon moisture brought an outbreak of thunderstorms to the Mojave Desert and southern Great Basin, with the most activity on the 3rd and 4th. Widespread flash flooding and severe weather occurred. | Getz                 | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 8/3/2014   | Flash Flood | A major surge of monsoon moisture brought an outbreak of thunderstorms to the Mojave Desert and southern Great Basin, with the most activity on the 3rd and 4th. Widespread flash flooding and severe weather occurred. | Temple Bar Marina    | 0          | 0        | \$1,000          | \$0   | \$1,000 |

| Event Date | Hazard      | Description  | Location           | Fatalities | Injuries | Damage Estimates |       |         |
|------------|-------------|--|--------------------|------------|----------|------------------|-------|---------|
|            |             |  |                    |            |          | Property         | Crops | Total   |
| 8/12/2014  | Flash Flood | A push of monsoon moisture fueled thunderstorms over the Mojave Desert. Some storms produced severe weather and flash flooding.                            | Oatman             | 0          | 0        | \$5,000          | \$0   | \$5,000 |
| 8/12/2014  | Flash Flood | A push of monsoon moisture fueled thunderstorms over the Mojave Desert. Some storms produced severe weather and flash flooding.                            | Willow Beach       | 0          | 0        | \$5,000          | \$0   | \$5,000 |
| 8/12/2014  | Flash Flood | A push of monsoon moisture fueled thunderstorms over the Mojave Desert. Some storms produced severe weather and flash flooding.                            | Golden Shores      | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 8/19/2014  | Flash Flood | A significant push of monsoon moisture fueled an outbreak of thunderstorms over the Mojave Desert. Many storms produced severe weather and flash flooding. | Topock             | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 8/19/2014  | Flash Flood | A significant push of monsoon moisture fueled an outbreak of thunderstorms over the Mojave Desert. Many storms produced severe weather and flash flooding. | Kingman            | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 8/19/2014  | Flash Flood | A significant push of monsoon moisture fueled an outbreak of thunderstorms over the Mojave Desert. Many storms produced severe weather and flash flooding. | Davis Dam          | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 8/19/2014  | Flash Flood | A significant push of monsoon moisture fueled an outbreak of thunderstorms over the Mojave Desert. Many storms produced severe weather and flash flooding. | New Kingman-Butler | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 8/19/2014  | Flash Flood | A significant push of monsoon moisture fueled an outbreak of thunderstorms over the Mojave Desert. Many storms produced severe weather and flash flooding. | Dolan Spgs         | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 8/19/2014  | Flash Flood | A significant push of monsoon moisture fueled an outbreak of thunderstorms over the Mojave Desert. Many storms produced severe weather and flash flooding. | Golden Valley      | 0          | 0        | \$1,000          | \$0   | \$1,000 |

| Event Date | Hazard      | Description  | Location            | Fatalities | Injuries | Damage Estimates |       |          |
|------------|-------------|--|---------------------|------------|----------|------------------|-------|----------|
|            |             |  |                     |            |          | Property         | Crops | Total    |
| 8/19/2014  | Flash Flood | A significant push of monsoon moisture fueled an outbreak of thunderstorms over the Mojave Desert. Many storms produced severe weather and flash flooding.   | Golden Valley       | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 8/20/2014  | Flood       | A significant push of monsoon moisture fueled an outbreak of thunderstorms over the Mojave Desert. Many storms produced severe weather and flash flooding.   | Topock              | 0          | 0        | \$10,000         | \$0   | \$10,000 |
| 8/20/2014  | Flash Flood | A significant push of monsoon moisture fueled an outbreak of thunderstorms over the Mojave Desert. Many storms produced severe weather and flash flooding.   | Cane Beds           | 0          | 0        | \$5,000          | \$0   | \$5,000  |
| 8/21/2014  | Flash Flood | A significant push of monsoon moisture fueled an outbreak of thunderstorms over the Mojave Desert. Many storms produced severe weather and flash flooding.   | Willow Beach        | 0          | 0        | \$10,000         | \$0   | \$10,000 |
| 8/21/2014  | Flash Flood | A significant push of monsoon moisture fueled an outbreak of thunderstorms over the Mojave Desert. Many storms produced severe weather and flash flooding.   | Dolan Spgs          | 0          | 0        | \$5,000          | \$0   | \$5,000  |
| 9/7/2014   | Flash Flood | A major surge of monsoon moisture aided by Hurricane Norbert just west of Baja California fueled an outbreak of thunderstorms over the Mojave Desert and southern Great Basin. Widespread flash flooding occurred. | Hualapai            | 0          | 0        | \$50,000         | \$0   | \$50,000 |
| 9/7/2014   | Flash Flood | A major surge of monsoon moisture aided by Hurricane Norbert just west of Baja California fueled an outbreak of thunderstorms over the Mojave Desert and southern Great Basin. Widespread flash flooding occurred. | Temple Bar Marina   | 0          | 0        | \$5,000          | \$0   | \$5,000  |
| 9/7/2014   | Flash Flood | A major surge of monsoon moisture aided by Hurricane Norbert just west of Baja California fueled an outbreak of thunderstorms over the Mojave Desert and southern Great Basin. Widespread flash flooding occurred. | (Igm)Mojave Co Arpt | 0          | 0        | \$1,000          | \$0   | \$1,000  |

| Event Date | Hazard      | Description  | Location             | Fatalities | Injuries | Damage Estimates |       |          |
|------------|-------------|--|----------------------|------------|----------|------------------|-------|----------|
|            |             |  |                      |            |          | Property         | Crops | Total    |
| 9/7/2014   | Flash Flood | A major surge of monsoon moisture aided by Hurricane Norbert just west of Baja California fueled an outbreak of thunderstorms over the Mojave Desert and southern Great Basin. Widespread flash flooding occurred. | Dolan Spgs           | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 9/8/2014   | Flash Flood | A major surge of monsoon moisture aided by Hurricane Norbert just west of Baja California fueled an outbreak of thunderstorms over the Mojave Desert and southern Great Basin. Widespread flash flooding occurred. | Littlefield          | 0          | 0        | \$10,000         | \$0   | \$10,000 |
| 9/8/2014   | Flash Flood | A major surge of monsoon moisture aided by Hurricane Norbert just west of Baja California fueled an outbreak of thunderstorms over the Mojave Desert and southern Great Basin. Widespread flash flooding occurred. | (Lhu)Lake Havasu Cit | 0          | 0        | \$10,000         | \$0   | \$10,000 |
| 9/8/2014   | Flood       | A major surge of monsoon moisture aided by Hurricane Norbert just west of Baja California fueled an outbreak of thunderstorms over the Mojave Desert and southern Great Basin. Widespread flash flooding occurred. | Topock               | 0          | 0        | \$2,000          | \$0   | \$2,000  |
| 9/8/2014   | Flash Flood | A major surge of monsoon moisture aided by Hurricane Norbert just west of Baja California fueled an outbreak of thunderstorms over the Mojave Desert and southern Great Basin. Widespread flash flooding occurred. | Oatman               | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 9/16/2014  | Flash Flood | Another push of monsoon moisture fueled thunderstorms over the Mojave Desert. Several storms produced flash flooding, and isolated large hail also occurred.   | Kingman Arpt         | 0          | 0        | \$2,000          | \$0   | \$2,000  |
| 9/16/2014  | Flash Flood | Another push of monsoon moisture fueled thunderstorms over the Mojave Desert. Several storms produced flash flooding, and isolated large hail also occurred.   | Dolan Spgs           | 0          | 0        | \$2,000          | \$0   | \$2,000  |

| Event Date | Hazard      | Description  | Location             | Fatalities | Injuries | Damage Estimates |       |          |
|------------|-------------|--|----------------------|------------|----------|------------------|-------|----------|
|            |             |  |                      |            |          | Property         | Crops | Total    |
| 9/16/2014  | Flash Flood | Another push of monsoon moisture fueled thunderstorms over the Mojave Desert. Several storms produced flash flooding, and isolated large hail also occurred. | (Lhu)Lake Havasu Cit | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 9/16/2014  | Flash Flood | Another push of monsoon moisture fueled thunderstorms over the Mojave Desert. Several storms produced flash flooding, and isolated large hail also occurred. | Walapai              | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 9/16/2014  | Flash Flood | Another push of monsoon moisture fueled thunderstorms over the Mojave Desert. Several storms produced flash flooding, and isolated large hail also occurred. | Hualapai             | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 9/17/2014  | Flood       | Another push of monsoon moisture fueled thunderstorms over the Mojave Desert. Several storms produced flash flooding, and isolated large hail also occurred. | Topock               | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 9/27/2014  | Flash Flood | A Pacific storm system brought a period of wind ahead of it, then tapped into deep moisture which fueled severe thunderstorms and flash flooding.            | Dolan Spgs           | 0          | 0        | \$10,000         | \$0   | \$10,000 |
| 9/27/2014  | Flash Flood | A Pacific storm system brought a period of wind ahead of it, then tapped into deep moisture which fueled severe thunderstorms and flash flooding.            | Colorado City        | 0          | 0        | \$10,000         | \$0   | \$10,000 |
| 9/27/2014  | Flash Flood | A Pacific storm system brought a period of wind ahead of it, then tapped into deep moisture which fueled severe thunderstorms and flash flooding.            | (lgm)Mojave Co Arpt  | 0          | 0        | \$2,000          | \$0   | \$2,000  |
| 9/27/2014  | Flash Flood | A Pacific storm system brought a period of wind ahead of it, then tapped into deep moisture which fueled severe thunderstorms and flash flooding.            | Golden Valley        | 0          | 0        | \$2,000          | \$0   | \$2,000  |
| 9/27/2014  | Flash Flood | A Pacific storm system brought a period of wind ahead of it, then tapped into deep moisture which fueled severe thunderstorms and flash flooding.            | Berry                | 0          | 0        | \$1,000          | \$0   | \$1,000  |



| Event Date | Hazard      | Description  | Location            | Fatalities | Injuries | Damage Estimates |       |         |
|------------|-------------|--|---------------------|------------|----------|------------------|-------|---------|
|            |             |  |                     |            |          | Property         | Crops | Total   |
| 9/27/2014  | Flash Flood | A Pacific storm system brought a period of wind ahead of it, then tapped into deep moisture which fueled severe thunderstorms and flash flooding.                            | New Kingman-Butler  | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 7/2/2015   | Flash Flood | Monsoon moisture fueled thunderstorms over the Mojave Desert and southern Great Basin. Several storms produced severe weather and flash flooding.                            | Tuweep              | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 7/5/2015   | Flash Flood | Another push of monsoon moisture fueled more thunderstorms over the Mojave Desert and southern Great Basin. Significant flash flooding and isolated severe weather occurred. | (Igm)Mojave Co Arpt | 0          | 0        | \$0              | \$0   | \$0     |
| 7/6/2015   | Flash Flood | Another push of monsoon moisture fueled more thunderstorms over the Mojave Desert and southern Great Basin. Significant flash flooding and isolated severe weather occurred. | Yucca               | 0          | 0        | \$5,000          | \$0   | \$5,000 |
| 7/6/2015   | Flash Flood | Another push of monsoon moisture fueled more thunderstorms over the Mojave Desert and southern Great Basin. Significant flash flooding and isolated severe weather occurred. | Temple Bar Marina   | 0          | 0        | \$5,000          | \$0   | \$5,000 |
| 7/6/2015   | Flash Flood | Another push of monsoon moisture fueled more thunderstorms over the Mojave Desert and southern Great Basin. Significant flash flooding and isolated severe weather occurred. | Hackberry           | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 7/17/2015  | Flash Flood | A huge push of monsoon moisture from Hurricane Dolores fueled a major outbreak of flash flooding and severe weather in the Mojave Desert and southern Great Basin.           | Yucca               | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 7/17/2015  | Flash Flood | A huge push of monsoon moisture from Hurricane Dolores fueled a major outbreak of flash flooding and severe weather in the Mojave Desert and southern Great Basin.           | Davis Dam           | 0          | 0        | \$1,000          | \$0   | \$1,000 |

| Event Date | Hazard      | Description  | Location          | Fatalities | Injuries | Damage Estimates |       |         |
|------------|-------------|--|-------------------|------------|----------|------------------|-------|---------|
|            |             |  |                   |            |          | Property         | Crops | Total   |
| 7/18/2015  | Flash Flood | A huge push of monsoon moisture from Hurricane Dolores fueled a major outbreak of flash flooding and severe weather in the Mojave Desert and southern Great Basin. | Colorado City     | 0          | 0        | \$5,000          | \$0   | \$5,000 |
| 7/18/2015  | Flash Flood | A huge push of monsoon moisture from Hurricane Dolores fueled a major outbreak of flash flooding and severe weather in the Mojave Desert and southern Great Basin. | Walapai           | 0          | 0        | \$4,000          | \$0   | \$4,000 |
| 7/18/2015  | Flash Flood | A huge push of monsoon moisture from Hurricane Dolores fueled a major outbreak of flash flooding and severe weather in the Mojave Desert and southern Great Basin. | Getz              | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 7/18/2015  | Flash Flood | A huge push of monsoon moisture from Hurricane Dolores fueled a major outbreak of flash flooding and severe weather in the Mojave Desert and southern Great Basin. | Yucca             | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 7/18/2015  | Flood       | A huge push of monsoon moisture from Hurricane Dolores fueled a major outbreak of flash flooding and severe weather in the Mojave Desert and southern Great Basin. | Haviland          | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 7/18/2015  | Flash Flood | A huge push of monsoon moisture from Hurricane Dolores fueled a major outbreak of flash flooding and severe weather in the Mojave Desert and southern Great Basin. | Hackberry         | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 7/20/2015  | Flash Flood | A huge push of monsoon moisture from Hurricane Dolores fueled a major outbreak of flash flooding and severe weather in the Mojave Desert and southern Great Basin. | Temple Bar Marina | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 7/20/2015  | Flash Flood | A huge push of monsoon moisture from Hurricane Dolores fueled a major outbreak of flash flooding and severe weather in the Mojave Desert and southern Great Basin. | Hualapai          | 0          | 0        | \$2,000          | \$0   | \$2,000 |

| Event Date | Hazard      | Description  | Location             | Fatalities | Injuries | Damage Estimates |       |         |
|------------|-------------|--|----------------------|------------|----------|------------------|-------|---------|
|            |             |  |                      |            |          | Property         | Crops | Total   |
| 7/30/2015  | Flash Flood | Another push of monsoon moisture fueled an outbreak of thunderstorms over the Mojave Desert and southern Great Basin. Several storms produced flash flooding and severe weather. | Griffith             | 0          | 0        | \$5,000          | \$0   | \$5,000 |
| 7/30/2015  | Flood       | Another push of monsoon moisture fueled an outbreak of thunderstorms over the Mojave Desert and southern Great Basin. Several storms produced flash flooding and severe weather. | Topock               | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 7/30/2015  | Flash Flood | Another push of monsoon moisture fueled an outbreak of thunderstorms over the Mojave Desert and southern Great Basin. Several storms produced flash flooding and severe weather. | (Lhu)Lake Havasu Cit | 0          | 0        | \$0              | \$0   | \$0     |
| 8/6/2015   | Flood       | A push of monsoon moisture fueled thunderstorms over the Mojave Desert and southern Great Basin. Some storms produced flash flooding and severe weather.                         | Topock               | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 8/7/2015   | Flash Flood | A push of monsoon moisture fueled thunderstorms over the Mojave Desert and southern Great Basin. Some storms produced flash flooding and severe weather.                         | (Lhu)Lake Havasu Cit | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 8/7/2015   | Flash Flood | A push of monsoon moisture fueled thunderstorms over the Mojave Desert and southern Great Basin. Some storms produced flash flooding and severe weather.                         | New Kingman-Butler   | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 8/7/2015   | Flash Flood | A push of monsoon moisture fueled thunderstorms over the Mojave Desert and southern Great Basin. Some storms produced flash flooding and severe weather.                         | Kingman Arpt         | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 8/7/2015   | Flash Flood | A push of monsoon moisture fueled thunderstorms over the Mojave Desert and southern Great Basin. Some storms produced flash flooding and severe weather.                         | Peach Spgs           | 0          | 0        | \$1,000          | \$0   | \$1,000 |

| Event Date | Hazard      | Description   | Location            | Fatalities | Injuries | Damage Estimates |       |           |
|------------|-------------|---|---------------------|------------|----------|------------------|-------|-----------|
|            |             |   |                     |            |          | Property         | Crops | Total     |
| 8/9/2015   | Flash Flood | A push of monsoon moisture fueled thunderstorms over the Mojave Desert and southern Great Basin. Some storms produced flash flooding and severe weather.                                    | Walapai             | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 8/13/2015  | Flash Flood | Another push of monsoon moisture fueled thunderstorms over the eastern portions of the Mojave Desert and southern Great Basin. Some storms produced severe weather and flash flooding.      | (Igm)Mojave Co Arpt | 0          | 0        | \$2,000          | \$0   | \$2,000   |
| 9/14/2015  | Flash Flood | Training thunderstorms in the mountains above Hildale, Utah led to major flash flooding in Colorado City, AZ and areas downstream. One man was killed when his car was swept away.          | Colorado City Arpt  | 1          | 0        | \$500,000        | \$0   | \$500,000 |
| 10/6/2015  | Flood       | A strong upper level low fueled thunderstorms over the Mojave Desert. Many storms produced flash flooding, and isolated severe weather also occurred.                                       | Topock              | 0          | 0        | \$2,000          | \$0   | \$2,000   |
| 10/6/2015  | Flash Flood | A strong upper level low fueled thunderstorms over the Mojave Desert. Many storms produced flash flooding, and isolated severe weather also occurred.                                       | Golden Valley       | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 10/17/2015 | Flash Flood | An upper level low pressure system brought a round of thunderstorms to the Mojave Desert and southern Great Basin. Significant flash flooding occurred, along with isolated severe weather. | Colorado City       | 0          | 0        | \$5,000          | \$0   | \$5,000   |
| 10/18/2015 | Flash Flood | An upper level low pressure system brought a round of thunderstorms to the Mojave Desert and southern Great Basin. Significant flash flooding occurred, along with isolated severe weather. | Golden Valley       | 0          | 0        | \$5,000          | \$0   | \$5,000   |

| Event Date | Hazard      | Description   | Location           | Fatalities | Injuries | Damage Estimates |       |         |
|------------|-------------|---|--------------------|------------|----------|------------------|-------|---------|
|            |             |   |                    |            |          | Property         | Crops | Total   |
| 10/18/2015 | Flash Flood | An upper level low pressure system brought a round of thunderstorms to the Mojave Desert and southern Great Basin. Significant flash flooding occurred, along with isolated severe weather.                             | Dolan Spgs         | 0          | 0        | \$5,000          | \$0   | \$5,000 |
| 10/18/2015 | Flood       | An upper level low pressure system brought a round of thunderstorms to the Mojave Desert and southern Great Basin. Significant flash flooding occurred, along with isolated severe weather.                             | Topock             | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 10/18/2015 | Flash Flood | An upper level low pressure system brought a round of thunderstorms to the Mojave Desert and southern Great Basin. Significant flash flooding occurred, along with isolated severe weather.                             | Temple Bar Marina  | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 10/18/2015 | Flash Flood | An upper level low pressure system brought a round of thunderstorms to the Mojave Desert and southern Great Basin. Significant flash flooding occurred, along with isolated severe weather.                             | New Kingman-Butler | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 10/20/2015 | Flash Flood | A few thunderstorms lingered over the Mojave Desert as the low pressure system responsible for the previous three days' worth of flash flooding and severe weather slowly moved east. Isolated flash flooding occurred. | Signal             | 0          | 0        | \$5,000          | \$0   | \$5,000 |
| 10/20/2015 | Flash Flood | A few thunderstorms lingered over the Mojave Desert as the low pressure system responsible for the previous three days' worth of flash flooding and severe weather slowly moved east. Isolated flash flooding occurred. | Oatman             | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 10/20/2015 | Flash Flood | A few thunderstorms lingered over the Mojave Desert as the low pressure system responsible for the previous three days' worth of flash flooding and severe weather slowly moved east. Isolated flash flooding occurred. | Kingman Arpt       | 0          | 0        | \$2,000          | \$0   | \$2,000 |

| Event Date | Hazard      | Description   | Location           | Fatalities | Injuries | Damage Estimates |       |          |
|------------|-------------|---|--------------------|------------|----------|------------------|-------|----------|
|            |             |   |                    |            |          | Property         | Crops | Total    |
| 7/1/2016   | Flash Flood | Severe weather and flash flooding which began on June 27th with the first monsoon moisture push of the season continued through July 2nd.                                     | Oatman             | 0          | 0        | \$5,000          | \$0   | \$5,000  |
| 7/2/2016   | Flash Flood | Severe weather and flash flooding which began on June 27th with the first monsoon moisture push of the season continued through July 2nd.                                     | Valentine          | 0          | 0        | \$2,000          | \$0   | \$2,000  |
| 7/2/2016   | Flash Flood | Severe weather and flash flooding which began on June 27th with the first monsoon moisture push of the season continued through July 2nd.                                     | Signal             | 0          | 0        | \$2,000          | \$0   | \$2,000  |
| 7/2/2016   | Flash Flood | Severe weather and flash flooding which began on June 27th with the first monsoon moisture push of the season continued through July 2nd.                                     | Davis Dam          | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 7/27/2016  | Flash Flood | Another push of monsoon moisture led to isolated severe weather and flash flooding over the Mojave Desert and southern Great Basin. The episode continued through August 5th. | New Kingman-Butler | 0          | 0        | \$5,000          | \$0   | \$5,000  |
| 8/1/2016   | Flash Flood | A monsoon moisture push which began on July 27th continued into August 5th, bringing considerable flash flooding and isolated severe weather.                                 | Dolan Spgs         | 0          | 0        | \$50,000         | \$0   | \$50,000 |
| 8/1/2016   | Flash Flood | A monsoon moisture push which began on July 27th continued into August 5th, bringing considerable flash flooding and isolated severe weather.                                 | Colorado City      | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 8/2/2016   | Flood       | A monsoon moisture push which began on July 27th continued into August 5th, bringing considerable flash flooding and isolated severe weather.                                 | Topock             | 0          | 0        | \$2,000          | \$0   | \$2,000  |
| 8/2/2016   | Flash Flood | A monsoon moisture push which began on July 27th continued into August 5th, bringing considerable flash flooding and isolated severe weather.                                 | Kingman            | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 8/2/2016   | Flash Flood | A monsoon moisture push which began on July 27th continued into August 5th, bringing considerable flash flooding and isolated severe weather.                                 | Haviland           | 0          | 0        | \$1,000          | \$0   | \$1,000  |

| Event Date | Hazard      | Description  | Location             | Fatalities | Injuries | Damage Estimates |       |         |
|------------|-------------|--|----------------------|------------|----------|------------------|-------|---------|
|            |             |  |                      |            |          | Property         | Crops | Total   |
| 8/2/2016   | Flood       | A monsoon moisture push which began on July 27th continued into August 5th, bringing considerable flash flooding and isolated severe weather.                          | (Lhu)Lake Havasu Cit | 0          | 0        | \$0              | \$0   | \$0     |
| 8/3/2016   | Flash Flood | A monsoon moisture push which began on July 27th continued into August 5th, bringing considerable flash flooding and isolated severe weather.                          | Kingman Arpt         | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 8/3/2016   | Flash Flood | A monsoon moisture push which began on July 27th continued into August 5th, bringing considerable flash flooding and isolated severe weather.                          | (lgm)Mojave Co Arpt  | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 8/5/2016   | Flood       | A monsoon moisture push which began on July 27th continued into August 5th, bringing considerable flash flooding and isolated severe weather.                          | Wikieup              | 0          | 0        | \$5,000          | \$0   | \$5,000 |
| 8/9/2016   | Flash Flood | A brief push of moisture into northwest Arizona led to isolated flash flooding.  | Peach Spgs           | 0          | 0        | \$5,000          | \$0   | \$5,000 |
| 8/10/2016  | Flash Flood | A brief push of moisture into northwest Arizona led to isolated flash flooding.  | Peach Spgs           | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 8/18/2016  | Flash Flood | Another push of monsoon moisture brought isolated severe weather and flash flooding.   | Hualapai             | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 8/22/2016  | Flash Flood | A significant push of monsoon moisture, aided by an approaching upper level trough, brought an outbreak of severe weather and flash flooding.                          | Golden Valley        | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 8/22/2016  | Flash Flood | A significant push of monsoon moisture, aided by an approaching upper level trough, brought an outbreak of severe weather and flash flooding.                          | (lgm)Mojave Co Arpt  | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 8/22/2016  | Flash Flood | A significant push of monsoon moisture, aided by an approaching upper level trough, brought an outbreak of severe weather and flash flooding.                          | New Kingman-Butler   | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 8/26/2016  | Flash Flood | Yet more monsoon moisture, this time aided by an approaching upper level low and jet streak, brought a mainly nocturnal outbreak of severe weather and flash flooding. | Riviera              | 0          | 0        | \$1,000          | \$0   | \$1,000 |



| Event Date | Hazard      | Description  | Location             | Fatalities | Injuries | Damage Estimates |       |           |
|------------|-------------|--|----------------------|------------|----------|------------------|-------|-----------|
|            |             |  |                      |            |          | Property         | Crops | Total     |
| 8/27/2016  | Flash Flood | Yet more monsoon moisture, this time aided by an approaching upper level low and jet streak, brought a mainly nocturnal outbreak of severe weather and flash flooding.     | Golden Shores        | 0          | 0        | \$3,000          | \$0   | \$3,000   |
| 8/27/2016  | Flash Flood | Yet more monsoon moisture, this time aided by an approaching upper level low and jet streak, brought a mainly nocturnal outbreak of severe weather and flash flooding.     | (Lhu)Lake Havasu Cit | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 9/22/2016  | Flash Flood | A cold front passing through the Mojave Desert brought a band of thunderstorms well ahead of it, and strong winds with dust storm conditions immediately ahead of it.      | Colorado City        | 0          | 0        | \$5,000          | \$0   | \$5,000   |
| 11/21/2016 | Flash Flood | A short line of thunderstorms formed rapidly overnight, bringing isolated flash flooding.  | Golden Valley        | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 12/24/2016 | Flood       | A wet Pacific storm brought heavy rain and localized flooding to the lower elevations of the Mojave Desert.  | Topock               | 0          | 0        | \$2,000          | \$0   | \$2,000   |
| 12/24/2016 | Flood       | A wet Pacific storm brought heavy rain and localized flooding to the lower elevations of the Mojave Desert.  | Kingman Arpt         | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 7/13/2017  | Flash Flood | Monsoon moisture produced another round of scattered thunderstorms in Mohave County. One storm produced flash flooding.  | Kingman Arpt         | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 7/18/2017  | Flash Flood | Another push of monsoon moisture fueled thunderstorms over the eastern parts of the Mojave Desert. Some storms produced severe weather and flash flooding.                 | Wikieup              | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 7/25/2017  | Flash Flood | A big push of monsoon moisture fueled an outbreak of thunderstorms over the Desert Southwest. Many storms in the Mojave Desert produced flash flooding and severe weather. | Willow Beach         | 0          | 0        | \$100,000        | \$0   | \$100,000 |
| 7/25/2017  | Flash Flood | A big push of monsoon moisture fueled an outbreak of thunderstorms over the Desert Southwest. Many storms in the Mojave Desert produced flash flooding and severe weather. | Meadview             | 0          | 0        | \$5,000          | \$0   | \$5,000   |

| Event Date | Hazard      | Description  | Location            | Fatalities | Injuries | Damage Estimates |       |         |
|------------|-------------|--|---------------------|------------|----------|------------------|-------|---------|
|            |             |  |                     |            |          | Property         | Crops | Total   |
| 7/25/2017  | Flash Flood | A big push of monsoon moisture fueled an outbreak of thunderstorms over the Desert Southwest. Many storms in the Mojave Desert produced flash flooding and severe weather. | Meadview            | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 7/25/2017  | Flash Flood | A big push of monsoon moisture fueled an outbreak of thunderstorms over the Desert Southwest. Many storms in the Mojave Desert produced flash flooding and severe weather. | New Kingman-Butler  | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 7/25/2017  | Flash Flood | A big push of monsoon moisture fueled an outbreak of thunderstorms over the Desert Southwest. Many storms in the Mojave Desert produced flash flooding and severe weather. | Wikieup             | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 7/25/2017  | Flash Flood | A big push of monsoon moisture fueled an outbreak of thunderstorms over the Desert Southwest. Many storms in the Mojave Desert produced flash flooding and severe weather. | Valentine           | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 7/25/2017  | Flash Flood | A big push of monsoon moisture fueled an outbreak of thunderstorms over the Desert Southwest. Many storms in the Mojave Desert produced flash flooding and severe weather. | (Igm)Mojave Co Arpt | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 7/29/2017  | Flash Flood | Lingering moisture fueled isolated thunderstorms over the Mojave Desert. A couple of storms produced flash flooding.   | Signal              | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 8/2/2017   | Flash Flood | A push of monsoon moisture fueled an outbreak of thunderstorms with severe weather and flash flooding.   | Yucca               | 0          | 0        | \$3,000          | \$0   | \$3,000 |
| 8/2/2017   | Flash Flood | A push of monsoon moisture fueled an outbreak of thunderstorms with severe weather and flash flooding.   | Hackberry           | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 8/2/2017   | Flash Flood | A push of monsoon moisture fueled an outbreak of thunderstorms with severe weather and flash flooding.   | Oatman              | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 8/2/2017   | Flash Flood | A push of monsoon moisture fueled an outbreak of thunderstorms with severe weather and flash flooding.   | Mohave Valley       | 0          | 0        | \$1,000          | \$0   | \$1,000 |

| Event Date | Hazard      | Description   | Location            | Fatalities | Injuries | Damage Estimates |       |         |
|------------|-------------|---|---------------------|------------|----------|------------------|-------|---------|
|            |             |   |                     |            |          | Property         | Crops | Total   |
| 8/2/2017   | Flash Flood | A push of monsoon moisture fueled an outbreak of thunderstorms with severe weather and flash flooding.  | Topock              | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 8/10/2017  | Flash Flood | A weak push of monsoon moisture triggered isolated thunderstorms over the Mojave Desert. A few storms produced severe weather and flash flooding.   | Haviland            | 0          | 0        | \$5,000          | \$0   | \$5,000 |
| 8/12/2017  | Flash Flood | A weak push of monsoon moisture triggered isolated thunderstorms over the Mojave Desert. A few storms produced severe weather and flash flooding.   | Willow Beach        | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 8/24/2017  | Flash Flood | A weak area of low pressure passing through the Mojave Desert plus lingering moisture triggered a small area of thunderstorms. A few storms produced flash flooding over Mohave County.               | Dolan Spgs          | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 8/24/2017  | Flash Flood | A weak area of low pressure passing through the Mojave Desert plus lingering moisture triggered a small area of thunderstorms. A few storms produced flash flooding over Mohave County.               | Dolan Spgs          | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 8/24/2017  | Flash Flood | A weak area of low pressure passing through the Mojave Desert plus lingering moisture triggered a small area of thunderstorms. A few storms produced flash flooding over Mohave County.               | Temple Bar Marina   | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 9/2/2017   | Flash Flood | Monsoon moisture pushing west and north brought another round of thunderstorms to the Mojave Desert.  | Dolan Spgs          | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 9/8/2017   | Flash Flood | A strong push of monsoon moisture plus low pressure moving in from the west triggered an outbreak of thunderstorms over the Mojave Desert. Several storms produced flash flooding and severe weather. | (Igm)Mojave Co Arpt | 0          | 0        | \$5,000          | \$0   | \$5,000 |

| Event Date | Hazard      | Description   | Location             | Fatalities | Injuries | Damage Estimates |       |         |
|------------|-------------|---|----------------------|------------|----------|------------------|-------|---------|
|            |             |   |                      |            |          | Property         | Crops | Total   |
| 9/8/2017   | Flash Flood | A strong push of monsoon moisture plus low pressure moving in from the west triggered an outbreak of thunderstorms over the Mojave Desert. Several storms produced flash flooding and severe weather. | Golden Valley        | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 9/8/2017   | Flash Flood | A strong push of monsoon moisture plus low pressure moving in from the west triggered an outbreak of thunderstorms over the Mojave Desert. Several storms produced flash flooding and severe weather. | Willow Beach         | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 9/9/2017   | Flash Flood | A strong push of monsoon moisture plus low pressure moving in from the west triggered an outbreak of thunderstorms over the Mojave Desert. Several storms produced flash flooding and severe weather. | (Lhu)Lake Havasu Cit | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 9/9/2017   | Flash Flood | A strong push of monsoon moisture plus low pressure moving in from the west triggered an outbreak of thunderstorms over the Mojave Desert. Several storms produced flash flooding and severe weather. | Getz                 | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 7/9/2018   | Flash Flood | The first monsoon moisture push of the season fueled isolated thunderstorms over the Mojave Desert. Some storms produced severe weather and flash flooding.   | Chloride             | 0          | 0        | \$5,000          | \$0   | \$5,000 |
| 7/9/2018   | Flash Flood | The first monsoon moisture push of the season fueled isolated thunderstorms over the Mojave Desert. Some storms produced severe weather and flash flooding.   | Hualapai             | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 7/11/2018  | Flash Flood | A more substantial push of monsoon moisture helped trigger widespread thunderstorms across the Mojave Desert and southern Great Basin. Many storms produced severe weather and flash flooding.        | Yucca                | 0          | 0        | \$1,000          | \$0   | \$1,000 |

| Event Date | Hazard      | Description  | Location     | Fatalities | Injuries | Damage Estimates |       |          |
|------------|-------------|--|--------------|------------|----------|------------------|-------|----------|
|            |             |  |              |            |          | Property         | Crops | Total    |
| 7/11/2018  | Flash Flood | A more substantial push of monsoon moisture helped trigger widespread thunderstorms across the Mojave Desert and southern Great Basin. Many storms produced severe weather and flash flooding. | Oatman       | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 7/12/2018  | Flash Flood | A more substantial push of monsoon moisture helped trigger widespread thunderstorms across the Mojave Desert and southern Great Basin. Many storms produced severe weather and flash flooding. | Santa Claus  | 0          | 0        | \$10,000         | \$0   | \$10,000 |
| 7/12/2018  | Flash Flood | A more substantial push of monsoon moisture helped trigger widespread thunderstorms across the Mojave Desert and southern Great Basin. Many storms produced severe weather and flash flooding. | Kingman Arpt | 0          | 0        | \$10,000         | \$0   | \$10,000 |
| 7/12/2018  | Flash Flood | A more substantial push of monsoon moisture helped trigger widespread thunderstorms across the Mojave Desert and southern Great Basin. Many storms produced severe weather and flash flooding. | Getz         | 0          | 0        | \$2,000          | \$0   | \$2,000  |
| 7/12/2018  | Flash Flood | A more substantial push of monsoon moisture helped trigger widespread thunderstorms across the Mojave Desert and southern Great Basin. Many storms produced severe weather and flash flooding. | Oatman       | 0          | 0        | \$2,000          | \$0   | \$2,000  |
| 7/12/2018  | Flash Flood | A more substantial push of monsoon moisture helped trigger widespread thunderstorms across the Mojave Desert and southern Great Basin. Many storms produced severe weather and flash flooding. | Signal       | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 7/12/2018  | Flash Flood | A more substantial push of monsoon moisture helped trigger widespread thunderstorms across the Mojave Desert and southern Great Basin. Many storms produced severe weather and flash flooding. | Hualapai     | 0          | 0        | \$1,000          | \$0   | \$1,000  |

| Event Date | Hazard      | Description   | Location             | Fatalities | Injuries | Damage Estimates |       |         |
|------------|-------------|---|----------------------|------------|----------|------------------|-------|---------|
|            |             |   |                      |            |          | Property         | Crops | Total   |
| 7/12/2018  | Flash Flood | A more substantial push of monsoon moisture helped trigger widespread thunderstorms across the Mojave Desert and southern Great Basin. Many storms produced severe weather and flash flooding.            | Willow Beach         | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 7/12/2018  | Flash Flood | A more substantial push of monsoon moisture helped trigger widespread thunderstorms across the Mojave Desert and southern Great Basin. Many storms produced severe weather and flash flooding.            | (Lhu)Lake Havasu Cit | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 7/12/2018  | Flash Flood | A more substantial push of monsoon moisture helped trigger widespread thunderstorms across the Mojave Desert and southern Great Basin. Many storms produced severe weather and flash flooding.            | Valentine            | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 7/12/2018  | Flash Flood | A more substantial push of monsoon moisture helped trigger widespread thunderstorms across the Mojave Desert and southern Great Basin. Many storms produced severe weather and flash flooding.            | Willow Beach         | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 7/17/2018  | Flash Flood | After a brief break, another push of monsoon moisture fueled another outbreak of thunderstorms across the Mojave Desert and southern Great Basin. Many storms produced severe weather and flash flooding. | (lgm)Mojave Co Arpt  | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 7/18/2018  | Flash Flood | After a brief break, another push of monsoon moisture fueled another outbreak of thunderstorms across the Mojave Desert and southern Great Basin. Many storms produced severe weather and flash flooding. | (lgm)Mojave Co Arpt  | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 7/21/2018  | Flash Flood | After a brief break, another push of monsoon moisture fueled another outbreak of thunderstorms across the Mojave Desert and southern Great Basin. Many storms produced severe weather and flash flooding. | Griffith             | 0          | 0        | \$1,000          | \$0   | \$1,000 |

| Event Date | Hazard      | Description  | Location  | Fatalities | Injuries | Damage Estimates |       |         |
|------------|-------------|--|-----------|------------|----------|------------------|-------|---------|
|            |             |  |           |            |          | Property         | Crops | Total   |
| 7/30/2018  | Flood       | The last push of moisture in July triggered scattered thunderstorms over the Mojave Desert. Some storms produced severe weather and flash flooding.                | Kingman   | 0          | 0        | \$0              | \$0   | \$0     |
| 8/2/2018   | Flash Flood | Southerly flow pulled moisture into the Desert Southwest, fueling thunderstorms over the Mojave Desert. Many storms produced flash flooding and/or severe weather. | Meadview  | 0          | 0        | \$5,000          | \$0   | \$5,000 |
| 8/2/2018   | Flash Flood | Southerly flow pulled moisture into the Desert Southwest, fueling thunderstorms over the Mojave Desert. Many storms produced flash flooding and/or severe weather. | Meadview  | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 8/2/2018   | Flash Flood | Southerly flow pulled moisture into the Desert Southwest, fueling thunderstorms over the Mojave Desert. Many storms produced flash flooding and/or severe weather. | Hualapai  | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 8/2/2018   | Flash Flood | Southerly flow pulled moisture into the Desert Southwest, fueling thunderstorms over the Mojave Desert. Many storms produced flash flooding and/or severe weather. | Cone Spgs | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 8/2/2018   | Flash Flood | Southerly flow pulled moisture into the Desert Southwest, fueling thunderstorms over the Mojave Desert. Many storms produced flash flooding and/or severe weather. | Cone Spgs | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 8/2/2018   | Flash Flood | Southerly flow pulled moisture into the Desert Southwest, fueling thunderstorms over the Mojave Desert. Many storms produced flash flooding and/or severe weather. | Signal    | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 8/2/2018   | Flash Flood | Southerly flow pulled moisture into the Desert Southwest, fueling thunderstorms over the Mojave Desert. Many storms produced flash flooding and/or severe weather. | Wikieup   | 0          | 0        | \$1,000          | \$0   | \$1,000 |



| Event Date | Hazard      | Description  | Location            | Fatalities | Injuries | Damage Estimates |       |          |
|------------|-------------|--|---------------------|------------|----------|------------------|-------|----------|
|            |             |  |                     |            |          | Property         | Crops | Total    |
| 8/2/2018   | Flash Flood | Southerly flow pulled moisture into the Desert Southwest, fueling thunderstorms over the Mojave Desert. Many storms produced flash flooding and/or severe weather. | Wikieup             | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 8/2/2018   | Flash Flood | Southerly flow pulled moisture into the Desert Southwest, fueling thunderstorms over the Mojave Desert. Many storms produced flash flooding and/or severe weather. | Kingman             | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 8/2/2018   | Flash Flood | Southerly flow pulled moisture into the Desert Southwest, fueling thunderstorms over the Mojave Desert. Many storms produced flash flooding and/or severe weather. | (Igm)Mojave Co Arpt | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 8/2/2018   | Flood       | Southerly flow pulled moisture into the Desert Southwest, fueling thunderstorms over the Mojave Desert. Many storms produced flash flooding and/or severe weather. | Topock              | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 8/9/2018   | Flash Flood | Hurricane John triggered a Gulf Surge, bringing scattered thunderstorms to the Mojave Desert, some of which produced severe weather and/or flash flooding.         | Peach Spgs          | 0          | 0        | \$2,000          | \$0   | \$2,000  |
| 8/10/2018  | Flash Flood | Hurricane John triggered a Gulf Surge, bringing scattered thunderstorms to the Mojave Desert, some of which produced severe weather and/or flash flooding.         | Tuweep              | 0          | 2        | \$25,000         | \$0   | \$25,000 |
| 8/11/2018  | Flash Flood | Hurricane John triggered a Gulf Surge, bringing scattered thunderstorms to the Mojave Desert, some of which produced severe weather and/or flash flooding.         | Oatman              | 0          | 0        | \$5,000          | \$0   | \$5,000  |
| 8/14/2018  | Flash Flood | Southerly flow pulled moisture into the Mojave Desert, fueling scattered thunderstorms. Some storms produced severe weather and/or flash flooding.                 | (Igm)Mojave Co Arpt | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 8/15/2018  | Flash Flood | Southerly flow pulled moisture into the Mojave Desert, fueling scattered thunderstorms. Some storms produced severe weather and/or flash flooding.                 | Kingman Arpt        | 0          | 0        | \$1,000          | \$0   | \$1,000  |

| Event Date | Hazard      | Description  | Location      | Fatalities | Injuries | Damage Estimates |       |           |
|------------|-------------|--|---------------|------------|----------|------------------|-------|-----------|
|            |             |  |               |            |          | Property         | Crops | Total     |
| 8/15/2018  | Flash Flood | Southerly flow pulled moisture into the Mojave Desert, fueling scattered thunderstorms. Some storms produced severe weather and/or flash flooding.                     | Walapai       | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 8/16/2018  | Flash Flood | Southerly flow pulled moisture into the Mojave Desert, fueling scattered thunderstorms. Some storms produced severe weather and/or flash flooding.                     | Willow Beach  | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 8/17/2018  | Flash Flood | Southerly flow pulled moisture into the Mojave Desert, fueling scattered thunderstorms. Some storms produced severe weather and/or flash flooding.                     | Signal        | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 8/21/2018  | Flash Flood | Southeasterly flow pulled monsoon moisture up into the eastern Mojave Desert, fueling scattered thunderstorms over Mohave County. Some storms produced flash flooding. | Cane Beds     | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 8/22/2018  | Flash Flood | Southeasterly flow pulled monsoon moisture up into the eastern Mojave Desert, fueling scattered thunderstorms over Mohave County. Some storms produced flash flooding. | Colorado City | 0          | 0        | \$100,000        | \$0   | \$100,000 |
| 8/22/2018  | Flash Flood | Southeasterly flow pulled monsoon moisture up into the eastern Mojave Desert, fueling scattered thunderstorms over Mohave County. Some storms produced flash flooding. | Cone Spgs     | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 8/22/2018  | Flash Flood | Southeasterly flow pulled monsoon moisture up into the eastern Mojave Desert, fueling scattered thunderstorms over Mohave County. Some storms produced flash flooding. | Cone Spgs     | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 8/22/2018  | Flash Flood | Southeasterly flow pulled monsoon moisture up into the eastern Mojave Desert, fueling scattered thunderstorms over Mohave County. Some storms produced flash flooding. | Wikieup       | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 8/22/2018  | Flash Flood | Southeasterly flow pulled monsoon moisture up into the eastern Mojave Desert, fueling scattered thunderstorms over Mohave County. Some storms produced flash flooding. | Wikieup       | 0          | 0        | \$1,000          | \$0   | \$1,000   |

| Event Date | Hazard      | Description   | Location      | Fatalities | Injuries | Damage Estimates |       |         |
|------------|-------------|---|---------------|------------|----------|------------------|-------|---------|
|            |             |   |               |            |          | Property         | Crops | Total   |
| 8/23/2018  | Flash Flood | Southeasterly flow pulled monsoon moisture up into the eastern Mojave Desert, fueling scattered thunderstorms over Mohave County. Some storms produced flash flooding.  | Signal        | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 9/3/2018   | Flash Flood | Broad troughing and low grade monsoon moisture triggered a few thunderstorms over Mohave County.  | Colorado City | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 10/3/2018  | Flash Flood | A strong Pacific low pressure system plus leftover moisture from the remnants of Hurricane Rosa produced thunderstorms over the Mojave Desert. Significant flash flooding and isolated severe weather occurred. | Berry         | 0          | 0        | \$4,000          | \$0   | \$4,000 |
| 10/3/2018  | Flash Flood | A strong Pacific low pressure system plus leftover moisture from the remnants of Hurricane Rosa produced thunderstorms over the Mojave Desert. Significant flash flooding and isolated severe weather occurred. | Kingman       | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 10/3/2018  | Flash Flood | A strong Pacific low pressure system plus leftover moisture from the remnants of Hurricane Rosa produced thunderstorms over the Mojave Desert. Significant flash flooding and isolated severe weather occurred. | Mohave Valley | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 10/3/2018  | Flash Flood | A strong Pacific low pressure system plus leftover moisture from the remnants of Hurricane Rosa produced thunderstorms over the Mojave Desert. Significant flash flooding and isolated severe weather occurred. | Golden Valley | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 10/3/2018  | Flood       | A strong Pacific low pressure system plus leftover moisture from the remnants of Hurricane Rosa produced thunderstorms over the Mojave Desert. Significant flash flooding and isolated severe weather occurred. | Topock        | 0          | 0        | \$1,000          | \$0   | \$1,000 |

| Event Date | Hazard      | Description   | Location  | Fatalities | Injuries | Damage Estimates |       |         |
|------------|-------------|---|-----------|------------|----------|------------------|-------|---------|
|            |             |   |           |            |          | Property         | Crops | Total   |
| 10/3/2018  | Flash Flood | A strong Pacific low pressure system plus leftover moisture from the remnants of Hurricane Rosa produced thunderstorms over the Mojave Desert. Significant flash flooding and isolated severe weather occurred. | Kingman   | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 10/3/2018  | Flash Flood | A strong Pacific low pressure system plus leftover moisture from the remnants of Hurricane Rosa produced thunderstorms over the Mojave Desert. Significant flash flooding and isolated severe weather occurred. | Kingman   | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 10/3/2018  | Flash Flood | A strong Pacific low pressure system plus leftover moisture from the remnants of Hurricane Rosa produced thunderstorms over the Mojave Desert. Significant flash flooding and isolated severe weather occurred. | Getz      | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 10/3/2018  | Flash Flood | A strong Pacific low pressure system plus leftover moisture from the remnants of Hurricane Rosa produced thunderstorms over the Mojave Desert. Significant flash flooding and isolated severe weather occurred. | Hualapai  | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 10/3/2018  | Flash Flood | A strong Pacific low pressure system plus leftover moisture from the remnants of Hurricane Rosa produced thunderstorms over the Mojave Desert. Significant flash flooding and isolated severe weather occurred. | Hackberry | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 10/3/2018  | Flash Flood | A strong Pacific low pressure system plus leftover moisture from the remnants of Hurricane Rosa produced thunderstorms over the Mojave Desert. Significant flash flooding and isolated severe weather occurred. | Kingman   | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 10/3/2018  | Flash Flood | A strong Pacific low pressure system plus leftover moisture from the remnants of Hurricane Rosa produced thunderstorms over the Mojave Desert. Significant flash flooding and isolated severe weather occurred. | Kingman   | 0          | 0        | \$1,000          | \$0   | \$1,000 |

| Event Date | Hazard      | Description   | Location     | Fatalities | Injuries | Damage Estimates |       |          |
|------------|-------------|---|--------------|------------|----------|------------------|-------|----------|
|            |             |   |              |            |          | Property         | Crops | Total    |
| 10/4/2018  | Flash Flood | A strong Pacific low pressure system plus leftover moisture from the remnants of Hurricane Rosa produced thunderstorms over the Mojave Desert. Significant flash flooding and isolated severe weather occurred. | Mc Connico   | 1          | 0        | \$25,000         | \$0   | \$25,000 |
| 10/4/2018  | Flash Flood | A strong Pacific low pressure system plus leftover moisture from the remnants of Hurricane Rosa produced thunderstorms over the Mojave Desert. Significant flash flooding and isolated severe weather occurred. | Getz         | 0          | 0        | \$5,000          | \$0   | \$5,000  |
| 10/4/2018  | Flash Flood | A strong Pacific low pressure system plus leftover moisture from the remnants of Hurricane Rosa produced thunderstorms over the Mojave Desert. Significant flash flooding and isolated severe weather occurred. | Wikieup      | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 10/4/2018  | Flash Flood | A strong Pacific low pressure system plus leftover moisture from the remnants of Hurricane Rosa produced thunderstorms over the Mojave Desert. Significant flash flooding and isolated severe weather occurred. | Cone Spgs    | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 10/4/2018  | Flash Flood | A strong Pacific low pressure system plus leftover moisture from the remnants of Hurricane Rosa produced thunderstorms over the Mojave Desert. Significant flash flooding and isolated severe weather occurred. | Wikieup      | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 10/4/2018  | Flash Flood | A strong Pacific low pressure system plus leftover moisture from the remnants of Hurricane Rosa produced thunderstorms over the Mojave Desert. Significant flash flooding and isolated severe weather occurred. | Getz         | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 10/11/2018 | Flash Flood | A low pressure system moving in from the southern California coast tapped into subtropical moisture, fueling thunderstorms over the Mojave Desert. A few storms produced flash flooding.                        | Willow Beach | 0          | 0        | \$2,000          | \$0   | \$2,000  |

| Event Date | Hazard      | Description  | Location      | Fatalities | Injuries | Damage Estimates |       |           |
|------------|-------------|--|---------------|------------|----------|------------------|-------|-----------|
|            |             |  |               |            |          | Property         | Crops | Total     |
| 10/11/2018 | Flash Flood | A low pressure system moving in from the southern California coast tapped into subtropical moisture, fueling thunderstorms over the Mojave Desert. A few storms produced flash flooding. | Walapai       | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 10/12/2018 | Flood       | A low pressure system moving in from the southern California coast tapped into subtropical moisture, fueling thunderstorms over the Mojave Desert. A few storms produced flash flooding. | Topock        | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 10/22/2018 | Flash Flood | A Pacific low pressure system pulled up a plume of subtropical moisture, triggering thunderstorms over the Mojave Desert. A few storms produced flash flooding.                          | Dolan Spgs    | 0          | 0        | \$2,000          | \$0   | \$2,000   |
| 10/22/2018 | Flash Flood | A Pacific low pressure system pulled up a plume of subtropical moisture, triggering thunderstorms over the Mojave Desert. A few storms produced flash flooding.                          | Dolan Spgs    | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 7/24/2019  | Flash Flood | A brief influx of monsoon moisture brought thunderstorms to the southern Mojave Desert. Some of the storms produced flooding.  | Golden Valley | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 8/7/2019   | Flash Flood | Monsoon moisture seeped into the southern Mojave Desert, fueling scattered thunderstorms. Some storms produced high winds and flash flooding.  | Golden Valley | 0          | 0        | \$25,000         | \$0   | \$25,000  |
| 8/7/2019   | Flood       | Monsoon moisture seeped into the southern Mojave Desert, fueling scattered thunderstorms. Some storms produced high winds and flash flooding.  | Griffith      | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 9/23/2019  | Flash Flood | Thunderstorms with very impressive supercellular structures and radar presentations (unusual for the region) produced large hail, damaging winds, and flash flooding.                    | Mohave Valley | 0          | 0        | \$100,000        | \$0   | \$100,000 |

| Event Date | Hazard      | Description   | Location             | Fatalities | Injuries | Damage Estimates |       |          |
|------------|-------------|---|----------------------|------------|----------|------------------|-------|----------|
|            |             |   |                      |            |          | Property         | Crops | Total    |
| 9/23/2019  | Flash Flood | Thunderstorms with very impressive supercellular structures and radar presentations (unusual for the region) produced large hail, damaging winds, and flash flooding. | Dolan Spgs           | 0          | 0        | \$3,000          | \$0   | \$3,000  |
| 9/23/2019  | Flash Flood | Thunderstorms with very impressive supercellular structures and radar presentations (unusual for the region) produced large hail, damaging winds, and flash flooding. | Oatman               | 0          | 0        | \$2,000          | \$0   | \$2,000  |
| 9/23/2019  | Flash Flood | Thunderstorms with very impressive supercellular structures and radar presentations (unusual for the region) produced large hail, damaging winds, and flash flooding. | Mohave Valley        | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 11/20/2019 | Flash Flood | Two low pressure areas interacted and brought widespread rain and flooding to the Mojave Desert.  | Golden Valley        | 0          | 0        | \$5,000          | \$0   | \$5,000  |
| 11/20/2019 | Flood       | Two low pressure areas interacted and brought widespread rain and flooding to the Mojave Desert.  | Topock               | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 11/20/2019 | Flash Flood | Two low pressure areas interacted and brought widespread rain and flooding to the Mojave Desert.  | Dolan Spgs           | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 11/20/2019 | Flash Flood | Two low pressure areas interacted and brought widespread rain and flooding to the Mojave Desert.  | Griffith             | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 11/20/2019 | Flash Flood | Two low pressure areas interacted and brought widespread rain and flooding to the Mojave Desert.  | Walapai              | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 11/28/2019 | Flash Flood | A large winter storm brought heavy rain and snow to the Mojave Desert and southern Great Basin, causing major impacts to the Thanksgiving holiday traffic.            | Golden Valley        | 0          | 1        | \$20,000         | \$0   | \$20,000 |
| 11/28/2019 | Flash Flood | A large winter storm brought heavy rain and snow to the Mojave Desert and southern Great Basin, causing major impacts to the Thanksgiving holiday traffic.            | (Lhu)Lake Havasu Cit | 0          | 0        | \$20,000         | \$0   | \$20,000 |



| Event Date | Hazard      | Description   | Location      | Fatalities | Injuries | Damage Estimates |       |         |
|------------|-------------|---|---------------|------------|----------|------------------|-------|---------|
|            |             |   |               |            |          | Property         | Crops | Total   |
| 11/28/2019 | Flash Flood | A large winter storm brought heavy rain and snow to the Mojave Desert and southern Great Basin, causing major impacts to the Thanksgiving holiday traffic.  | Golden Shores | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 11/28/2019 | Flash Flood | A large winter storm brought heavy rain and snow to the Mojave Desert and southern Great Basin, causing major impacts to the Thanksgiving holiday traffic.  | Mohave Valley | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 11/28/2019 | Flash Flood | A large winter storm brought heavy rain and snow to the Mojave Desert and southern Great Basin, causing major impacts to the Thanksgiving holiday traffic.  | Oatman        | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 11/28/2019 | Flash Flood | A large winter storm brought heavy rain and snow to the Mojave Desert and southern Great Basin, causing major impacts to the Thanksgiving holiday traffic.  | Dolan Spgs    | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 12/4/2019  | Flash Flood | A Pacific storm system brought widespread rain and isolated flooding.   | Golden Valley | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 12/4/2019  | Flash Flood | A Pacific storm system brought widespread rain and isolated flooding.   | Wikieup       | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 8/18/2020  | Flash Flood | A little monsoon moisture crept in under the big ridge aloft responsible for the ongoing heat wave, triggering a few thunderstorms over Mohave County. Isolated severe wind and flash flooding occurred.  | Cone Spgs     | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 7/13/2021  | Flash Flood | Monsoon moisture slowly seeped into the region under the big dome of high pressure which was causing record-breaking temperatures, fueling isolated to scattered thunderstorms. As the moisture increased, the main thunderstorm impact transitioned from high winds to flash flooding. | Mohave Valley | 0          | 0        | \$1,000          | \$0   | \$1,000 |

| Event Date | Hazard      | Description   | Location            | Fatalities | Injuries | Damage Estimates |       |           |
|------------|-------------|---|---------------------|------------|----------|------------------|-------|-----------|
|            |             |   |                     |            |          | Property         | Crops | Total     |
| 7/13/2021  | Flash Flood | Monsoon moisture slowly seeped into the region under the big dome of high pressure which was causing record-breaking temperatures, fueling isolated to scattered thunderstorms. As the moisture increased, the main thunderstorm impact transitioned from high winds to flash flooding. | Valentine           | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 7/13/2021  | Flash Flood | Monsoon moisture slowly seeped into the region under the big dome of high pressure which was causing record-breaking temperatures, fueling isolated to scattered thunderstorms. As the moisture increased, the main thunderstorm impact transitioned from high winds to flash flooding. | Walapai             | 0          | 0        | \$1,000          | \$0   | \$1,000   |
| 7/15/2021  | Flash Flood | Monsoon moisture slowly seeped into the region under the big dome of high pressure which was causing record-breaking temperatures, fueling isolated to scattered thunderstorms. As the moisture increased, the main thunderstorm impact transitioned from high winds to flash flooding. | (Igm)Mojave Co Arpt | 0          | 0        | \$10,000         | \$0   | \$10,000  |
| 7/15/2021  | Flash Flood | Monsoon moisture slowly seeped into the region under the big dome of high pressure which was causing record-breaking temperatures, fueling isolated to scattered thunderstorms. As the moisture increased, the main thunderstorm impact transitioned from high winds to flash flooding. | Dolan Spgs          | 0          | 0        | \$2,000          | \$0   | \$2,000   |
| 7/18/2021  | Flash Flood | A big push of monsoon moisture led to ten days of scattered thunderstorms over the Mojave Desert. Many storms produced flash flooding and/or high winds. Events in this episode are continued in the July 22-26 Thunderstorms episode.  | (Igm)Mojave Co Arpt | 0          | 0        | \$200,000        | \$0   | \$200,000 |

| Event Date | Hazard      | Description  | Location            | Fatalities | Injuries | Damage Estimates |       |         |
|------------|-------------|--|---------------------|------------|----------|------------------|-------|---------|
|            |             |  |                     |            |          | Property         | Crops | Total   |
| 7/18/2021  | Flash Flood | A big push of monsoon moisture led to ten days of scattered thunderstorms over the Mojave Desert. Many storms produced flash flooding and/or high winds. Events in this episode are continued in the July 22-26 Thunderstorms episode. | Meadview            | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 7/20/2021  | Flash Flood | A big push of monsoon moisture led to ten days of scattered thunderstorms over the Mojave Desert. Many storms produced flash flooding and/or high winds. Events in this episode are continued in the July 22-26 Thunderstorms episode. | Willow Beach        | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 7/21/2021  | Flash Flood | A big push of monsoon moisture led to ten days of scattered thunderstorms over the Mojave Desert. Many storms produced flash flooding and/or high winds. Events in this episode are continued in the July 22-26 Thunderstorms episode. | Golden Valley       | 0          | 0        | \$4,000          | \$0   | \$4,000 |
| 7/21/2021  | Flash Flood | A big push of monsoon moisture led to ten days of scattered thunderstorms over the Mojave Desert. Many storms produced flash flooding and/or high winds. Events in this episode are continued in the July 22-26 Thunderstorms episode. | (Igm)Mojave Co Arpt | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 7/21/2021  | Flash Flood | A big push of monsoon moisture led to ten days of scattered thunderstorms over the Mojave Desert. Many storms produced flash flooding and/or high winds. Events in this episode are continued in the July 22-26 Thunderstorms episode. | New Kingman-Butler  | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 7/21/2021  | Flash Flood | A big push of monsoon moisture led to ten days of scattered thunderstorms over the Mojave Desert. Many storms produced flash flooding and/or high winds. Events in this episode are continued in the July 22-26 Thunderstorms episode. | Getz                | 0          | 0        | \$1,000          | \$0   | \$1,000 |

| Event Date | Hazard      | Description  | Location             | Fatalities | Injuries | Damage Estimates |       |          |
|------------|-------------|--|----------------------|------------|----------|------------------|-------|----------|
|            |             |  |                      |            |          | Property         | Crops | Total    |
| 7/24/2021  | Flash Flood | This is a continuation of the July 17-21 Thunderstorms episode, which lasted ten days total.   | Colorado City        | 0          | 0        | \$10,000         | \$0   | \$10,000 |
| 7/25/2021  | Flash Flood | This is a continuation of the July 17-21 Thunderstorms episode, which lasted ten days total.   | Golden Valley        | 0          | 0        | \$25,000         | \$0   | \$25,000 |
| 7/25/2021  | Flash Flood | This is a continuation of the July 17-21 Thunderstorms episode, which lasted ten days total.   | (Lhu)Lake Havasu Cit | 0          | 0        | \$10,000         | \$0   | \$10,000 |
| 7/25/2021  | Flash Flood | This is a continuation of the July 17-21 Thunderstorms episode, which lasted ten days total.   | Kingman Arpt         | 0          | 0        | \$2,000          | \$0   | \$2,000  |
| 7/25/2021  | Flash Flood | This is a continuation of the July 17-21 Thunderstorms episode, which lasted ten days total.   | New Kingman-Butler   | 0          | 0        | \$2,000          | \$0   | \$2,000  |
| 7/25/2021  | Flash Flood | This is a continuation of the July 17-21 Thunderstorms episode, which lasted ten days total.   | Hackberry            | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 7/25/2021  | Flash Flood | This is a continuation of the July 17-21 Thunderstorms episode, which lasted ten days total.   | Hackberry            | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 7/25/2021  | Flash Flood | This is a continuation of the July 17-21 Thunderstorms episode, which lasted ten days total.   | Griffith             | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 7/25/2021  | Flash Flood | This is a continuation of the July 17-21 Thunderstorms episode, which lasted ten days total.   | Mc Connico           | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 7/25/2021  | Flash Flood | This is a continuation of the July 17-21 Thunderstorms episode, which lasted ten days total.   | Signal               | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 7/29/2021  | Flash Flood | After a brief break, another push of monsoon moisture fueled another round of thunderstorms over the Mojave Desert. Some storms produced flash flooding. | Wikieup              | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 7/31/2021  | Flash Flood | After a brief break, another push of monsoon moisture fueled another round of thunderstorms over the Mojave Desert. Some storms produced flash flooding. | Dolan Spgs           | 0          | 0        | \$10,000         | \$0   | \$10,000 |

| Event Date | Hazard      | Description  | Location           | Fatalities | Injuries | Damage Estimates |       |         |
|------------|-------------|--|--------------------|------------|----------|------------------|-------|---------|
|            |             |  |                    |            |          | Property         | Crops | Total   |
| 7/31/2021  | Flash Flood | After a brief break, another push of monsoon moisture fueled another round of thunderstorms over the Mojave Desert. Some storms produced flash flooding. | Dolan Spgs         | 0          | 0        | \$2,000          | \$0   | \$2,000 |
| 8/10/2021  | Flash Flood | Monsoon moisture fueled thunderstorms over the Mojave Desert, many of which produced severe winds and flash flooding.                                    | Dolan Spgs         | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 8/10/2021  | Flash Flood | Monsoon moisture fueled thunderstorms over the Mojave Desert, many of which produced severe winds and flash flooding.                                    | Dolan Spgs         | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 8/10/2021  | Flash Flood | Monsoon moisture fueled thunderstorms over the Mojave Desert, many of which produced severe winds and flash flooding.                                    | Getz               | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 8/10/2021  | Flash Flood | Monsoon moisture fueled thunderstorms over the Mojave Desert, many of which produced severe winds and flash flooding.                                    | New Kingman-Butler | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 8/10/2021  | Flash Flood | Monsoon moisture fueled thunderstorms over the Mojave Desert, many of which produced severe winds and flash flooding.                                    | Cone Spgs          | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 8/10/2021  | Flash Flood | Monsoon moisture fueled thunderstorms over the Mojave Desert, many of which produced severe winds and flash flooding.                                    | Cone Spgs          | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 8/10/2021  | Flash Flood | Monsoon moisture fueled thunderstorms over the Mojave Desert, many of which produced severe winds and flash flooding.                                    | Wikieup            | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 8/10/2021  | Flash Flood | Monsoon moisture fueled thunderstorms over the Mojave Desert, many of which produced severe winds and flash flooding.                                    | Griffith           | 0          | 0        | \$1,000          | \$0   | \$1,000 |
| 8/12/2021  | Flash Flood | Monsoon moisture fueled thunderstorms over the Mojave Desert, many of which produced severe winds and flash flooding.                                    | Colorado City      | 0          | 0        | \$1,000          | \$0   | \$1,000 |

| Event Date | Hazard      | Description  | Location            | Fatalities | Injuries | Damage Estimates |       |          |
|------------|-------------|--|---------------------|------------|----------|------------------|-------|----------|
|            |             |  |                     |            |          | Property         | Crops | Total    |
| 8/13/2021  | Flash Flood | Monsoon moisture fueled thunderstorms over the Mojave Desert, many of which produced severe winds and flash flooding.  | Valentine           | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 8/29/2021  | Flash Flood | As high pressure responsible for excessive heat began to weaken, monsoon moisture seeped into the Mojave Desert, fueling a round of thunderstorms. Severe winds, flash flooding, and a landspout occurred. | (Igm)Mojave Co Arpt | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 8/29/2021  | Flash Flood | As high pressure responsible for excessive heat began to weaken, monsoon moisture seeped into the Mojave Desert, fueling a round of thunderstorms. Severe winds, flash flooding, and a landspout occurred. | Signal              | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 8/29/2021  | Flash Flood | As high pressure responsible for excessive heat began to weaken, monsoon moisture seeped into the Mojave Desert, fueling a round of thunderstorms. Severe winds, flash flooding, and a landspout occurred. | Cone Spgs           | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 8/31/2021  | Flash Flood | As high pressure responsible for excessive heat began to weaken, monsoon moisture seeped into the Mojave Desert, fueling a round of thunderstorms. Severe winds, flash flooding, and a landspout occurred. | Dolan Spgs          | 0          | 0        | \$25,000         | \$0   | \$25,000 |
| 8/31/2021  | Flash Flood | As high pressure responsible for excessive heat began to weaken, monsoon moisture seeped into the Mojave Desert, fueling a round of thunderstorms. Severe winds, flash flooding, and a landspout occurred. | Hackberry           | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 8/31/2021  | Flash Flood | As high pressure responsible for excessive heat began to weaken, monsoon moisture seeped into the Mojave Desert, fueling a round of thunderstorms. Severe winds, flash flooding, and a landspout occurred. | (Igm)Mojave Co Arpt | 0          | 0        | \$1,000          | \$0   | \$1,000  |
| 9/2/2021   | Flash Flood | Lingering monsoon moisture fueled a few thunderstorms in Mohave County. One storm produced flash flooding.   | (Igm)Mojave Co Arpt | 0          | 0        | \$1,000          | \$0   | \$1,000  |



## **APPENDIX D**

### **Flood Hazard and Problem Area Maps**





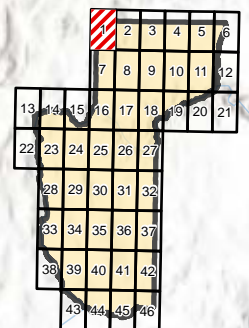
# Mohave County Flood Risk Management Plan

## Legend

- Flood Risk Areas
- Mohave County Boundary
- HUC8 Boundary
- Major Streams
- Non-Incorporated Communities
- Incorporated Communities
  - Bullhead City
  - Colorado City
  - Kingman
  - Lake Havasu City
- Tribal Communities
  - Kaibab Paiute Res
  - Hualapai Nation Res
  - Fort Mojave Res
- FRMP Problem Areas
  - New (2022)
  - Removed
  - Existing (2015)

Sources:  
JE Fuller 2022: Mohave County 2022:  
ESRI 2022: FEMA 2022

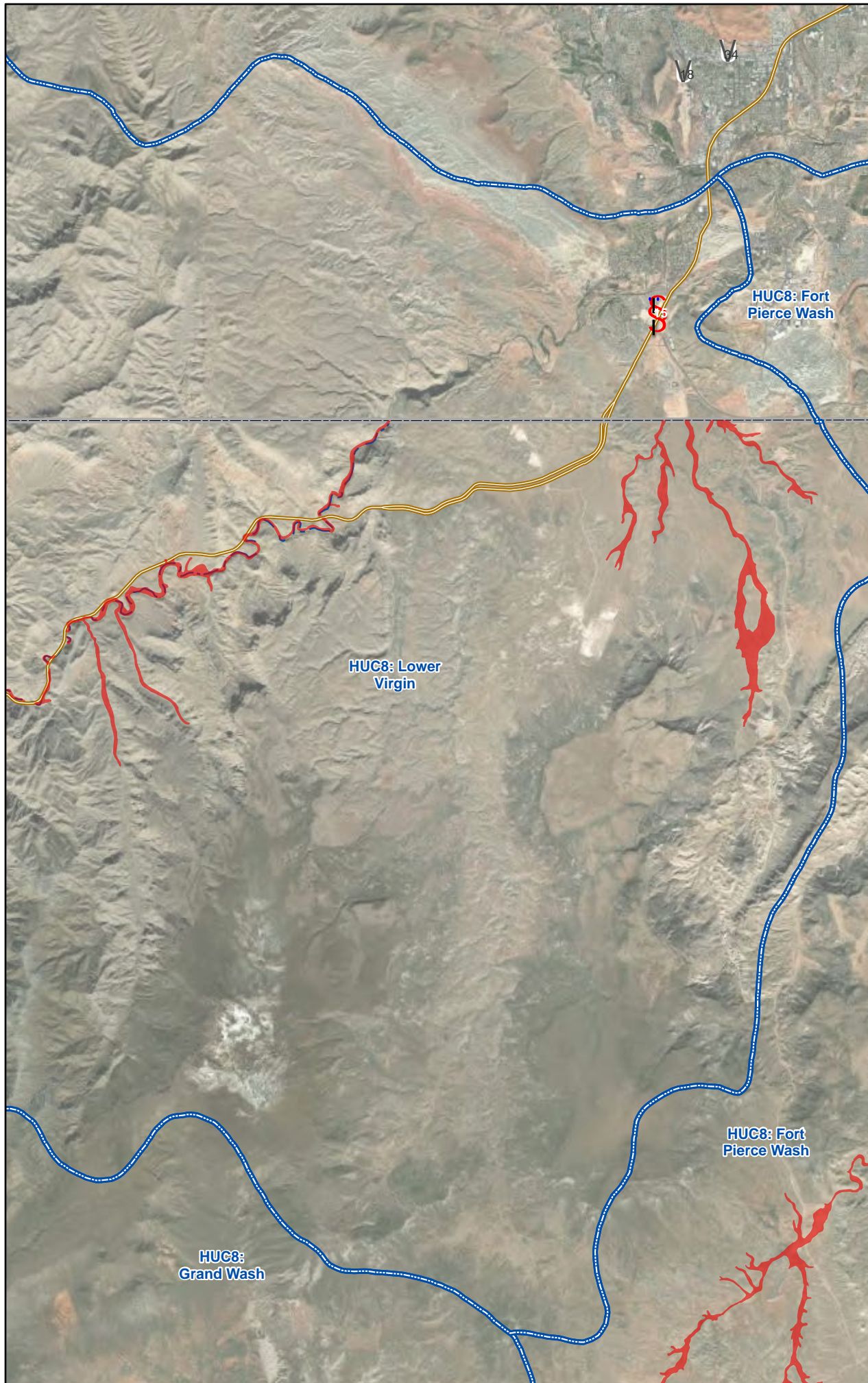
## Map Sheet Index



## Flood Risk Map







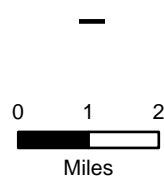
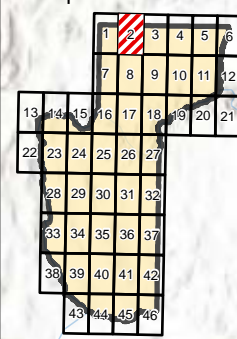
# Mohave County Flood Risk Management Plan

## Legend

- Flood Risk Areas
- Mohave County Boundary
- HUC8 Boundary
- Major Streams
- Non-Incorporated Communities
- Incorporated Communities
  - Bullhead City
  - Colorado City
  - Kingman
  - Lake Havasu City
- Tribal Communities
  - Kaibab Paiute Res
  - Hualapai Nation Res
  - Fort Mojave Res
- FRMP Problem Areas
  - New (2022)
  - Removed
  - Existing (2015)

Sources:  
JE Fuller 2022: Mohave County 2022:  
ESRI 2022: FEMA 2022

## Map Sheet Index



## Flood Risk Map





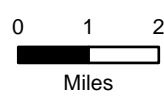
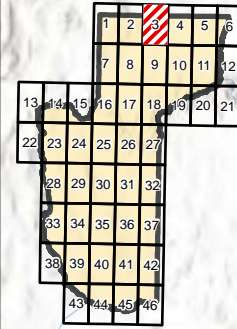
# Mohave County Flood Risk Management Plan

## Legend

- Flood Risk Areas
- Mohave County Boundary
- HUC8 Boundary
- Major Streams
- Non-Incorporated Communities
- Incorporated Communities**
  - Bullhead City
  - Colorado City
  - Kingman
  - Lake Havasu City
- Tribal Communities**
  - Kaibab Paiute Res
  - Hualapai Nation Res
  - Fort Mojave Res
- FRMP Problem Areas**
  - New (2022)
  - Removed
  - Existing (2015)

Sources:  
JE Fuller 2022: Mohave County 2022:  
ESRI 2022: FEMA 2022

## Map Sheet Index



## Flood Risk Map





# Mohave County Flood Risk Management Plan

## Legend

- Flood Risk Areas
- Mohave County Boundary
- HUC8 Boundary
- Major Streams
- Non-Incorporated Communities

### Incorporated Communities

- Bullhead City
- Colorado City
- Kingman
- Lake Havasu City

### Tribal Communities

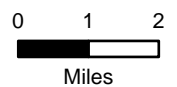
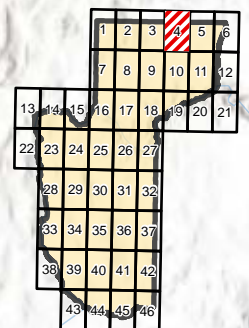
- Kaibab Paiute Res
- Hualapai Nation Res
- Fort Mojave Res

### FRMP Problem Areas

- New (2022)
- Removed
- Existing (2015)

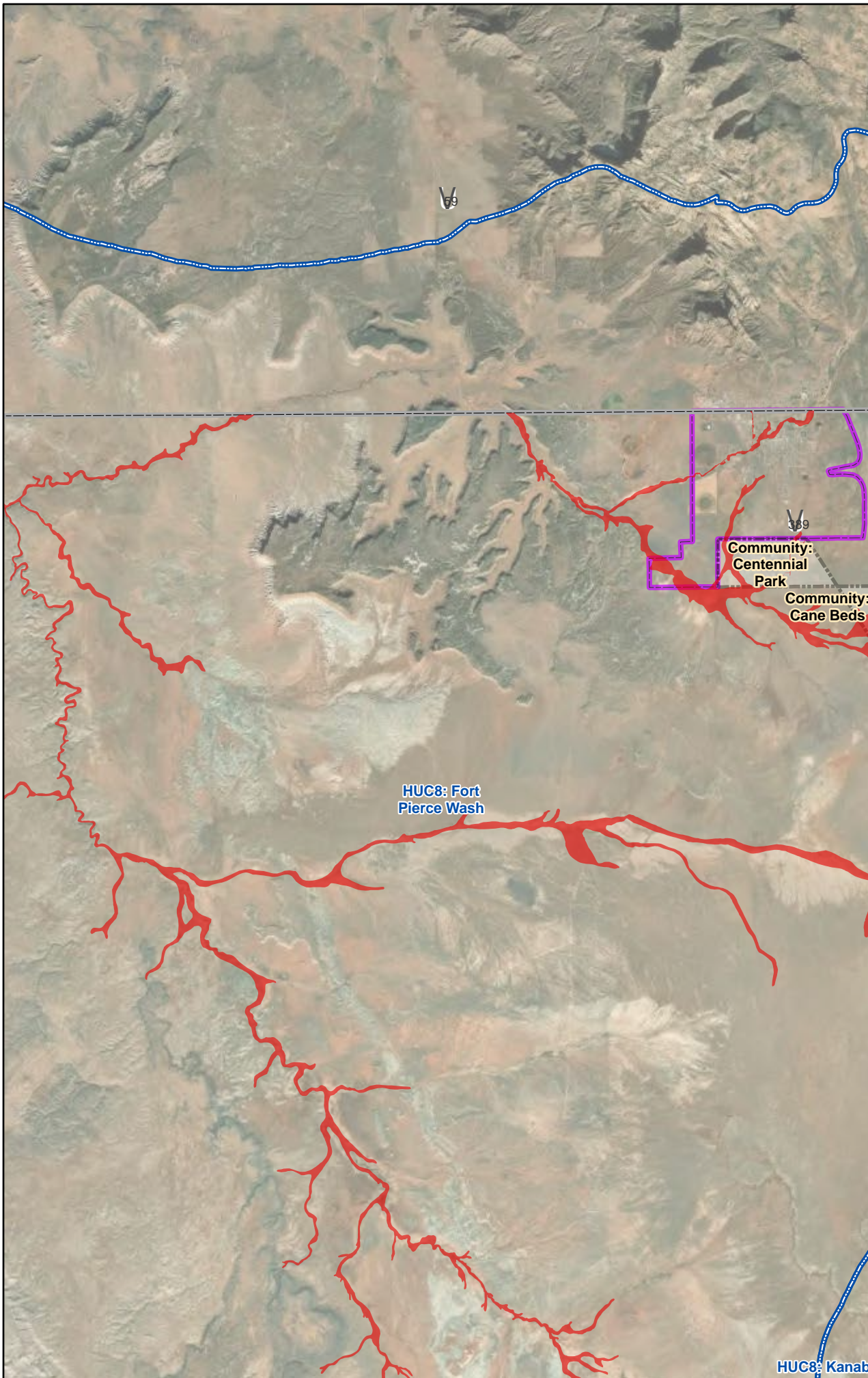
Sources:  
JE Fuller 2022; Mohave County 2022;  
ESRI 2022; FEMA 2022

## Map Sheet Index



## Flood Risk Map

Sheet 4 of 46







## Mohave County Flood Risk Management Plan

### Legend

- Flood Risk Areas
- Mohave County Boundary
- HUC8 Boundary
- Major Streams
- Non-Incorporated Communities

#### Incorporated Communities

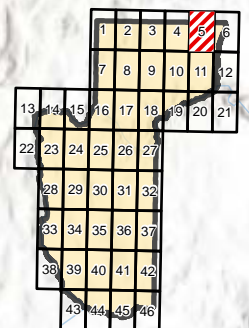
- Bullhead City
- Colorado City
- Kingman
- Lake Havasu City
- Tribal Communities
  - Kaibab Paiute Res
  - Hualapai Nation Res
  - Fort Mojave Res

#### FRMP Problem Areas

- New (2022)
- Removed
- Existing (2015)

Sources:  
JE Fuller 2022; Mohave County 2022;  
ESRI 2022; FEMA 2022

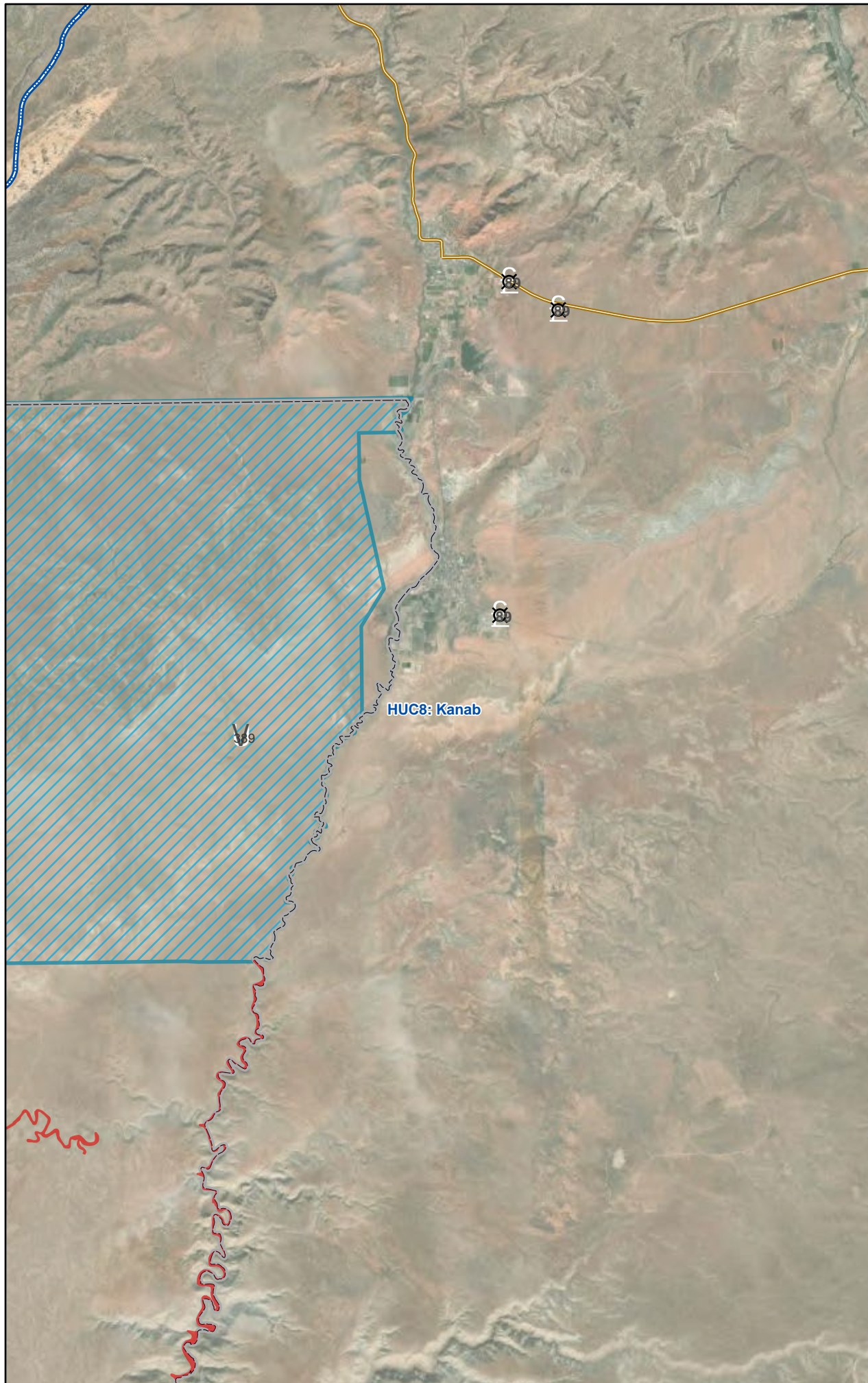
#### Map Sheet Index



Flood Risk Map

Sheet 5 of 46





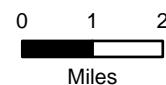
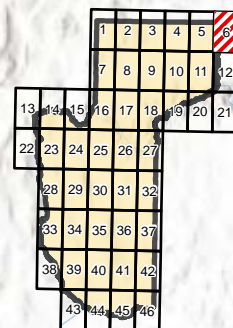
## Mohave County Flood Risk Management Plan

### Legend

- Flood Risk Areas
- Mohave County Boundary
- HUC8 Boundary
- Major Streams
- Non-Incorporated Communities
- Incorporated Communities
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  - Colorado City
  - Kingman
  - Lake Havasu City
- Tribal Communities
  - Kaibab Paiute Res
  - Hualapai Nation Res
  - Fort Mojave Res
- FRMP Problem Areas
  - New (2022)
  - Removed
  - Existing (2015)

Sources:  
JE Fuller 2022: Mohave County 2022:  
ESRI 2022: FEMA 2022

### Map Sheet Index



Flood Risk Map

Sheet 6 of 46





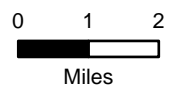
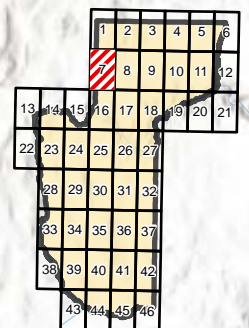
## Mohave County Flood Risk Management Plan

### Legend

- Flood Risk Areas
- Mohave County Boundary
- HUC8 Boundary
- Major Streams
- Non-Incorporated Communities
- Incorporated Communities
  - Bullhead City
  - Colorado City
  - Kingman
  - Lake Havasu City
- Tribal Communities
  - Kaibab Paiute Res
  - Hualapai Nation Res
  - Fort Mojave Res
- FRMP Problem Areas
  - New (2022)
  - Removed
  - Existing (2015)

Sources:  
JE Fuller 2022; Mohave County 2022;  
ESRI 2022; FEMA 2022

### Map Sheet Index



## Flood Risk Map

HUC8: Lower  
Virgin

HUC8:  
Lake Mead

HUC8:  
Grand Wash





# Mohave County Flood Risk Management Plan

## Legend

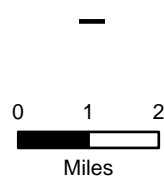
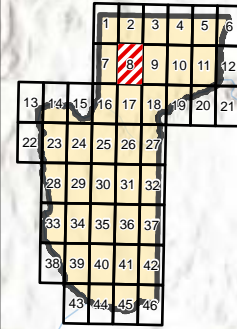
- Flood Risk Areas
- Mohave County Boundary
- HUC8 Boundary
- Major Streams
- Non-Incorporated Communities
- Incorporated Communities**
  - Bullhead City
  - Colorado City
  - Kingman
  - Lake Havasu City
- Tribal Communities**
  - Kaibab Paiute Res
  - Hualapai Nation Res
  - Fort Mojave Res

## FRMP Problem Areas

- ◆ New (2022)
- ◆ Removed
- ◆ Existing (2015)

Sources:  
JE Fuller 2022: Mohave County 2022:  
ESRI 2022: FEMA 2022

## Map Sheet Index



## Flood Risk Map





## Mohave County Flood Risk Management Plan

### Legend

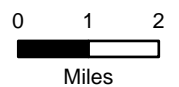
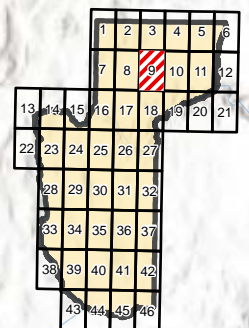
- Flood Risk Areas
- Mohave County Boundary
- HUC8 Boundary
- Major Streams
- Non-Incorporated Communities
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  - Bullhead City
  - Colorado City
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  - Kaibab Paiute Res
  - Hualapai Nation Res
  - Fort Mojave Res

### FRMP Problem Areas

- New (2022)
- Removed
- Existing (2015)

Sources:  
JE Fuller 2022; Mohave County 2022;  
ESRI 2022; FEMA 2022

### Map Sheet Index



## Flood Risk Map







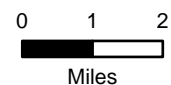
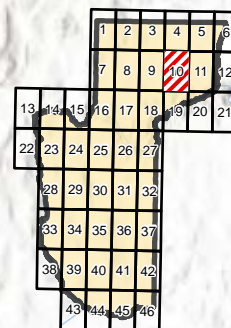
## Mohave County Flood Risk Management Plan

### Legend

- Flood Risk Areas
- Mohave County Boundary
- HUC8 Boundary
- Major Streams
- Non-Incorporated Communities
- Incorporated Communities
  - Bullhead City
  - Colorado City
  - Kingman
  - Lake Havasu City
- Tribal Communities
  - Kaibab Paiute Res
  - Hualapai Nation Res
  - Fort Mojave Res
- FRMP Problem Areas
  - New (2022)
  - Removed
  - Existing (2015)

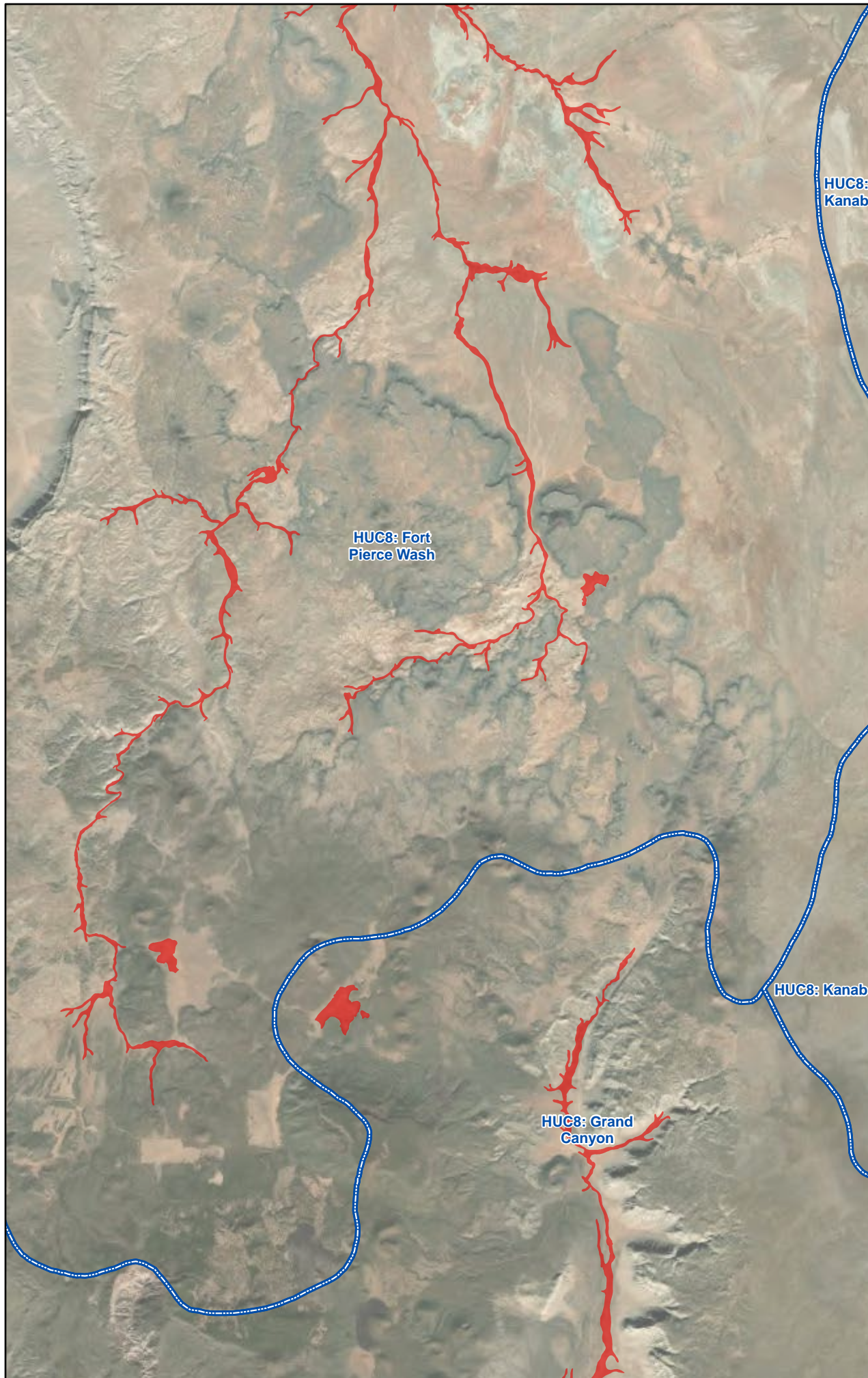
Sources:  
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ESRI 2022; FEMA 2022

### Map Sheet Index



Flood Risk Map

Sheet 10 of 46







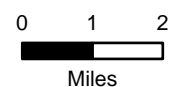
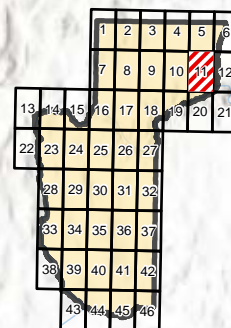
# Mohave County Flood Risk Management Plan

## Legend

- Flood Risk Areas
- Mohave County Boundary
- HUC8 Boundary
- Major Streams
- Non-Incorporated Communities
- Incorporated Communities
  - Bullhead City
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- Tribal Communities
  - Kaibab Paiute Res
  - Hualapai Nation Res
  - Fort Mojave Res
- FRMP Problem Areas
  - New (2022)
  - Removed
  - Existing (2015)

Sources:  
JE Fuller 2022: Mohave County 2022:  
ESRI 2022: FEMA 2022

## Map Sheet Index



## Flood Risk Map

HUC8: Fort  
Pierce Wash

HUC8: Kanab

HUC8: Grand  
Canyon





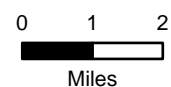
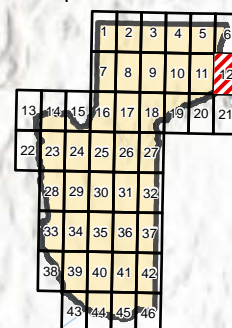
## Mohave County Flood Risk Management Plan

### Legend

-  Flood Risk Areas
-  Mohave County Boundary
-  HUC8 Boundary
-  Major Streams
-  Non-Incorporated Communities
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  -  Kingman
  -  Lake Havasu City
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  -  Kaibab Paiute Res
  -  Hualapai Nation Res
  -  Fort Mojave Res
- FRMP Problem Areas**
  -  New (2022)
  -  Removed
  -  Existing (2015)

Sources:  
JE Fuller 2022: Mohave County 2022:  
ESRI 2022: FEMA 2022

### Map Sheet Index



Flood Risk Map

Sheet 12 of 46

HUC8: Kanab

HUC8: Grand  
Canyon





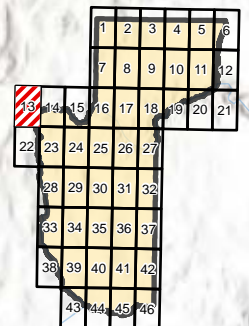
## Mohave County Flood Risk Management Plan

### Legend

- Flood Risk Areas
- Mohave County Boundary
- HUC8 Boundary
- Major Streams
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  - Kingman
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  - Kaibab Paiute Res
  - Hualapai Nation Res
  - Fort Mojave Res
- FRMP Problem Areas**
  - New (2022)
  - Removed
  - Existing (2015)

Sources:  
JE Fuller 2022: Mohave County 2022:  
ESRI 2022: FEMA 2022

### Map Sheet Index



## Flood Risk Map

Sheet 13 of 46







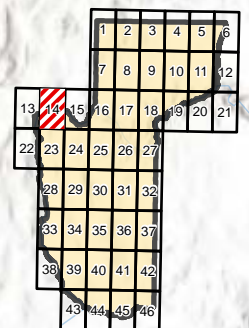
# Mohave County Flood Risk Management Plan

## Legend

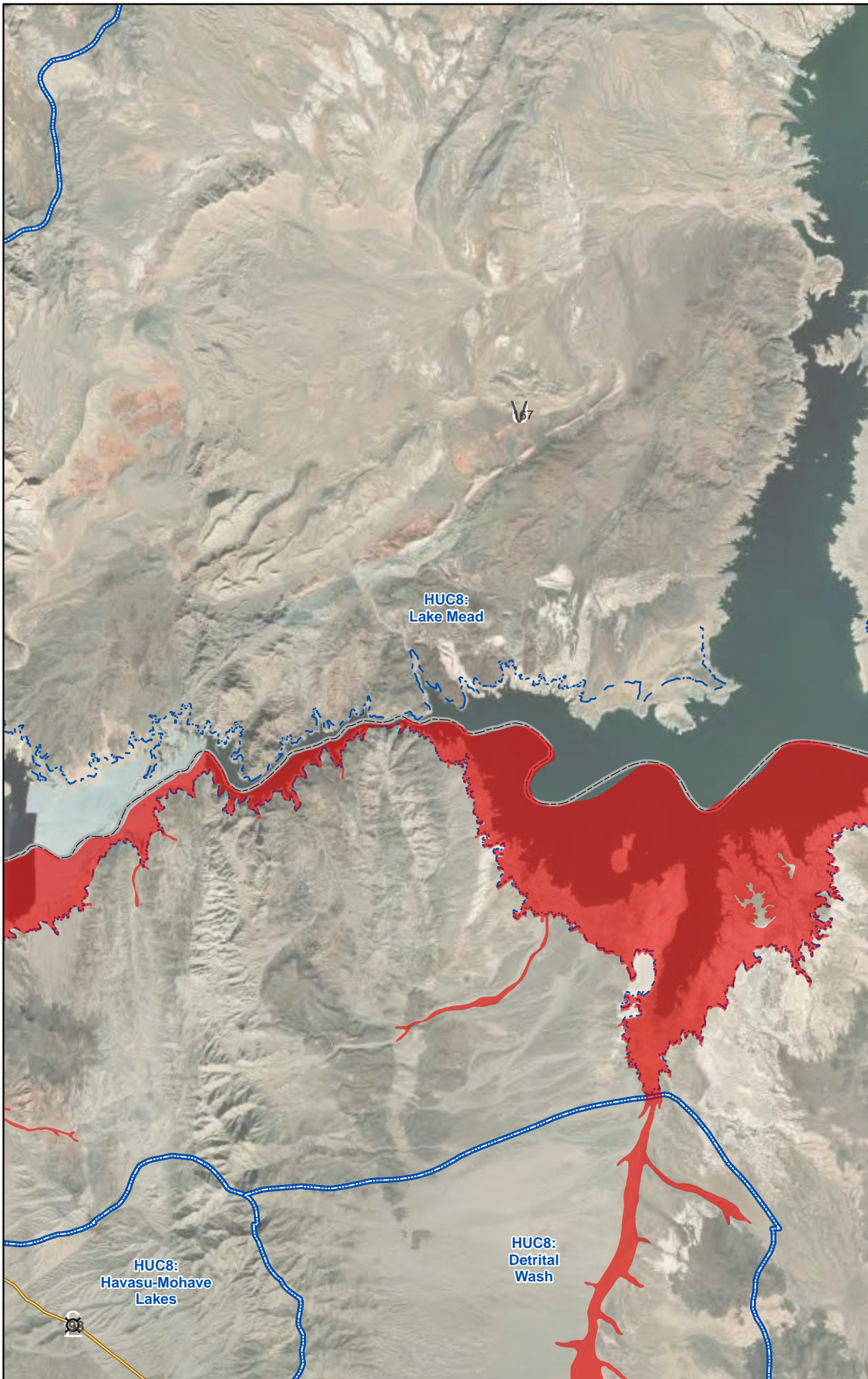
- Flood Risk Areas
- Mohave County Boundary
- HUC8 Boundary
- Major Streams
- Non-Incorporated Communities
- Incorporated Communities
  - Bullhead City
  - Colorado City
  - Kingman
  - Lake Havasu City
- Tribal Communities
  - Kaibab Paiute Res
  - Hualapai Nation Res
  - Fort Mojave Res
- FRMP Problem Areas
  - New (2022)
  - Removed
  - Existing (2015)

Sources:  
JE Fuller 2022: Mohave County 2022:  
ESRI 2022: FEMA 2022

## Map Sheet Index



## Flood Risk Map







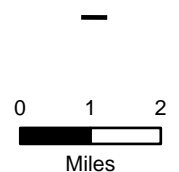
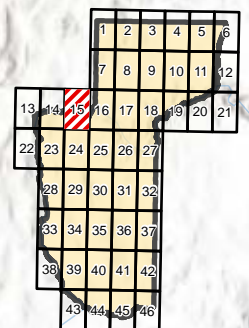
Mohave County  
Flood Risk  
Management Plan

Legend

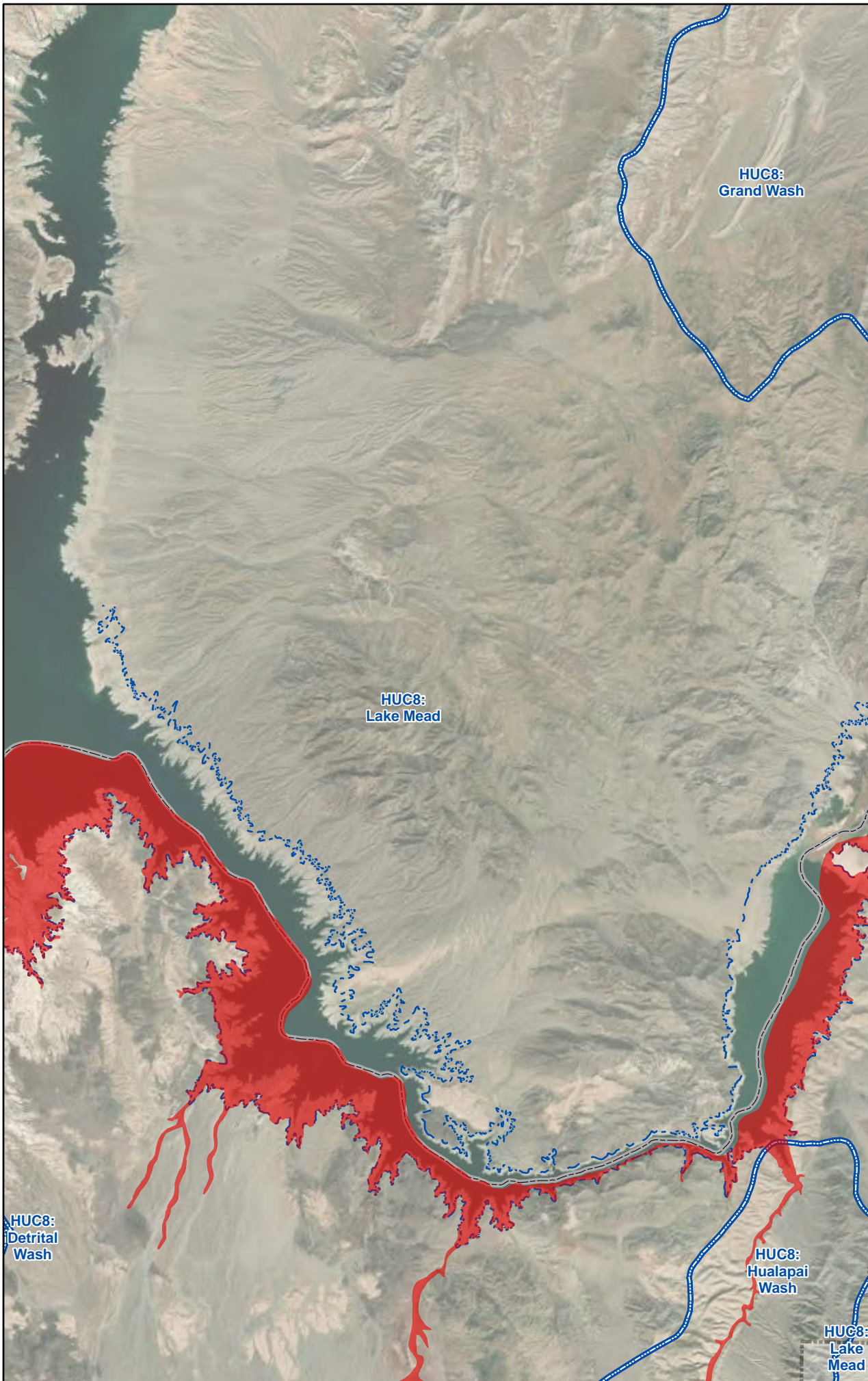
- Flood Risk Areas
- Mohave County Boundary
- HUC8 Boundary
- Major Streams
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  - Bullhead City
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- Tribal Communities
  - Kaibab Paiute Res
  - Hualapai Nation Res
  - Fort Mojave Res
- FRMP Problem Areas
  - New (2022)
  - Removed
  - Existing (2015)

Sources:  
JE Fuller 2022: Mohave County 2022:  
ESRI 2022: FEMA 2022

Map Sheet Index



Flood Risk Map







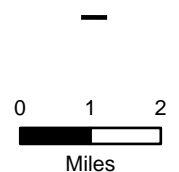
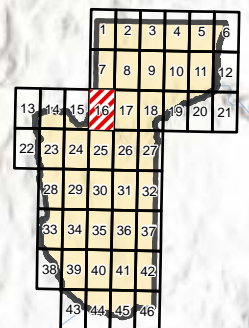
# Mohave County Flood Risk Management Plan

## Legend

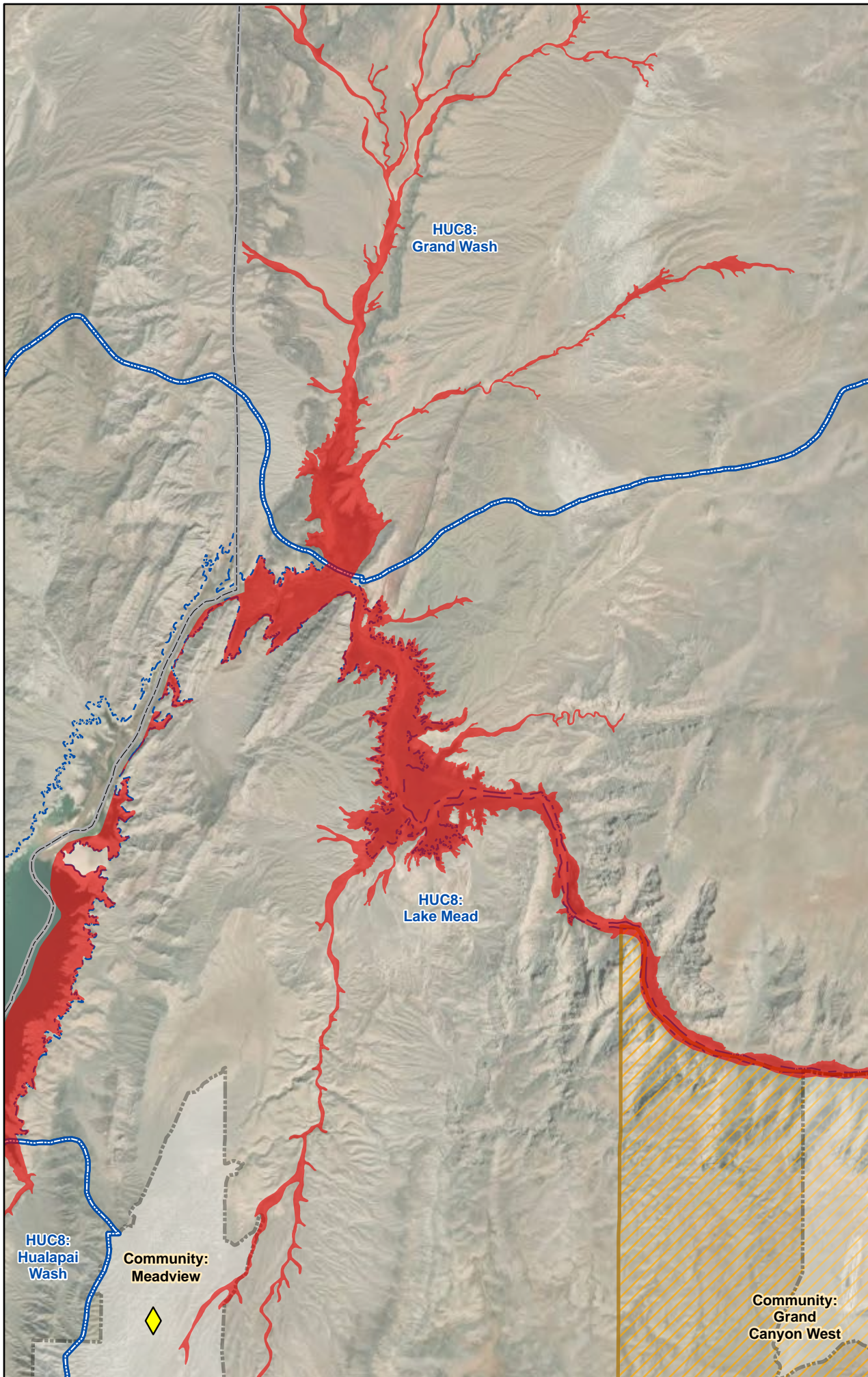
- Flood Risk Areas
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- Incorporated Communities
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  - Colorado City
  - Kingman
  - Lake Havasu City
- Tribal Communities
  - Kaibab Paiute Res
  - Hualapai Nation Res
  - Fort Mojave Res
- FRMP Problem Areas
  - New (2022)
  - Removed
  - Existing (2015)

Sources:  
JE Fuller 2022; Mohave County 2022;  
ESRI 2022; FEMA 2022

## Map Sheet Index



## Flood Risk Map







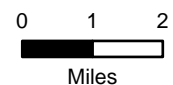
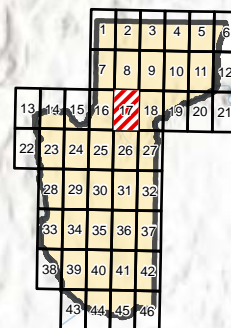
## Mohave County Flood Risk Management Plan

### Legend

- Flood Risk Areas
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- HUC8 Boundary
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  - Lake Havasu City
- Tribal Communities
  - Kaibab Paiute Res
  - Hualapai Nation Res
  - Fort Mojave Res
- FRMP Problem Areas
  - New (2022)
  - Removed
  - Existing (2015)

Sources:  
JE Fuller 2022: Mohave County 2022:  
ESRI 2022: FEMA 2022

### Map Sheet Index



Flood Risk Map

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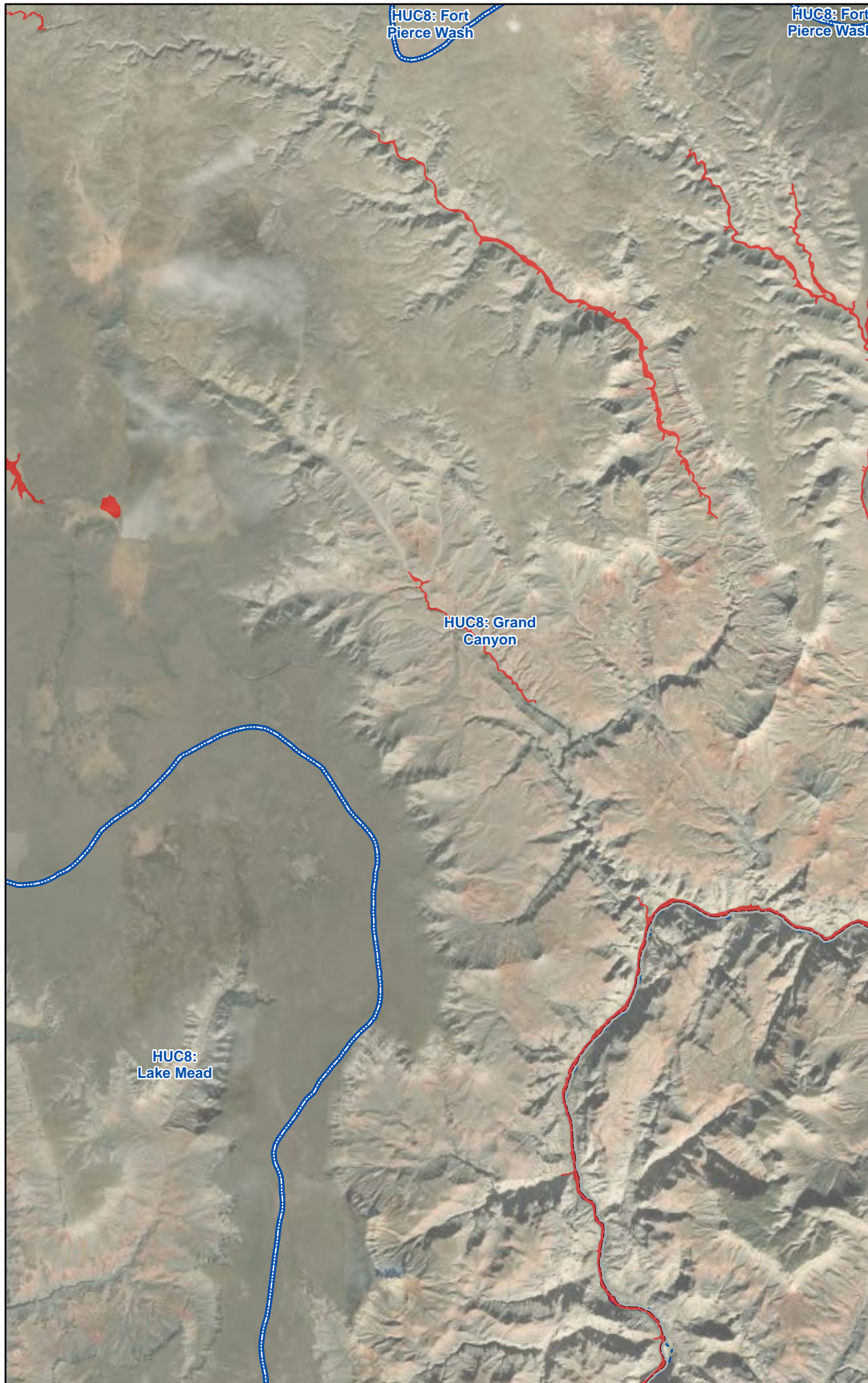
HUC8:  
Grand Wash

HUC8: Grand  
Canyon

HUC8:  
Lake Mead

Community:  
Grand  
Canyon West





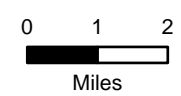
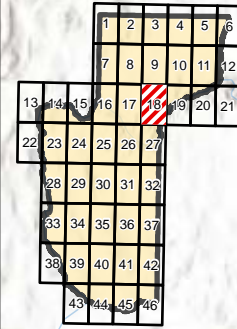
# Mohave County Flood Risk Management Plan

## Legend

- Flood Risk Areas
- Mohave County Boundary
- HUC8 Boundary
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- Incorporated Communities**
  - Bullhead City
  - Colorado City
  - Kingman
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- Tribal Communities**
  - Kaibab Paiute Res
  - Hualapai Nation Res
  - Fort Mojave Res
- FRMP Problem Areas**
  - New (2022)
  - Removed
  - Existing (2015)

Sources:  
JE Fuller 2022: Mohave County 2022:  
ESRI 2022: FEMA 2022

## Map Sheet Index



## Flood Risk Map





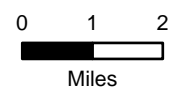
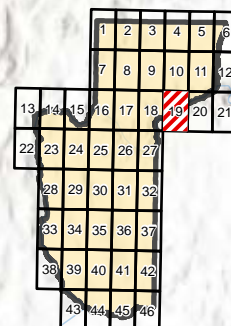
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  - Existing (2015)

Sources:  
JE Fuller 2022; Mohave County 2022;  
ESRI 2022; FEMA 2022

## Map Sheet Index



## Flood Risk Map





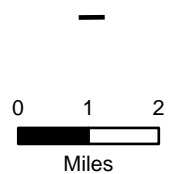
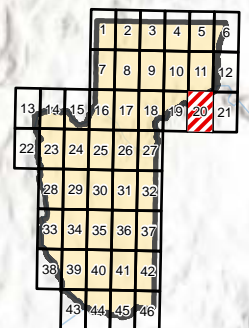
## Mohave County Flood Risk Management Plan

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Sources:  
JE Fuller 2022: Mohave County 2022:  
ESRI 2022: FEMA 2022

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Flood Risk Map

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HUC8: Grand  
Canyon





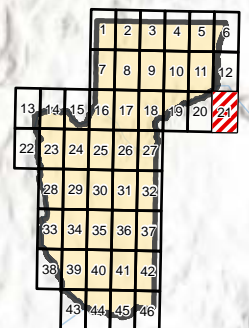
## Mohave County Flood Risk Management Plan

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Sources:  
JE Fuller 2022: Mohave County 2022:  
ESRI 2022: FEMA 2022

### Map Sheet Index



## Flood Risk Map





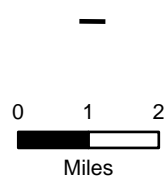
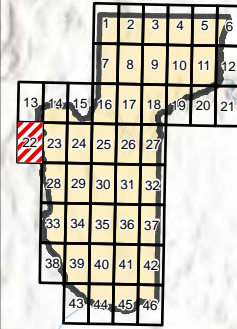
# Mohave County Flood Risk Management Plan

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Sources:  
JE Fuller 2022; Mohave County 2022;  
ESRI 2022; FEMA 2022

## Map Sheet Index



## Flood Risk Map





## Mohave County Flood Risk Management Plan

### Legend

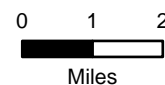
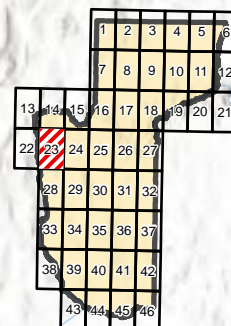
- Flood Risk Areas
- Mohave County Boundary
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### FRMP Problem Areas

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Sources:  
JE Fuller 2022: Mohave County 2022:  
ESRI 2022: FEMA 2022

### Map Sheet Index



## Flood Risk Map





## Mohave County Flood Risk Management Plan

### Legend

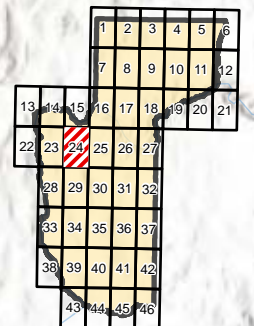
- Flood Risk Areas
- Mohave County Boundary
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  - Hualapai Nation Res
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- Removed
- Existing (2015)

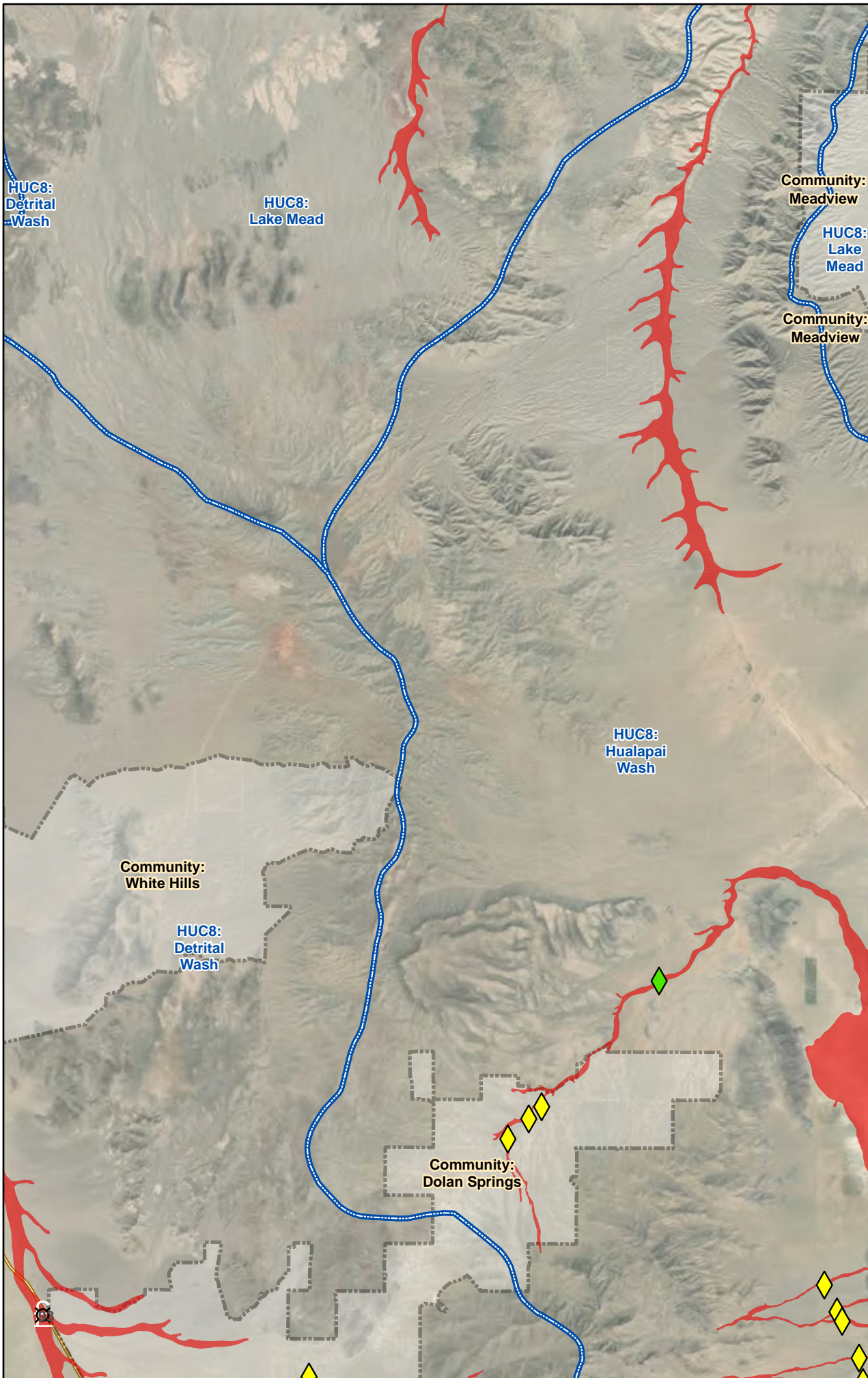
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ESRI 2022: FEMA 2022

### Map Sheet Index

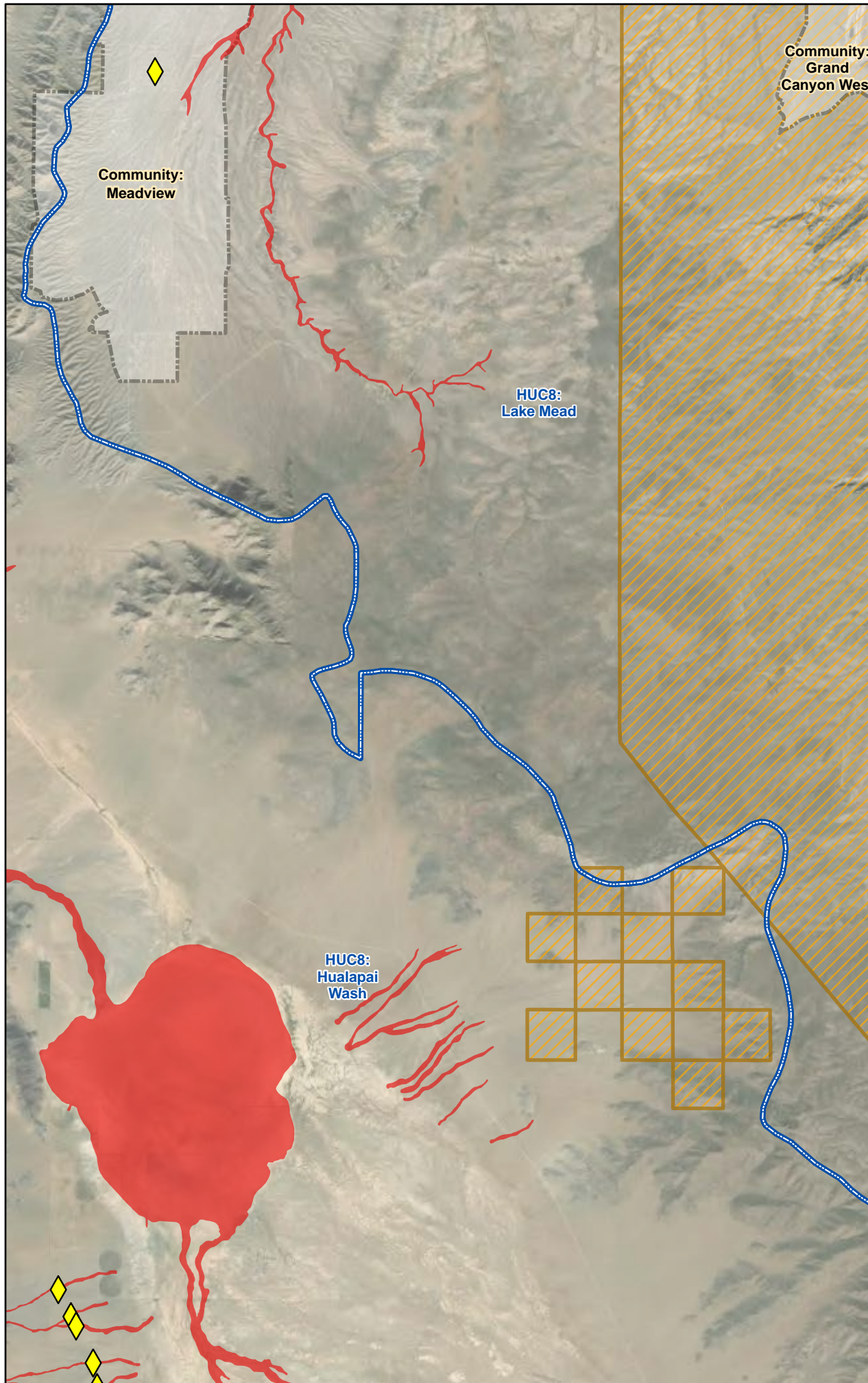


## Flood Risk Map

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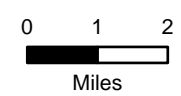
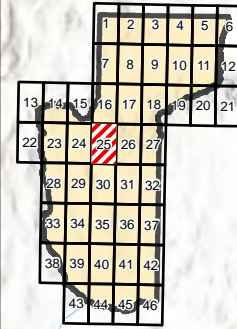
# Mohave County Flood Risk Management Plan

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Sources:  
JE Fuller 2022; Mohave County 2022;  
ESRI 2022; FEMA 2022

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## Flood Risk Map





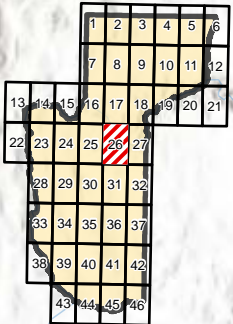
Mohave County  
Flood Risk  
Management Plan

Legend

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Sources:  
JE Fuller 2022: Mohave County 2022:  
ESRI 2022: FEMA 2022

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Flood Risk Map





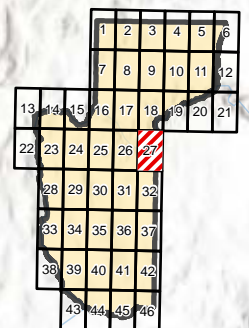
## Mohave County Flood Risk Management Plan

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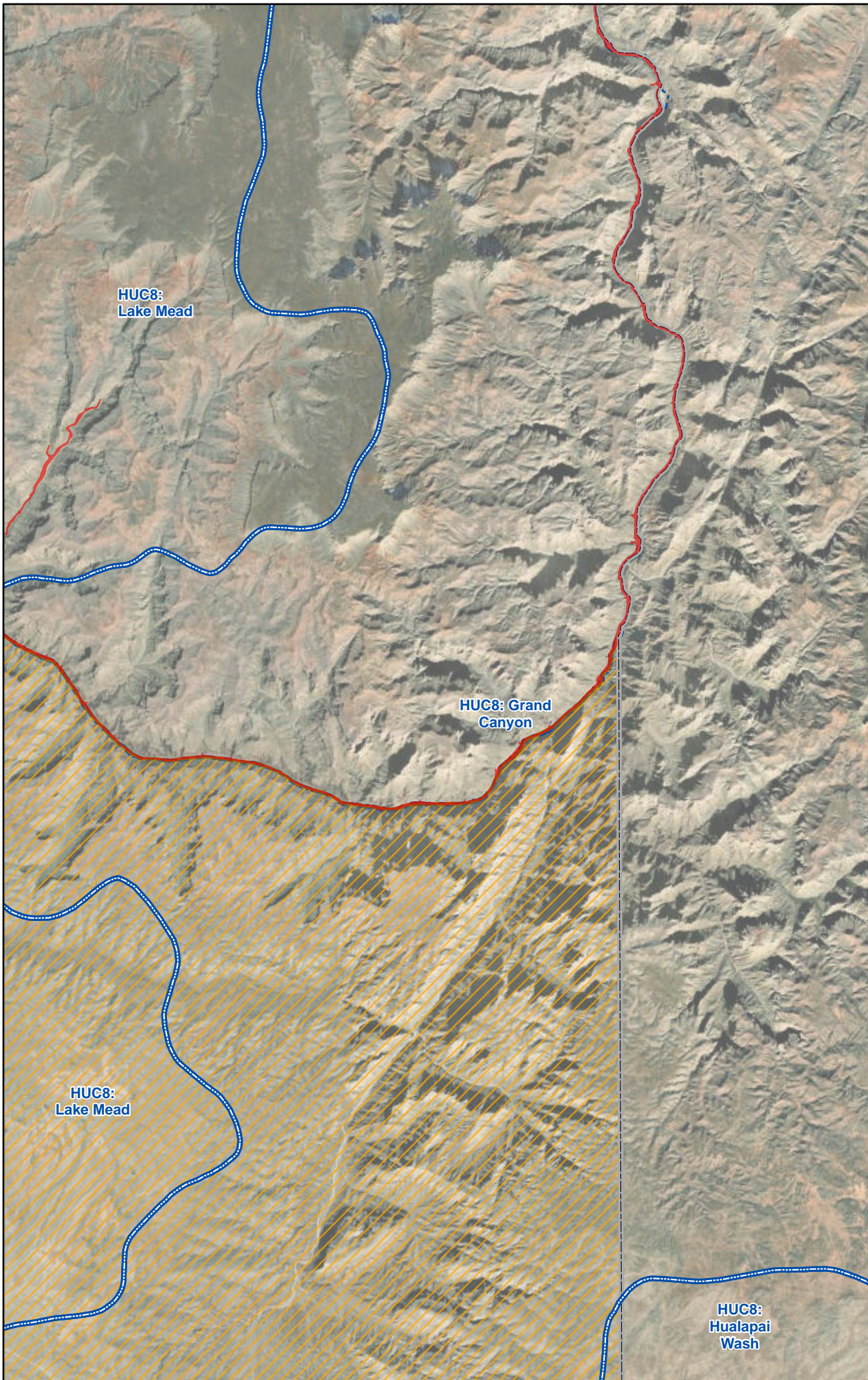
Sources:  
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ESRI 2022: FEMA 2022

### Map Sheet Index

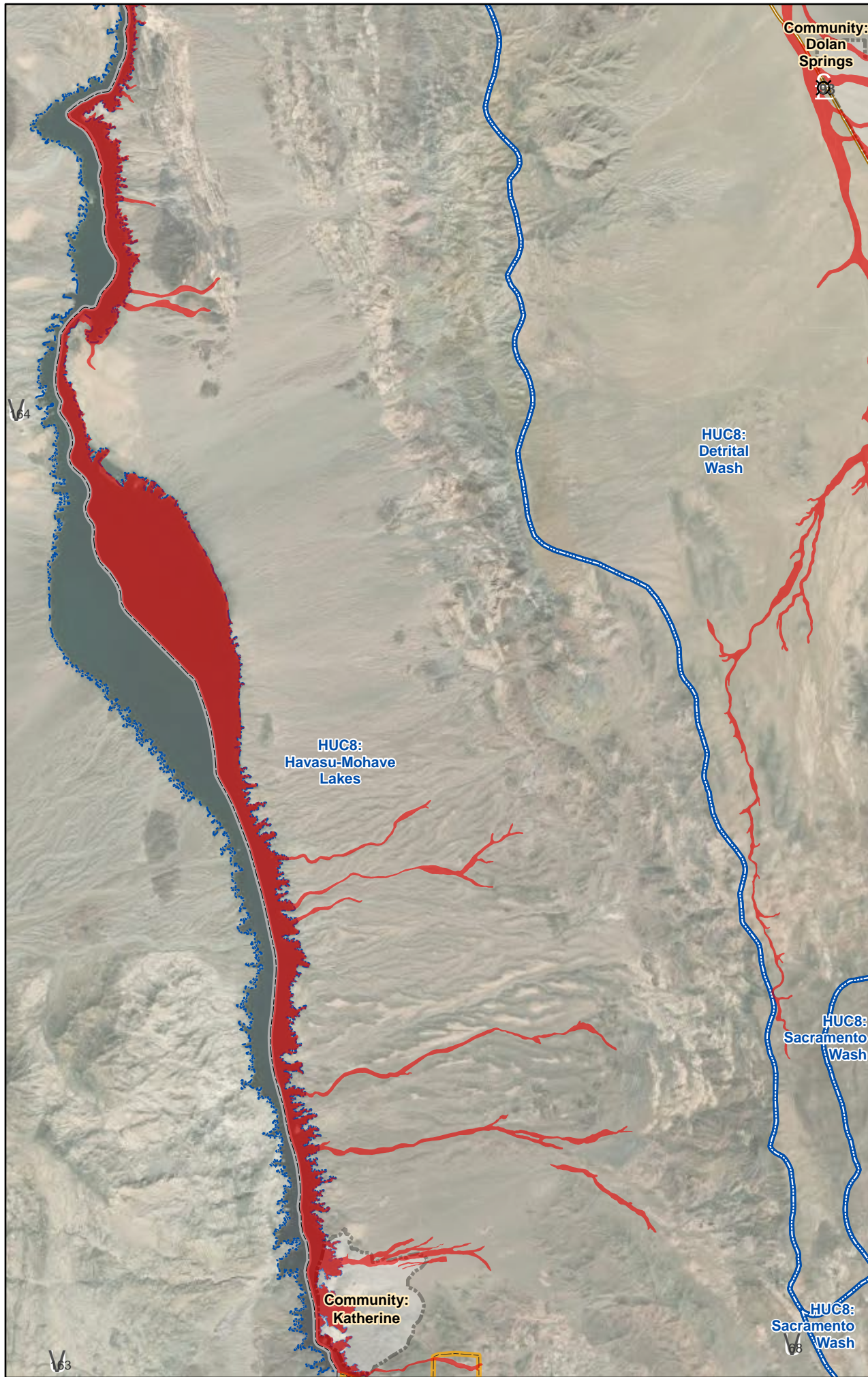


## Flood Risk Map

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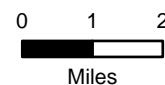
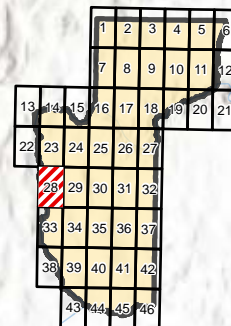
# Mohave County Flood Risk Management Plan

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  - ◆ New (2022)
  - ◆ Removed
  - ◆ Existing (2015)

Sources:  
JE Fuller 2022: Mohave County 2022:  
ESRI 2022: FEMA 2022

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## Flood Risk Map

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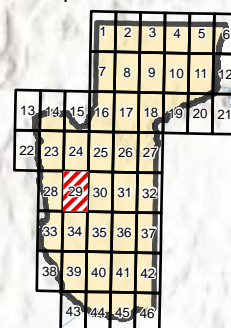
# Mohave County Flood Risk Management Plan

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  - New (2022)
  - Removed
  - Existing (2015)

Sources:  
JE Fuller 2022: Mohave County 2022:  
ESRI 2022: FEMA 2022

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## Flood Risk Map

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Community:  
Dolan Springs

HUC8:  
Detrital  
Wash

HUC8:  
Hualapai  
Wash

Community:  
Chloride

HUC8:  
Sacramento  
Wash

Community:  
So-Hi

Community:  
Golden  
Valley

HUC8:  
Havasut-Mohave  
Lakes





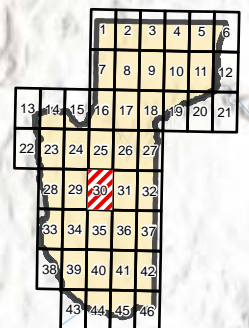
# Mohave County Flood Risk Management Plan

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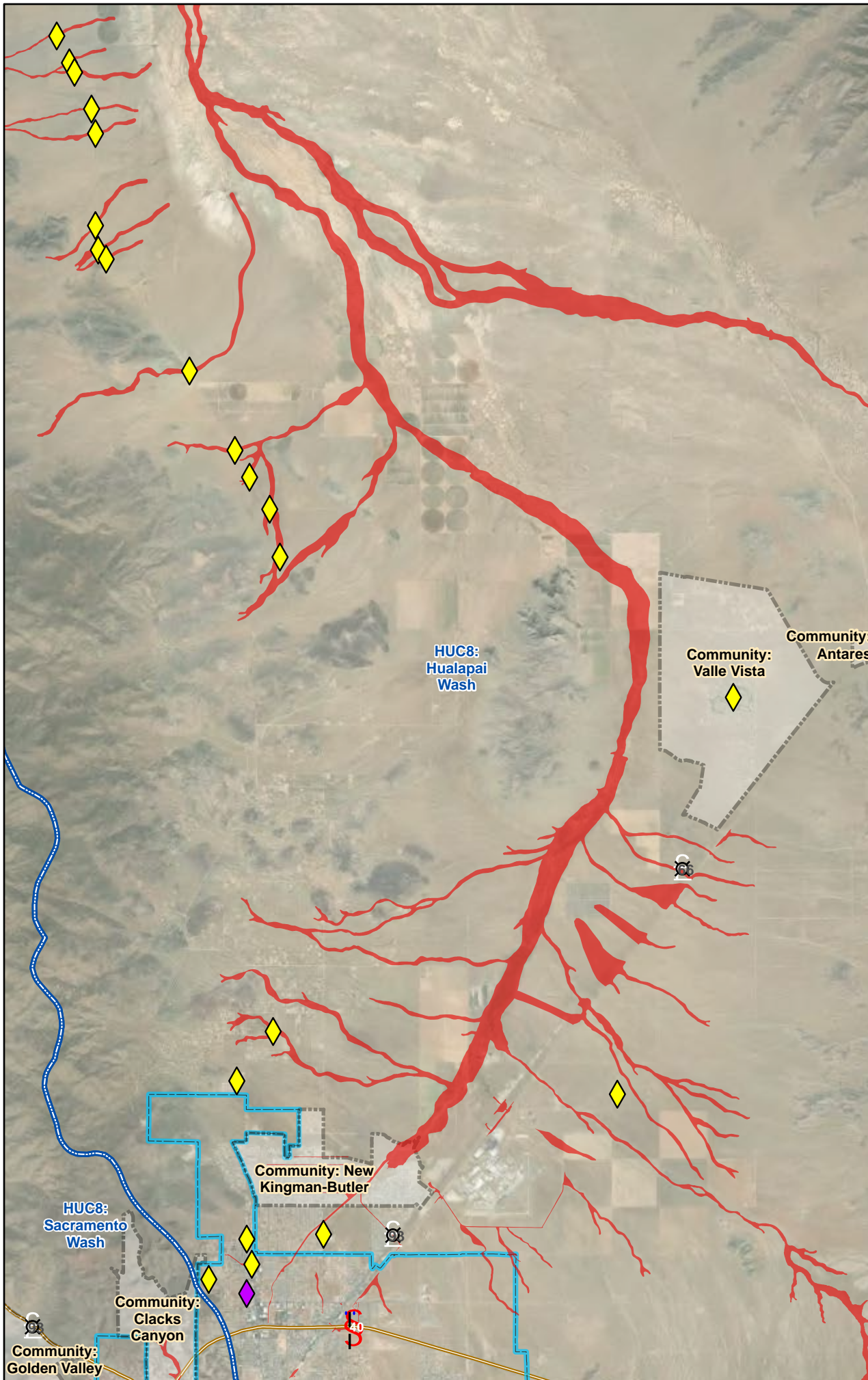
Sources:  
JE Fuller 2022: Mohave County 2022:  
ESRI 2022: FEMA 2022

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## Flood Risk Map

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# Mohave County Flood Risk Management Plan

## Legend

- Flood Risk Areas
- Mohave County Boundary
- HUC8 Boundary
- Major Streams
- Non-Incorporated Communities

### Incorporated Communities

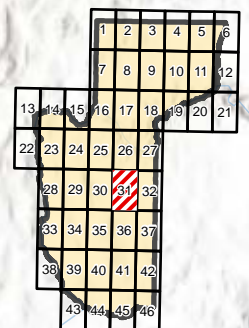
- Bullhead City
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  - Kaibab Paiute Res
  - Hualapai Nation Res
  - Fort Mojave Res

### FRMP Problem Areas

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- Removed
- Existing (2015)

Sources:  
JE Fuller 2022; Mohave County 2022;  
ESRI 2022; FEMA 2022

### Map Sheet Index



## Flood Risk Map





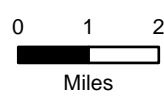
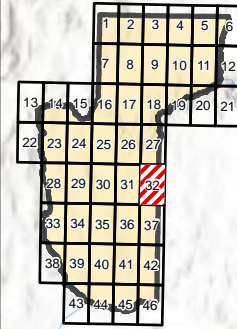
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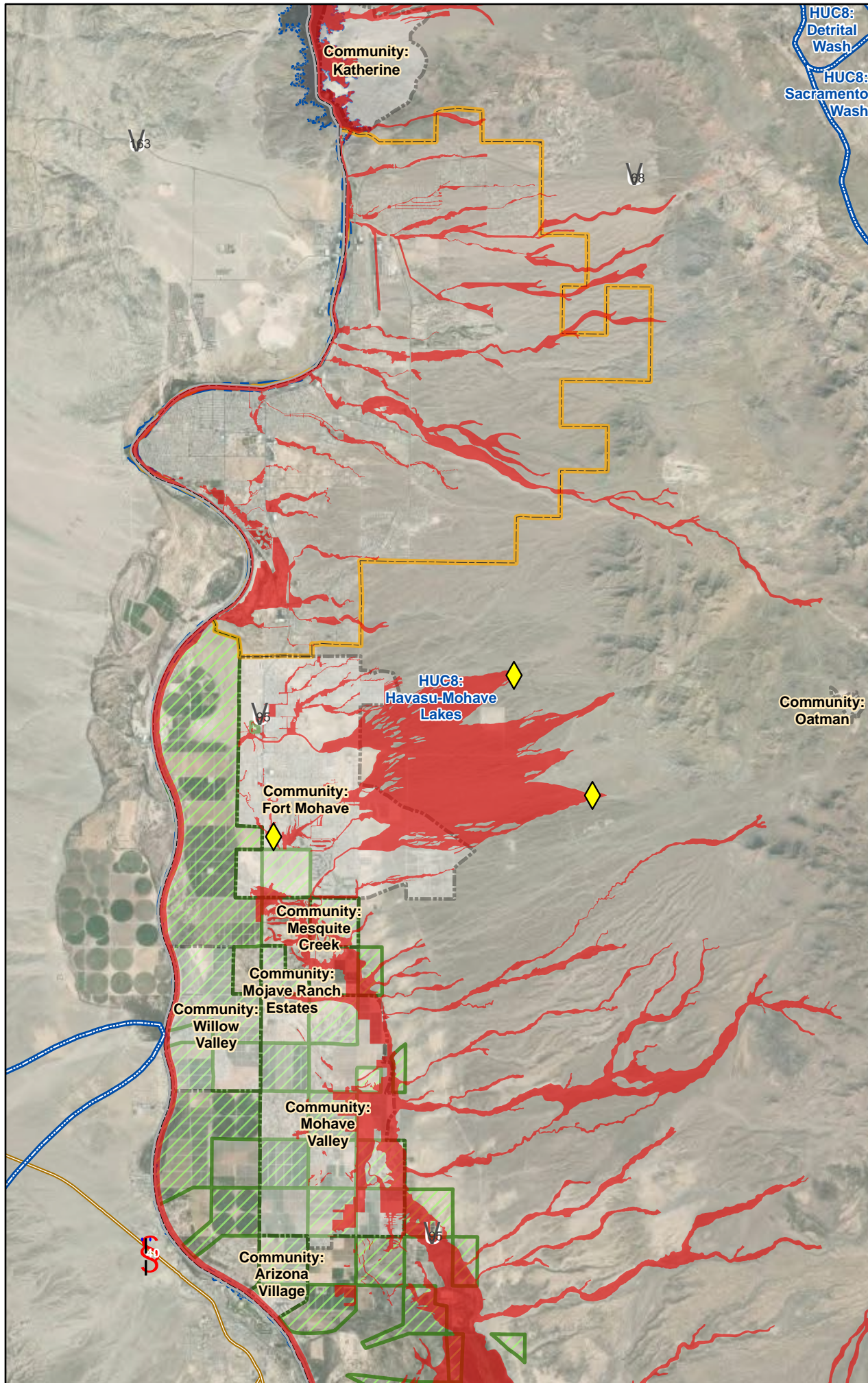
Sources:  
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ESRI 2022: FEMA 2022

## Map Sheet Index



## Flood Risk Map





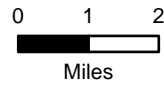
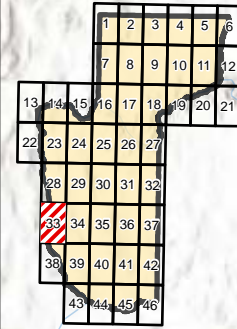
# Mohave County Flood Risk Management Plan

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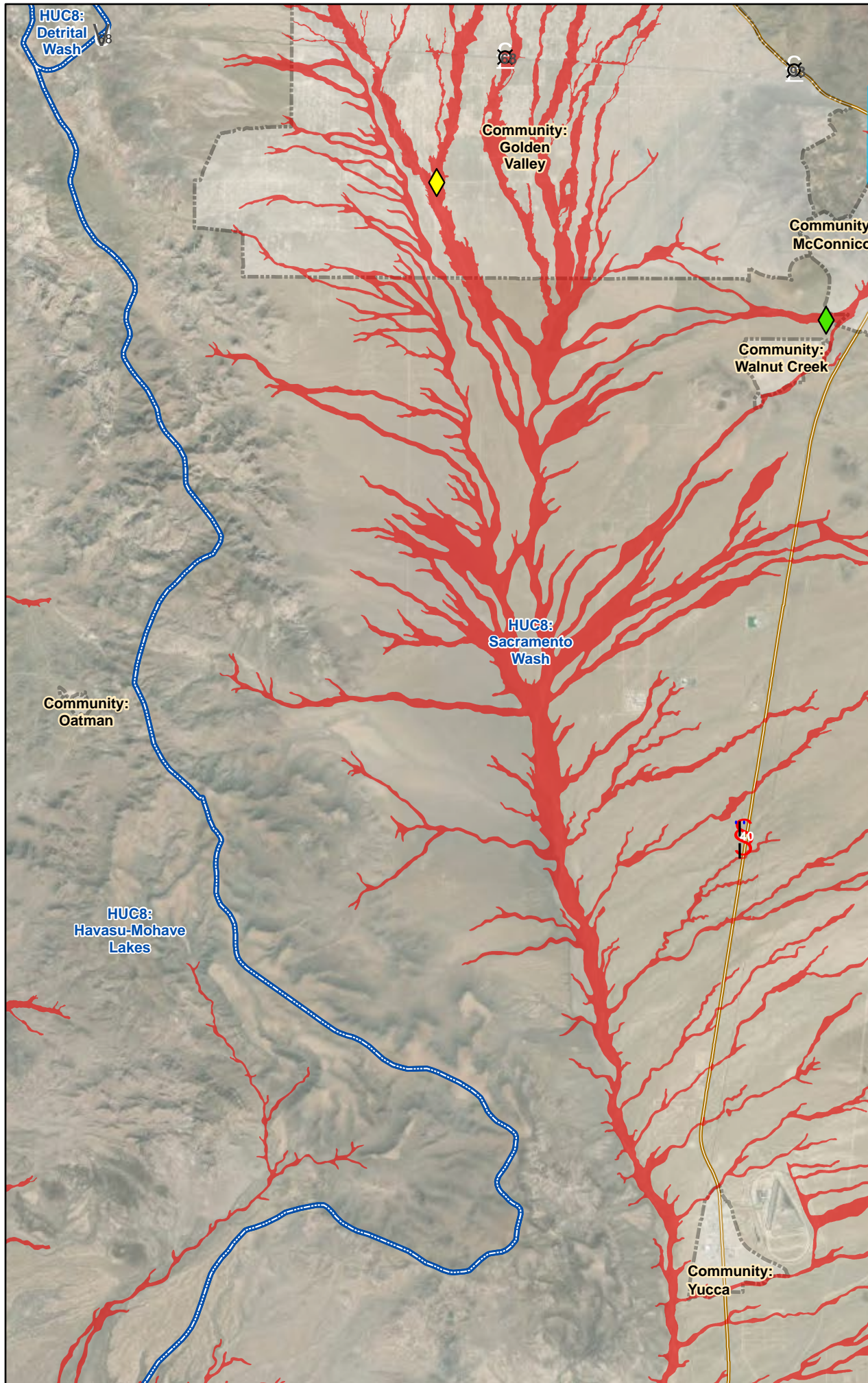
Sources:  
JE Fuller 2022: Mohave County 2022:  
ESRI 2022: FEMA 2022

## Map Sheet Index



## Flood Risk Map



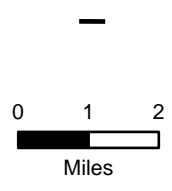
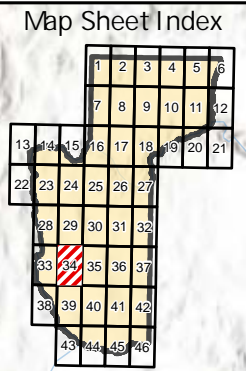


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ESRI 2022: FEMA 2022



## Flood Risk Map



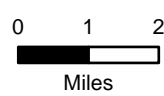
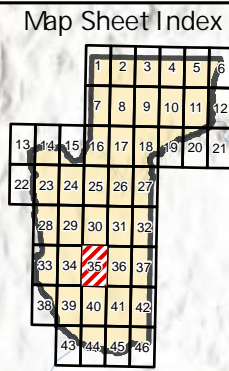


# Mohave County Flood Risk Management Plan

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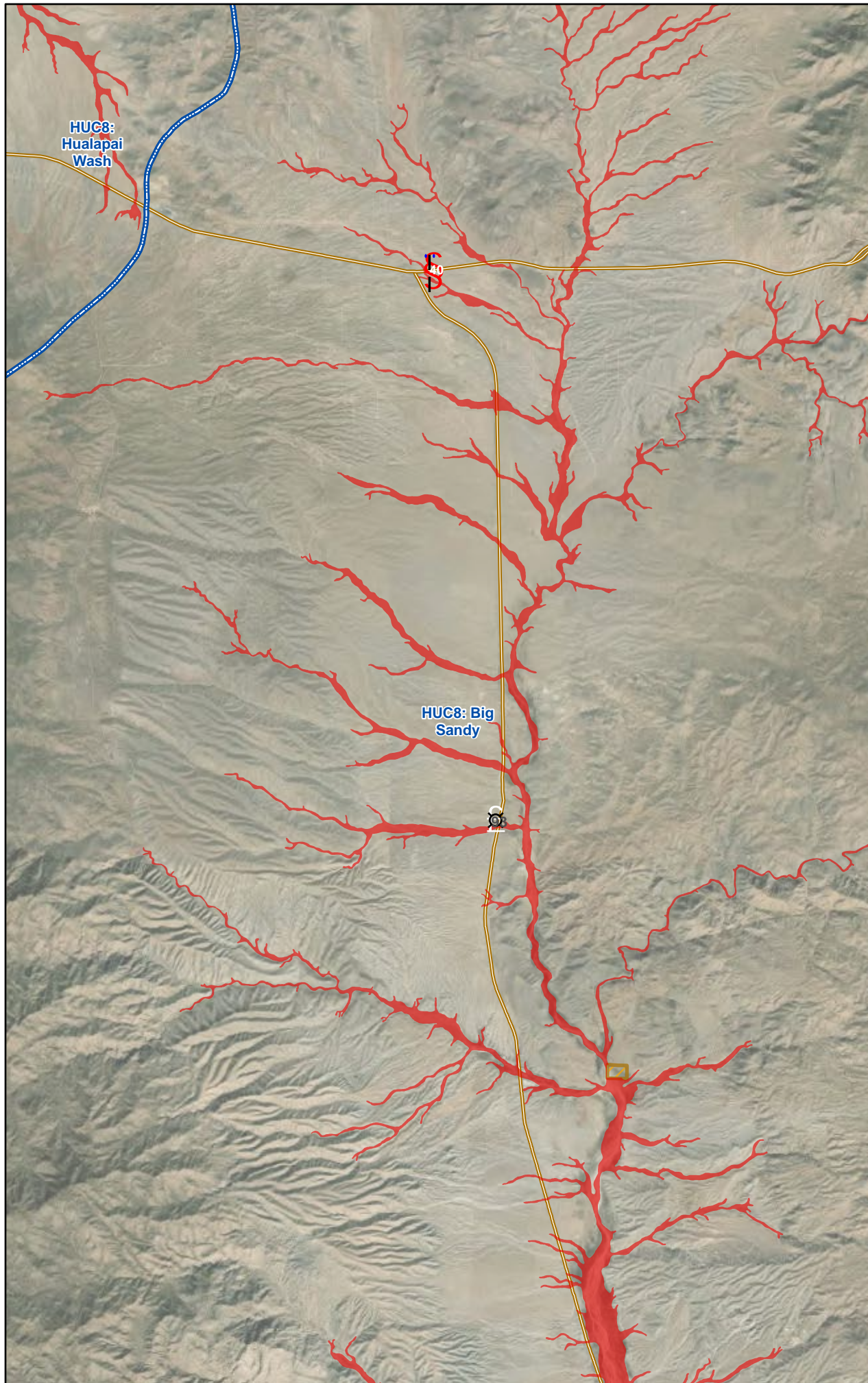
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Sources:  
JE Fuller 2022; Mohave County 2022;  
ESRI 2022; FEMA 2022



## Flood Risk Map





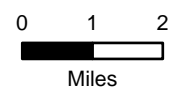
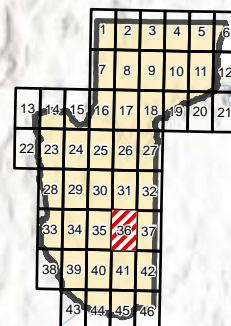
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Sources:  
JE Fuller 2022: Mohave County 2022:  
ESRI 2022: FEMA 2022

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Flood Risk Map

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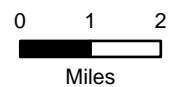
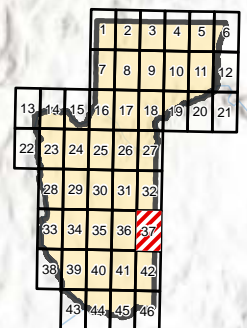
## Mohave County Flood Risk Management Plan

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- FRMP Problem Areas
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  - Existing (2015)

Sources:  
JE Fuller 2022: Mohave County 2022:  
ESRI 2022: FEMA 2022

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Flood Risk Map

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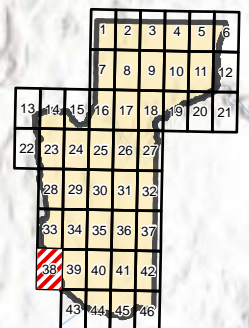
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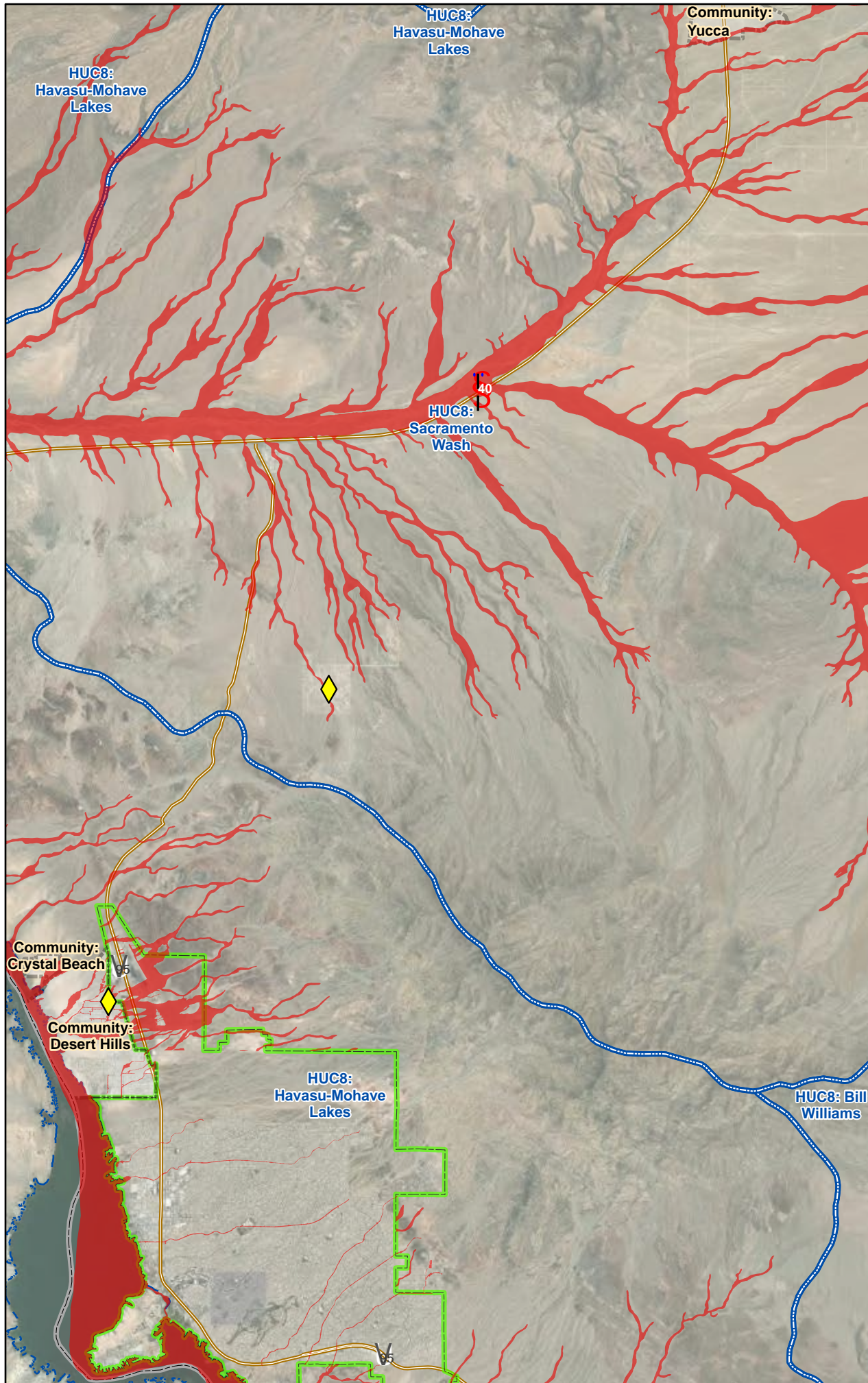
Sources:  
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ESRI 2022: FEMA 2022

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## Flood Risk Map





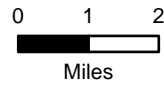
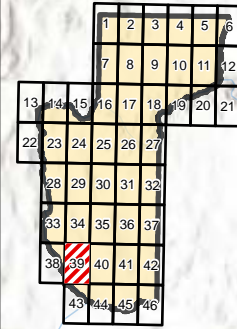
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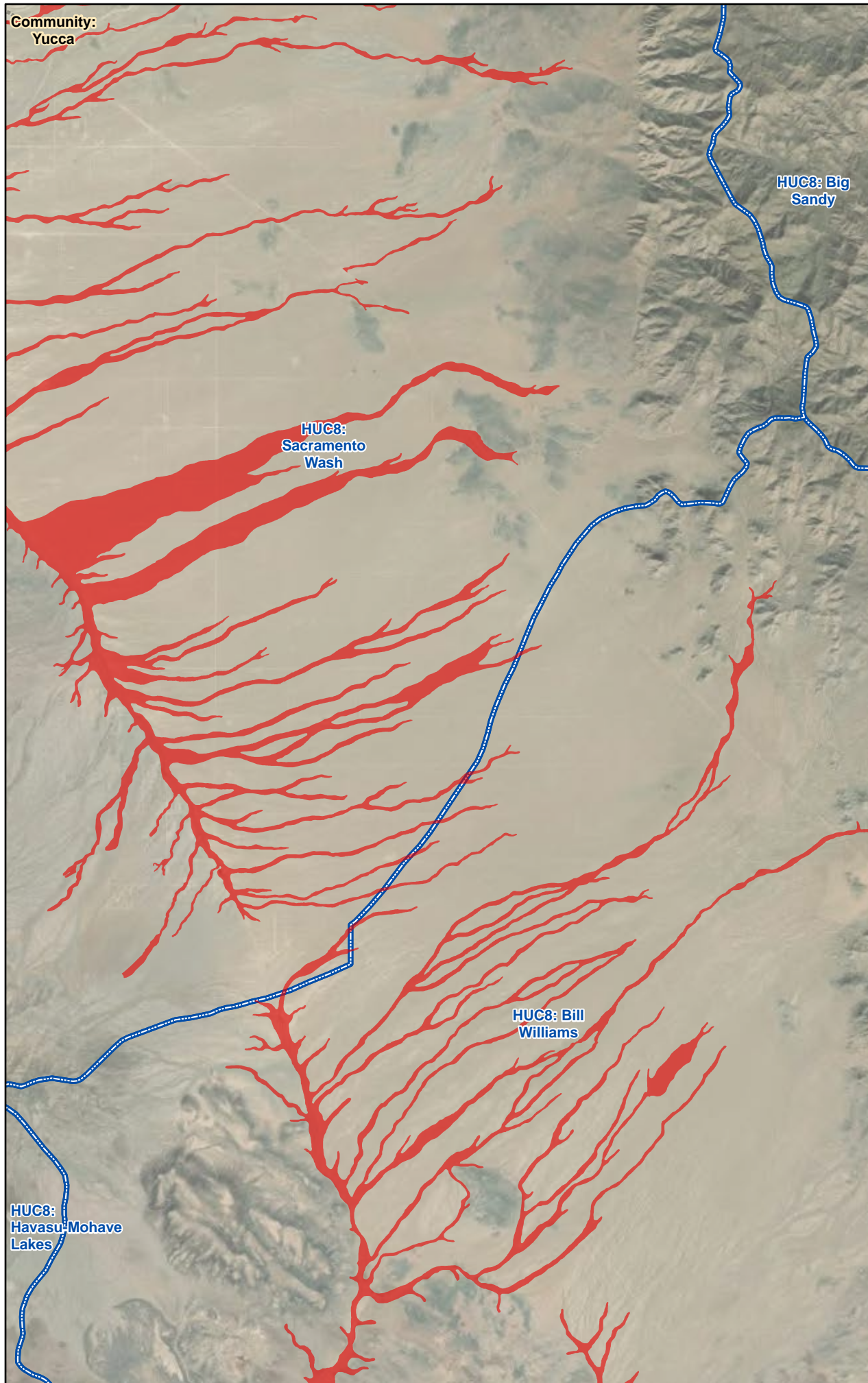
Sources:  
JE Fuller 2022: Mohave County 2022:  
ESRI 2022: FEMA 2022

## Map Sheet Index



## Flood Risk Map





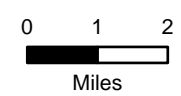
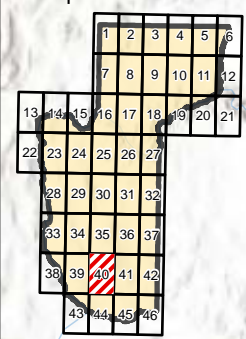
Mohave County  
Flood Risk  
Management Plan

Legend

- Flood Risk Areas
- Mohave County Boundary
- HUC8 Boundary
- Major Streams
- Non-Incorporated Communities
- Incorporated Communities
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  - Colorado City
  - Kingman
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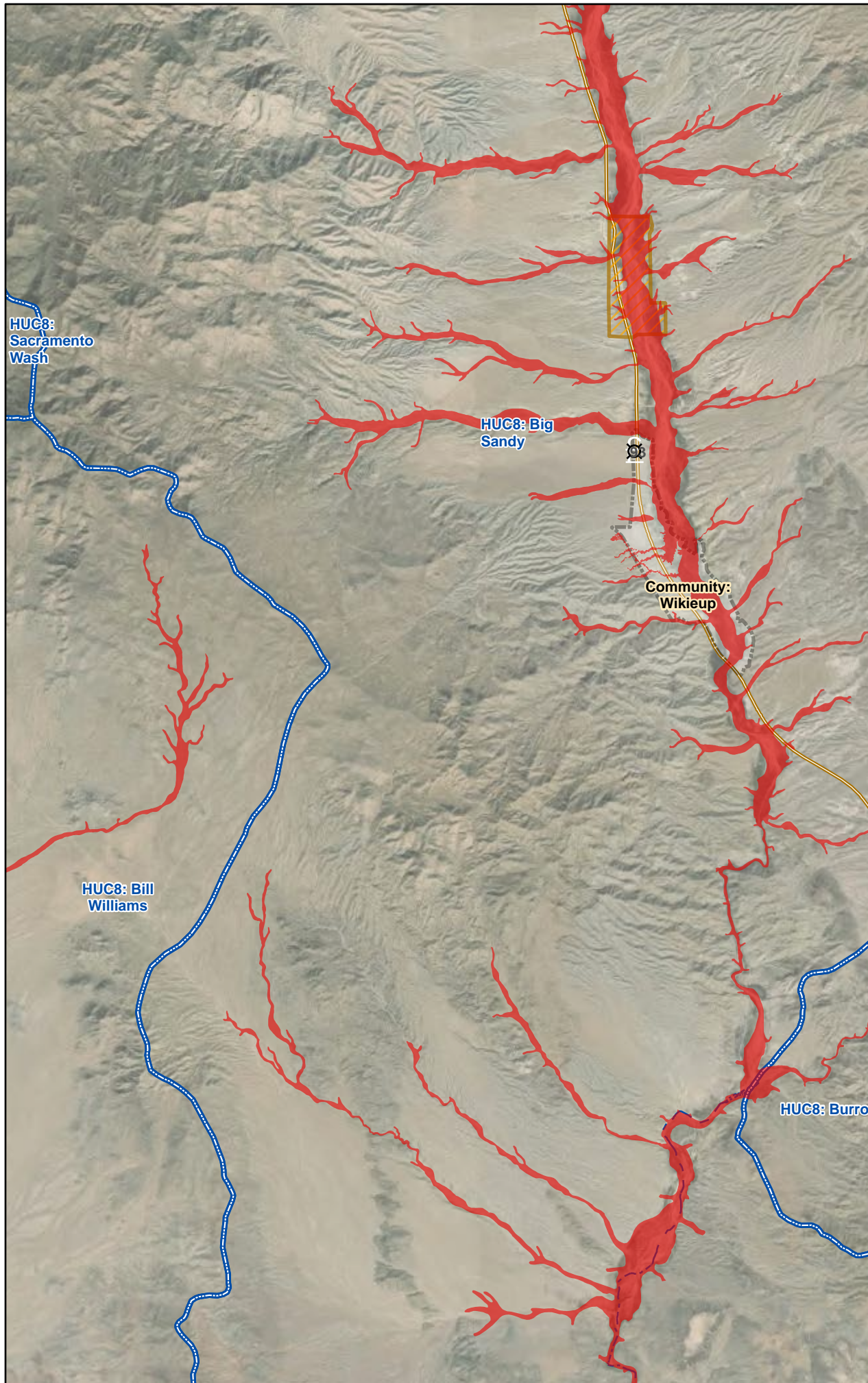
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Flood Risk Map





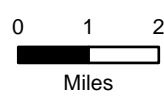
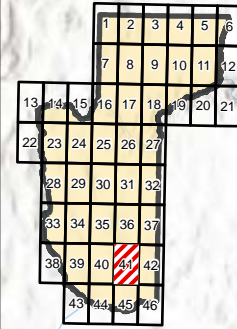
# Mohave County Flood Risk Management Plan

## Legend

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## Flood Risk Map



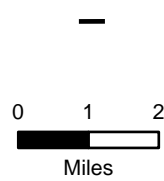
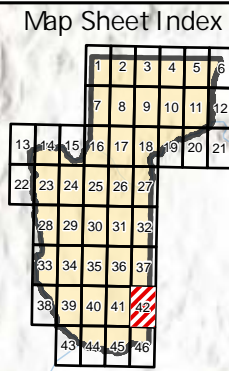


# Mohave County Flood Risk Management Plan

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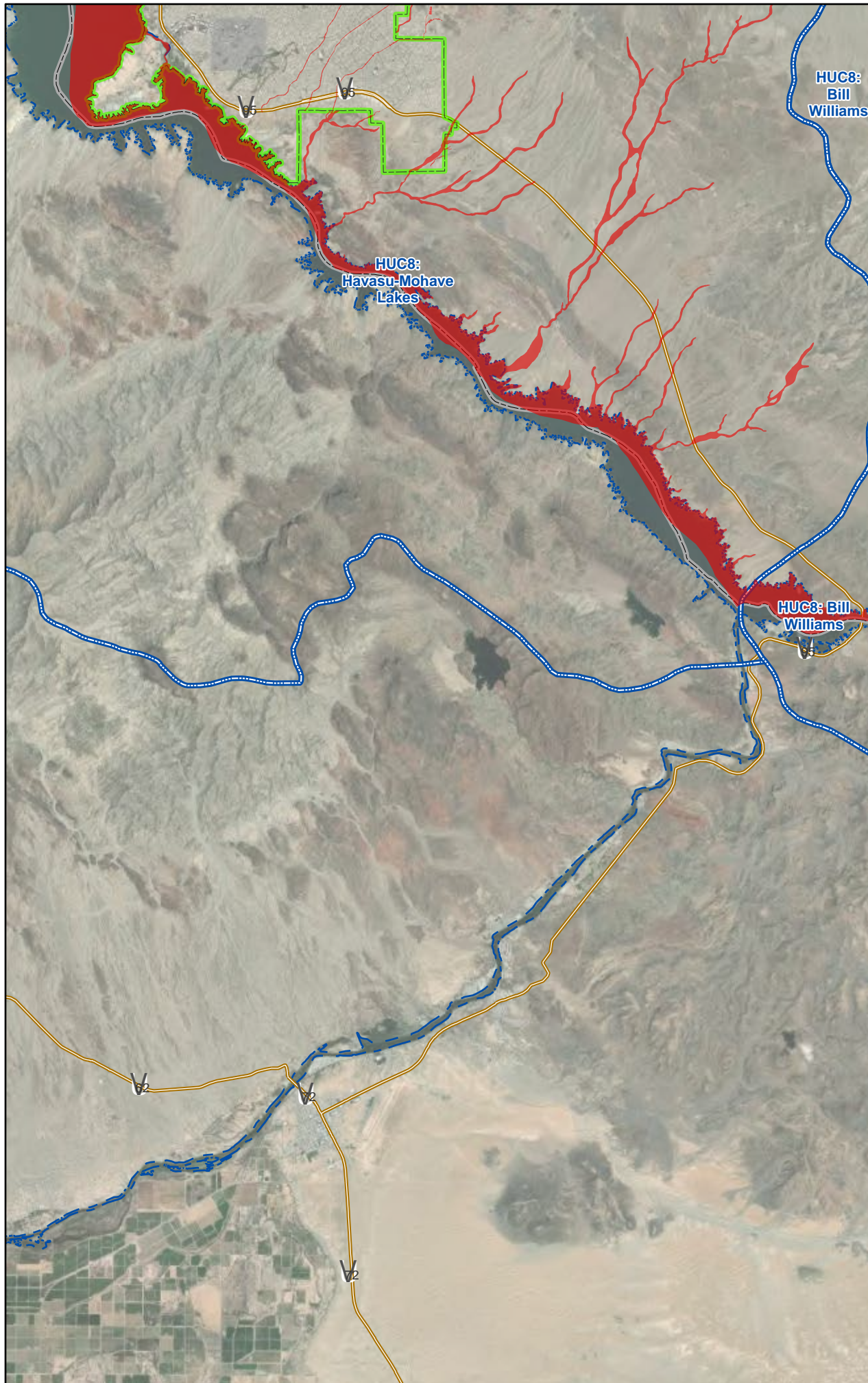
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Sources:  
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## Flood Risk Map





# Mohave County Flood Risk Management Plan

## Legend

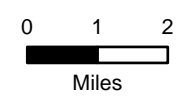
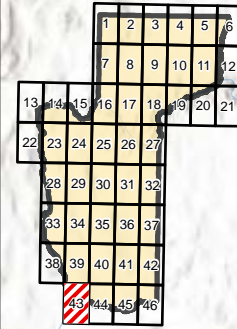
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## FRMP Problem Areas

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- ◆ Removed
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## Flood Risk Map





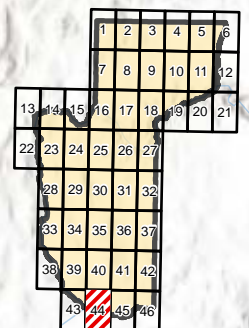
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## Map Sheet Index



## Flood Risk Map





## Mohave County Flood Risk Management Plan

### Legend

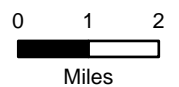
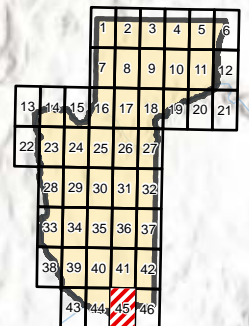
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## Flood Risk Map



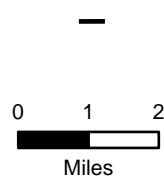
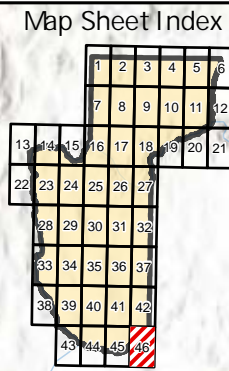


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## Flood Risk Map



## **APPENDIX E**

### **Annual FRMP Review Reports**



# MOHAVE COUNTY FLOOD CONTROL DISTRICT

## DEPARTMENT OF DEVELOPMENT SERVICES

P. O. Box 7000, Kingman, Arizona 86402-7000 3250 E Kino Ave, Kingman, AZ 86409 Telephone (928) 757-0925

FAX (928) 757-0912

[www.mohavecounty.us](http://www.mohavecounty.us)

Paul Baughman, P.E., CFM  
District Engineer

Timothy M. Walsh Jr., P.E.,  
Development Services Director

### MEMORANDUM

**To:** Mohave County Board of Supervisors

**From:** Mohave County Flood Control District Staff

**Date:** August 25<sup>th</sup>, 2023

**Re:** Fiscal Year 2023 Annual Flood Risk Management Plan Review

In 2015, the Mohave County Flood Control District (District) convened a planning team and prepared the *Mohave County Flood Risk Management Plan* (FRMP), which was presented to and adopted by the Mohave County Board of Supervisors (Board) on March 21, 2016. The FRMP for Mohave County (County) assesses the flooding hazards within the unincorporated areas of the County, summarizes previous and current County programs, describes potential mitigation strategies, and presents a plan for future actions of the County to build resilience to flood related risks. It was prepared with input from County residents, responsible County officials and staff, and consultants.

Mohave County currently participates in the Federal Emergency Management Agency's (FEMA) Community Rating System (CRS) Program, which is a subpart of the National Flood Insurance Program (NFIP). The FRMP planning process, content and scope are generally arranged to comply with Section 510 of the latest CRS guidelines, and is a part of the overall CRS program package that is maintained, administered and reported on by the District. FEMA requires an annual audit of the CRS program elements to maintain eligibility and rating. The provisions for the annual review of the FRMP are set forth in Section 7.1 of the FRMP. In response, the District performed the following steps:

- Contacted and updated the Advisory Committee discussed in Section 3.1 of the FRMP.
- Prepared a questionnaire that generally followed the Section 7.1 provisions and distributed the questionnaire to the Advisory Committee for comment and response.
- Convened an Advisory Committee meeting to review and discuss the questionnaire and responses, and to assess and update the Flood Risk Mitigation Action Plan in Section 6.3 of the FRMP.

A Section 7 annual review process was performed in August-September of 2017, 2018, and 2019 and a report summarizing the review and recommended updates was prepared, presented to, and approved by the Mohave County Board of Supervisors (Board) in September of those years. The annual review for 2023 followed a similar process, and the following report is a summary of the 2023 annual review conducted for the FRMP. The above bullet actions are discussed in more detail in the following sections.





## **ADVISORY COMMITTEE**

In July 2023, the District reached out to the past Advisory Committee members and/or their position replacements, to reconvene the committee for the review process. A list of the contacted participants is provided in Table 1.

| <b>TABLE 1 – Advisory Committee Members for FY 2023 Review</b> |  |  |   |
|--|--|--|---|
| <b>Advisory Committee Member</b>                               | <b>County Department</b>   | <b>Questionnaire Response Provided</b> | <b>Attendance at Advisory Committee Mtg</b> |
| <b>Mohave County Staff</b>                                     |  |  |   |
| Paul Baughman  | Flood Control District   |  | ✓   |
| Luke Brazdys   | Environmental Protection   |  | ✓   |
| Joseph Dorner  | Risk/Emergency Management  |  |   |
| Katherine Fish   | Flood Control District   |  | ✓   |
| Matt Gunderson   | Zoning   |  | ✓   |
| Hein Nguyen  | Public Works   | ✓                                      | ✓   |
| Jon Ortman   | Flood Control District   |  | ✓   |
| Gilbert Smaby  | Building Department  |  | ✓   |
| Scott Holtry   | Development Services Planning & Zoning                               | ✓                                      |   |
| Michael Smith  | Housing/Community Development  |  |   |
| <b>Public / Private Members</b>                                |  |  |   |
| <b>Advisory Committee Member</b>                               | <b>Public</b>  | <b>Questionnaire Response Provided</b> | <b>Attendance at Advisory Committee Mtg</b> |
| Kathy Ortman   | Realtor  | ✓                                      | ✓   |
| Pete Proffit   | Engineer   | ✓                                      |   |
| Travin Pennington  | Developer  | ✓                                      | ✓   |
| LaJuana Gillette   | P&Z Commissioner   |  |   |
| Mike Meersman  | Fire Department  |  | ✓   |
| Johnny Loera   | Bullhead City  | ✓                                      | ✓   |
| Greg Froslic   | Lake Havasu City   |  | ✓   |
| Vance Barlow   | Colorado City  |  |   |
| Phil Alred   | City of Kingman  |  | ✓   |
| Cole Cooper  | Project Consultant on behalf of Mohave County Flood Control District |  | ✓   |







The Advisory Committee was engaged to perform this annual review in two ways. The first was via the email distribution of a questionnaire that was sent out July 19<sup>th</sup>, 2023. The second was via a review meeting that was convened on August 10<sup>th</sup>, 2023 at the District's office. Details of both activities are summarized in the discussions below. A copy of the agenda and sign-in sheet for the Advisory Committee Meeting are provided in the Appendix.

## **QUESTIONNAIRE**

The District prepared a brief questionnaire that was designed to solicit responses from the Advisory Committee members pertaining to the review items listed in Section 7.1 of the FRMP. The questions posed to each of the Advisory Committee members in an email sent out on July 19<sup>th</sup>, 2023 are listed in Table 2, along with the responses received via reply emails. A copy of the questionnaire email distributed by the District is provided in the Appendix and the individual responses are on-file at the District's office.

| <b>TABLE 2 – 2023 Questionnaire Responses</b>  |
|--|
| <b>1. Have the flood risks and/or hazard areas in your area increased or decreased significantly since the last evaluation? Please tell us how.</b>  |
| <ul style="list-style-type: none"><li>I do see flood risks as the same.</li></ul>  |
| <ul style="list-style-type: none"><li>There has been recent residential development in my area. After the construction of these subdivisions, it seems as if drainage problems have gotten better and the streets are cleaner after a storm event. That said, I have noticed that the area around the Airway underpass and the new hospital seems as if the flood risks have increased.</li></ul>  |
| <ul style="list-style-type: none"><li>I am not aware of any change of flood risks or hazard areas increasing or decreasing.</li></ul>  |
| <ul style="list-style-type: none"><li>They stayed the same.</li></ul>  |
| <ul style="list-style-type: none"><li>Not to my knowledge.</li></ul>   |
| <ul style="list-style-type: none"><li>I don't believe there's been a significant increase or decrease in flood risks or hazards in our area. The Laughlin/Bullhead airport did complete a drainage project west of their runway to retain runoff, but our understanding is that it's designed to retain a 10-year event.</li></ul>   |
| <b>2. Have there been any significant flooding events since October 2021 that you are aware of occurring over the last year? If so, describe the event and its impacts.</b>  |
| <ul style="list-style-type: none"><li>So far, no.</li></ul>  |
| <ul style="list-style-type: none"><li>Yes, in 2022 there was some major flooding that occurred in the area of Airway and the new hospital. There were many houses that were damaged by the flood. Airway Ave was closed for many hours and access to that entire area was cut off, including the hospital. The box culverts under I-40 were at capacity and water was running over the top of I-40 and dumping large amounts of water into the residential area just to the north.</li></ul> |
| <ul style="list-style-type: none"><li>There was a significant flooding event on the east side of Kingman on Airway. Water overtopped I40 and flooded the streets. There were a number of homes that appeared to have been inundated.</li></ul>   |
| <ul style="list-style-type: none"><li>2022 was a very wet year, so we saw more flooding, but I feel that all the areas we saw run heavy were already known to flood, there was just more flow. There have also been more homes built in these areas since the last time we saw rains like this, so more damage.</li></ul>  |
| <ul style="list-style-type: none"><li>Flooding of Airway Ave in August of 2022 that resulted in many people not being able to access or leave their homes in Kingman Crossing, Heather, and Vista Bella subdivisions.</li></ul>  |





|  |
|--|
| <ul style="list-style-type: none"><li>We've had a couple of major storm events since October 2021, but the impacts have been felt mainly in previously identified flood prone areas. A few of the areas of the City experienced standing water for a few days, and the typical runoff onto Highway 95 occurred in the Original Bullhead Area between First Street and the Laughlin Bridge.</li></ul>   |
| <b>3. For flood events listed in response to Question No. 2, please note the effectiveness of any existing drainage facilities or improvements that were impacted or activated by the flood.</b>   |
| <ul style="list-style-type: none"><li>N/A</li></ul>  |
| <ul style="list-style-type: none"><li>It seemed that all of the drainage facilities in the area were undersized to handle the volume of water that the Airway Ave area received in the storms of 2022.</li></ul>   |
| <ul style="list-style-type: none"><li>It appeared that water was overtopping I40 which would imply the existing culverts were not conveying a sufficient amount of runoff or were overwhelmed.</li></ul>   |
| <ul style="list-style-type: none"><li>?</li></ul>  |
| <ul style="list-style-type: none"><li>Damage to the sidewalk and flood channel on APN 322-34-041.</li></ul>  |
| <ul style="list-style-type: none"><li>The drainage improvements at the airport seemed to reduce but not fully alleviate the flooding issues experienced in the Original Bullhead area. I believe other drainage facilities performed as expected.</li></ul>  |
| <b>4. Are the goals listed in Section 6.1 of the FRMP still applicable and able to address current and expected conditions?</b>  |
| <ul style="list-style-type: none"><li>The population of the county is not equal distribution. Some areas have a higher density than other areas. The county should provide more information focused on high density and risk. The county should evaluate if the informed information method is sufficient and efficient. Ex: How many users view flood information on Mohave County flood district website? How many people use the ARLERT website (Mohave.onerain.com)? Adequate information providing should be a goal or add to MJHMP objective 4. Objective 2 should add a transportation network. Keeping the transportation network running well is essential to mitigate emergencies' impact.</li></ul> |
| <ul style="list-style-type: none"><li>Yes, I think in general terms that the goals set out in Section 6.1 still apply. I feel like the listed "Goal 2" could be modified (see redline below).</li></ul> <p>GOAL 2 (current): Identify and pursue all reasonable avenues of funding for implementing flood risk reduction activities.</p> <p>GOAL 2 (proposed): Identify and pursue all reasonable avenues of funding and possible partnerships with local developers and projects for implementing flood risk reduction activities. Ask developers to be partners in regional drainage solutions that benefit them and the surrounding area.</p>   |
| <ul style="list-style-type: none"><li>These goals are still applicable.</li></ul>  |
| <ul style="list-style-type: none"><li>I believe so.</li></ul>  |
| <ul style="list-style-type: none"><li>Yes</li></ul>  |
| <ul style="list-style-type: none"><li>Have not had opportunity to review FRMP.</li></ul>   |



The posed questions were further discussed with County staff after the Advisory Committee Meeting on August 10<sup>th</sup>, 2023. Notable discussions are summarized as follows:

- It appears that the consensus among those who responded to the questionnaire is that the flood risks/flood hazard areas have not changed significantly since the last update.
- 2022 was an especially wet year, and Airway Ave. was mentioned more than once as a known problem area.
- The goals listed in section 6.1 of the FRMP are still applicable.

### **FLOOD RISK MITIGATION ACTION PLAN – ASSESSMENT AND UPDATE**

The Advisory Committee reviewed and assessed each of the action/projects (A/P) listed in Tables 6.5 and 6.6 from the 2022 Mohave County FRMP (represented at Tables 4 and 5 in this report respectively). Each A/P was reviewed and discussed regarding its current status and the future disposition of the A/P for the coming year. Table 3 represents only A/Ps from the 2022 update. New projects recommended during the 2023 advisory committee meeting are included in Tables 4 and 5 below. A summary of that review/assessment is provided in Table 3.

| <b>TABLE 3 – 2023 Mitigation Action Plan Assessment</b> |   |               |                     |   |
|---|---|---------------|---------------------|---|
| <b>ID No.</b>   | <b>Description</b>  | <b>STATUS</b> | <b>DIS-POSITION</b> | <b>EXPLANATION</b>                          |
| 1   | Install flashing signage for key low water crossings on county maintained highways at identified locations.                                 | In-progress   | Keep                | Still a desired A/P.                        |
| 2   | Identify, preliminarily size and prioritize drainage crossings along Stockton Hill Road (phase 1 in review by FEMA ; Ph.2 awaiting funding) | In-progress   | Keep                | Revise to include status of Phases 1 and 2. |
| 3   | Identify preliminarily size and prioritize drainage crossings along Pearce Ferry Road   | In-progress   | Keep                | Still a desired A/P.                        |
| 4   | Pursue flood risk mapping and study funding through FEMA CTP program  | In-progress   | Keep                | Still a desired A/P.                        |
| 5   | Pursue mitigation project funding through FEMA HMA programs (HMGP, BRIC, FMA)   | In-progress   | Keep                | Still a desired A/P.                        |
| 6   | Provide real time data to emergency management personel during a response event   | In-progress   | Keep                | Still a desired A/P.                        |





**TABLE 3 – 2023 Mitigation Action Plan Assessment**

| <b>ID No.</b> | <b>Description</b>   | <b>STATUS</b> | <b>DIS-POSITION</b> | <b>EXPLANATION</b>   |
|---------------|--|---------------|---------------------|--|
| 7             | Facilitate opening and operation of the EOC/DOC and participate in both real time and practice exercises.  | In-progress   | Keep                | Still a desired A/P.   |
| 8             | Support Public Works Road Department with real time data for potential road closures.  | In-progress   | Keep                | Still a desired A/P.   |
| 9             | Provide hydrologic analysis for flooding issues associated with post-wildfire related floods during the wildfire event.  | In-progress   | Keep                | Still a desired A/P.   |
| 10            | Maintain stormwater management plan/ordinance to satisfy the MS4 designation for Unincorporated areas of Mohave County.  | In-progress   | Keep                | Still a desired A/P.   |
| 11            | Provide continued floodplain management assistance and help to incorporated communities.   | In-progress   | Keep                | Still a desired A/P.   |
| 12            | Work with incorporated cities to pursue grant funds for flood control projects.  | In-progress   | Keep                | Still a desired A/P.   |
| 13            | Collaborate with FEMA on a regional and national level regarding working with local jurisdictions.   | In-progress   | Keep                | Still a desired A/P.   |
| 14            | Continued expansion and refinement of the county ALERT system by cooperating with Federal, Tribal, State and local agencies and officials.   | In-progress   | Keep                | County investigating possibility of ordering transmitters and other misc. equipment ahead of time. |
| 15            | Perform a DCR to analyze the drainage at Hillcrest and Stockton Hill Road. Known issues include undersized culverts, sediment deposition on the roads, and inadequate upstream drainage control. | In-progress   | Keep                | Still a desired A/P.   |





**TABLE 3 – 2023 Mitigation Action Plan Assessment**

| <b>ID No.</b> | <b>Description</b>  | <b>STATUS</b> | <b>DIS-POSITION</b> | <b>EXPLANATION</b>  |
|---------------|---|---------------|---------------------|---|
| 16            | Perform a DCR to analyze the drainage at the intersection of Stockton Hill Road near the Shadow Mountain alignment. Known issues include a large box culvert that is not hydraulically connected to flood flows it is intended to convey. | In-progress   | Keep                | Still a desired A/P.  |
| 17            | Perform a DCR to analyze the drainage at the intersection of Western and Airway. Known drainage issues include a retention basin that is not hydraulically connected to flood flows.  | In-progress   | Keep                | Still a desired A/P.  |
| 18            | Perform a DCR to analyze the drainage in the area of Lead Street and Stockton Hill Avenue. Known issues include frequent flooding of homes, flooding of high school downstream, and the need for upstream retention basins.               | Completed     | Delete              | Project moving to next phase ; new project (second phase) added to table 6.5 and 6.6. |
| 19            | Perform floodplain analysis for the Golden Shores watershed. Known issues include widespread, unanalyzed drainage problems, a need for mapping, floodplain analysis, and a ROW acquisition program. Soils in the area are highly erosive. | In-progress   | Keep                | Still a desired A/P.  |
| 20            | Design and construct American Business Park retention basins.   | In-progress   | Keep                | Still a desired A/P.  |
| 21            | Design and construction project for infiltration basins on Rattlesnake Wash, West Kingman, and Grace Neal Channel/Mohave Wash. Project would be a joint venture between Mohave County and BLM or ASLD.                                    | In-progress   | Keep                | Still a desired A/P.  |
| 22            | Perform floodplain mapping for Havasu Heights.  | In-progress   | Keep                | Still a desired A/P.  |
| 23            | Perform floodplain mapping for Meadview.  | In-progress   | Keep                | Still a desired A/P.  |



**TABLE 3 – 2023 Mitigation Action Plan Assessment**

| <b>ID No.</b> | <b>Description</b>   | <b>STATUS</b> | <b>DIS-POSITION</b> | <b>EXPLANATION</b>  |
|---------------|--|---------------|---------------------|---|
| 24            | Perform floodplain remapping in the unincorporated county portion of the North Kingman area (Stockton Hill Road project). Two-dimensional is recommended. Distributary flow patterns.  | Completed     | Delete              | Completed in January 2023.  |
| 25            | Perform floodplain remapping in the unincorporated county portion of the Valle Vista area including the Kingman Airport area. Two-dimensional is recommended. Distributary flow patterns.  | Completed     | Delete              | Completed in 2022   |
| 26            | Perform DCR for the Latigo Lane drainage issues in area in the City of Kingman.  | In-progress   | Keep                | Still a desired A/P.  |
| 27            | The Railroad Channel Project would benefit from a HAZUS analysis to prepare for grant applications. This project involves the design and construction of approximately 6 miles of channels along US 66 and the Burlington Northern Santa Fe (BNSF) Railroad alignment to intercept runoff on the south side of the elevated BNSF Railroad tracks and convey it to the Rattlesnake Wash Bridge near the airport. Flow will then be conveyed under US 66, and then through existing drainage rights of way to Mohave Wash. | No Action     | Delete              | No apparent funding at the moment. Possibly re-visit during future updates. |
| 28            | Jagerson Suffock: The purpose of this project is to widen Jagerson Avenue to improve access in the area while also providing drainage improvements. The portion of Jagerson Avenue from the Kingman City Limits to just past Bond Street will be widened and curb, gutter and sidewalk will be added to the north side of Jagerson Avenue in the area fronting Mohave Community College.   | In-progress   | Keep                | Still a desired A/P.  |





**TABLE 3 – 2023 Mitigation Action Plan Assessment**

| ID No. | Description  | STATUS      | DIS-POSITION | EXPLANATION  |
|--------|--|-------------|--------------|--|
| 29     | Grace Neal Channel: Grace Neal Parkway is bordered on the north and south by undeveloped land, although subdivisions are being developed at the western side of the intersection of Banks St. and Grace Neal Parkway and another near Township 17 and Section 19 line called Eagle View. There are several washes crossing the existing alignment. Flooding issues in the north portion of Kingman will be reduced by intercepting the flows and conveying them the Mohave Wash in an improved channel | In-progress | Keep         | Phase 1 done, will need to be retrofitted during phase 3, Phase 2 partially under construction, Phase 3 entering design. |
| 30     | Obtain topographic mapping for Golden Shores, Dolan Springs, Meadview, and Havasu Heights. Mapping could be used for future floodplain mapping and DCR analyses.   | Completed   | Delete       | Completed in 2022.   |
| 31     | Obtain topographic mapping for southeast Mohave County, approximately 3,000 sq. mi. expected.  | In-progress | Keep         | Flight expected to occur in year 2023, data processing to be completed by 2024.  |
| 32     | County-wide ALERT2 upgrades.   | In-progress | Keep         | An on-going effort that was not previously accounted for in past A/P tables.   |

Following the A/P assessment, the Advisory Committee brainstormed the need for new A/Ps to be added to the list which resulted in four new A/Ps (labeled with ID Nos. 28, 29, 30, and 31 in tables 4 and 5 below). The A/P ID Nos. 18, 24, 25, 27, and 30 were removed from the prior year's list (Table 3 above) as the action/projects having either been completed or otherwise identified for removal. The Advisory Committee rated and ranked the four new A/Ps and developed the implementation strategy for each. The remaining A/Ps were reviewed and updated as needed to reflect changes in funding, priority, or implementation.

The fully reviewed and updated Flood Risk Mitigation Action Plan A/Ps for the coming year are summarized below in Tables 4 and 5. The A/Ps considered in Tables 4 and 5 have been re-numbered to reflect the current/active list.





## SUMMARY

The District was able to successfully reconvene the Advisory Committee and perform the 4<sup>th</sup> annual review of the FRMP, including a full assessment and update of the Flood Risk Mitigation Strategy. Tables 4 and 5 summarize the updated Flood Risk Mitigation Strategy for the next year. The next annual review will occur around the July/August 2024 timeframe.

Table 6-4 (below) from the County's Flood Risk Management Plan defines the different project priority rankings (A-E) assigned to each project in Table 4.

| <i>Table 6-4 - Priority ranking criteria for MCFCD projects</i> |  |
|---|--|
| <b>Project Priority Ranking</b>                                 | <b>Project Priority Criteria Description</b>   |
| <b>A</b>  | <b>Highest priority project:</b> Areas of significant flooding and/or sedimentation problems. MCFCD has all the information needed to proceed with this study design or construction project. The projects are either underway or will begin typically within the next fiscal year depending on available budget.  |
| <b>B</b>  | <b>High priority project:</b> Areas of significant flooding and/or sedimentation problems. MCFCD considers this to be an important project but is actively gathering information. These projects are planned to begin in the next 2-5 fiscal years (depending on available budget) and include projects such as aerial mapping, hydrology studies, and design concept reports (DCR). |
| <b>C</b>  | <b>Medium priority project:</b> Areas of moderate flooding and/or sedimentation problems. These represent projects in which MCFCD will continue to gather information. Based on that information, these projects may become higher priority in the future. The timeline for these projects is typically 3-10 fiscal years  |
| <b>D</b>  | <b>Low priority project:</b> These projects benefit a limited number of individual residents. In some cases these projects will be driven by development and would be generally funded by developers.  |
| <b>E</b>  | <b>Lowest priority project:</b> These projects either offer minor benefit to the residents of Mohave County or they are outside the jurisdiction of the MCFCD. Some of these projects may be a higher priority to other jurisdictions such as cities or Indian communities. No timeline is projected for these projects.   |







**Table 4 - Flood Risk Management Plan 2023 actions/projects List**

| ID No. | Description  | Goals Addressed | Estimated Cost   | Favorable = F<br>Neutral = N<br>Less Favorable = L |                              |              |                             |                         | Action/<br>Project<br>Priority<br>Rank |
|--------|--|-----------------|------------------|--|------------------------------|--------------|-----------------------------|-------------------------|--|
|        |  |                 |                  | Technical<br>Feasibility                           | Regulatory<br>Administration | Cost/Benefit | Support<br>Public/Political | Environmental<br>Impact |  |
| 1      | Install flashing signage for key low water crossings on county-maintained highways at identified locations.                                | 1, 3            | \$8,000/location | F  | N                            | F            | F                           | F                       | B                                      |
| 2      | Identify preliminarily size and prioritize drainage crossings along Stockton Hill Road (phase 1 in review by FEMA ; Ph.2 awaiting funding) | 1, 3            | Staff Time       | F  | N                            | F            | F                           | F                       | B                                      |
| 3      | Identify, preliminarily size and prioritize drainage crossings along Pierce Ferry Road   | 1, 3            | Staff Time       | F  | N                            | F            | F                           | F                       | B                                      |





**Table 4 - Flood Risk Management Plan 2023 actions/projects List**

| ID No. | Description   | Goals Addressed | Estimated Cost | Favorable = F<br>Neutral = N<br>Less Favorable = L |                              |              |                             |                         | Action/<br>Project<br>Priority<br>Rank |
|--------|---|-----------------|----------------|--|------------------------------|--------------|-----------------------------|-------------------------|--|
|        |   |                 |                | Technical<br>Feasibility                           | Regulatory<br>Administration | Cost/Benefit | Support<br>Public/Political | Environmental<br>Impact |  |
|        |   |                 |                |  |                              |              |                             |                         |  |
| 4      | Pursue flood risk mapping and study funding through FEMA CTP program                                      | 1, 2, 3         | Staff Time     | F  | N                            | F            | F                           | F                       | A                                      |
| 5      | Pursue mitigation project funding through FEMA HMA programs (HMGP, BRIC, FMA)                             | 1, 2            | Staff Time     | F  | N                            | F            | F                           | F                       | A                                      |
| 6      | Provide real time data to emergency management personnel during a response event                          | 4               | Staff Time     | F  | N                            | F            | F                           | F                       | A                                      |
| 7      | Facilitate opening and operation of the EOC/DOC and participate in both real time and practice exercises. | 4               | Staff Time     | F  | N                            | F            | F                           | F                       | A                                      |





**Table 4 - Flood Risk Management Plan 2023 actions/projects List**

| ID No. | Description   | Goals Addressed | Estimated Cost | Favorable = F<br>Neutral = N<br>Less Favorable = L |                              |              |                             |                         | Action/<br>Project<br>Priority<br>Rank |
|--------|---|-----------------|----------------|--|------------------------------|--------------|-----------------------------|-------------------------|--|
|        |   |                 |                | Technical<br>Feasibility                           | Regulatory<br>Administration | Cost/Benefit | Support<br>Public/Political | Environmental<br>Impact |  |
|        |   |                 |                |  |                              |              |                             |                         |  |
| 8      | Support Public Works Road Department with real time data for potential road closures.                                   | 1, 4            | Staff Time     | F  | N                            | F            | F                           | F                       | A                                      |
| 9      | Provide hydrologic analysis for flooding issues associated with post-wildfire related floods during the wildfire event. | 1, 3, 4         | Staff Time     | F  | N                            | F            | F                           | F                       | A                                      |
| 10     | Maintain stormwater management plan/ordinance to satisfy the MS4 designation for Unincorporated areas of Mohave County. | 1, 3            | Staff Time     | F  | N                            | N            | N                           | F                       | A                                      |
| 11     | Provide continued floodplain management assistance and help to incorporated communities.                                | 1, 3, 4         | Staff Time     | F  | N                            | F            | F                           | N                       | A                                      |





**Table 4 - Flood Risk Management Plan 2023 actions/projects List**

| ID No. | Description  | Goals Addressed | Estimated Cost             | Favorable = F<br>Neutral = N<br>Less Favorable = L |                              |              |                             |                         | Action/<br>Project<br>Priority<br>Rank |
|--------|--|-----------------|----------------------------|--|------------------------------|--------------|-----------------------------|-------------------------|--|
|        |  |                 |                            | Technical<br>Feasibility                           | Regulatory<br>Administration | Cost/Benefit | Support<br>Public/Political | Environmental<br>Impact |  |
|        |  |                 |                            |  |                              |              |                             |                         |  |
| 12     | Work with incorporated cities to pursue grant funds for flood control projects.  | 1, 2, 3         | Staff Time                 | F  | N                            | F            | F                           | N                       | A                                      |
| 13     | Collaborate with FEMA on a regional and national level regarding working with local jurisdictions.   | 1, 2, 3         | Staff Time                 | F  | N                            | F            | F                           | N                       | A                                      |
| 14     | Continued expansion and refinement of the county ALERT system by cooperating with Federal, Tribal, State and local agencies and officials. | 1, 3, 4         | \$10k to \$15k per station | F  | F                            | N            | F                           | F                       | A                                      |







**Table 4 - Flood Risk Management Plan 2023 actions/projects List**

| ID No. | Description   | Goals Addressed | Estimated Cost | Favorable = F<br>Neutral = N<br>Less Favorable = L |                              |              |                             |                         | Action/<br>Project<br>Priority<br>Rank |
|--------|---|-----------------|----------------|--|------------------------------|--------------|-----------------------------|-------------------------|--|
|        |   |                 |                | Technical<br>Feasibility                           | Regulatory<br>Administration | Cost/Benefit | Support<br>Public/Political | Environmental<br>Impact |  |
|        |   |                 |                |  |                              |              |                             |                         |  |
| 15     | Perform a DCR to analyze the drainage at Hillcrest and Stockton Hill Road. Known issues include undersized culverts, sediment deposition on the roads, and inadequate upstream drainage control.  | 3               | \$50K          | F  | F                            | F            | F                           | N                       | A                                      |
| 16     | Perform a DCR to analyze the drainage at the intersection of Stockton Hill Road near the Shadow Mountain alignment. Known issues include a large box culvert that is not hydraulically connected to flood flows it is intended to convey. | 3               | \$50K          | F  | F                            | F            | F                           | N                       | C                                      |





**Table 4 - Flood Risk Management Plan 2023 actions/projects List**

| ID No. | Description   | Goals Addressed | Estimated Cost | Favorable = F<br>Neutral = N<br>Less Favorable = L |                              |              |                             |                         | Action/<br>Project<br>Priority<br>Rank |
|--------|---|-----------------|----------------|--|------------------------------|--------------|-----------------------------|-------------------------|--|
|        |   |                 |                | Technical<br>Feasibility                           | Regulatory<br>Administration | Cost/Benefit | Support<br>Public/Political | Environmental<br>Impact |  |
|        |   |                 |                |  |                              |              |                             |                         |  |
| 17     | Perform a DCR to analyze the drainage at the intersection of Western and Airway. Known drainage issues include a retention basin that is not hydraulically connected to flood flows.  | 3               | \$30K          | F  | F                            | F            | F                           | N                       | E                                      |
| 18     | Perform floodplain analysis for the Golden Shores watershed. Known issues include widespread, unanalyzed drainage problems, a need for mapping, floodplain analysis, and a ROW acquisition program. Soils in the area are highly erosive. | 3               | \$250k         | F  | N                            | F            | F                           | N                       | B                                      |





**Table 4 - Flood Risk Management Plan 2023 actions/projects List**

| ID No. | Description  | Goals Addressed | Estimated Cost     | Favorable = F<br>Neutral = N<br>Less Favorable = L |                              |              |                             |                         | Action/<br>Project<br>Priority<br>Rank |
|--------|--|-----------------|--------------------|--|------------------------------|--------------|-----------------------------|-------------------------|--|
|        |  |                 |                    | Technical<br>Feasibility                           | Regulatory<br>Administration | Cost/Benefit | Support<br>Public/Political | Environmental<br>Impact |  |
|        |  |                 |                    |  |                              |              |                             |                         |  |
| 19     | Design and construct American Business Park retention basins.  | 3               | \$150K             | F  | N                            | N            | F                           | N                       | D                                      |
| 20     | Design and construction project for infiltration basins on Rattlesnake Wash, West Kingman, and Grace Neal Channel/Mohave Wash. Project would be a joint venture between Mohave County and BLM or ASLD. | 1, 3            | Varies by Location | F  | N                            | N            | F                           | N                       | B                                      |
| 21     | Perform floodplain mapping for Havasu Heights.   | 3               | \$200k             | F  | F                            | F            | F                           | N                       | B                                      |
| 22     | Perform floodplain mapping for Meadview.   | 3               | \$220k             | F  | F                            | F            | F                           | N                       | B                                      |





**Table 4 - Flood Risk Management Plan 2023 actions/projects List**

| ID No. | Description   | Goals Addressed | Estimated Cost | Favorable = F<br>Neutral = N<br>Less Favorable = L |                              |              |                             |                         | Action/<br>Project<br>Priority<br>Rank |
|--------|---|-----------------|----------------|--|------------------------------|--------------|-----------------------------|-------------------------|--|
|        |   |                 |                | Technical<br>Feasibility                           | Regulatory<br>Administration | Cost/Benefit | Support<br>Public/Political | Environmental<br>Impact |  |
|        |   |                 |                |  |                              |              |                             |                         |  |
| 23     | Perform DCR for the Latigo Lane drainage issues in area in the City of Kingman. | 1, 3            | \$50K          | F  | F                            | F            | F                           | N                       | E                                      |







**Table 4 - Flood Risk Management Plan 2023 actions/projects List**

| ID No. | Description  | Goals Addressed | Estimated Cost | Favorable = F<br>Neutral = N<br>Less Favorable = L |                           |              |                          |                      | Action/<br>Project<br>Priority<br>Rank |
|--------|--|-----------------|----------------|--|---------------------------|--------------|--------------------------|----------------------|--|
|        |  |                 |                | Technical Feasibility                              | Regulatory Administration | Cost/Benefit | Support Public/Political | Environmental Impact |  |
| 24     | Jageron Suffock: The purpose of this project is to widen Jageron Avenue to improve access in the area while also providing drainage improvements. The portion of Jageron Avenue from the Kingman City Limits to just past Bond Street will be widened and curb, gutter and sidewalk will be added to the north side of Jageron Avenue in the area fronting Mohave Community College. | 3               | \$2.1M         | F  | N                         | F            | F                        | N                    | C                                      |





**MOHAVE COUNTY FLOOD CONTROL DISTRICT**  
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|    |  |       |                          |   |   |   |   |   |   |
|----|--|-------|--------------------------|---|---|---|---|---|---|
| 25 | Grace Neal Channel: Grace Neal Parkway is bordered on the north and south by undeveloped land, although subdivisions are being developed at the western side of the intersection of Banks St. and Grace Neal Parkway and another near Township 17 and Section 19 line called Eagle View. There are several washes crossing the existing alignment. Flooding issues in the north portion of Kingman will be reduced by intercepting the flows and conveying them the Mohave Wash in an improved channel | 3     | \$8.0M                   | F | N | N | F | N | A |
| 26 | Obtain topographic mapping for southeast Mohave County, approximately 3,000 sq. mi. expected.  | 3     | \$0                      | F | F | F | F | N | A |
| 27 | County-wide ALERT2 upgrades.   | 3,4   | \$1k to \$3k per station | F | F | N | F | F | A |
| 28 | Bank Street storm drain. North of Gordon to Mohave Wash.   | 2 , 3 | \$1.25 million           | F | F | F | F | N | A |





**Table 4 - Flood Risk Management Plan 2023 actions/projects List**

| ID No. | Description   | Goals Addressed | Estimated Cost | Favorable = F<br>Neutral = N<br>Less Favorable = L |                              |              |                             |                         | Action/<br>Project<br>Priority<br>Rank |
|--------|---|-----------------|----------------|--|------------------------------|--------------|-----------------------------|-------------------------|--|
|        |   |                 |                | Technical<br>Feasibility                           | Regulatory<br>Administration | Cost/Benefit | Support<br>Public/Political | Environmental<br>Impact |  |
|        |   |                 |                |  |                              |              |                             |                         |  |
| 29     | DCR level analysis for Kingman Air-Rail Manor area (greater Kingman addition DCR). Area surrounding Yavapai Street directly north of I40. | 1,3             | \$100k         | F  | F                            | F            | F                           | N                       | B                                      |
| 30     | Lee Williams Highschool flood mitigation design project   | 2,3             | \$250k         | F  | F                            | F            | F                           | N                       | C                                      |
| 31     | Grace-Neal Parkway bridge over Mohave Wash.   | 3               | \$8.0M         | F  | N                            | N            | F                           | N                       | A                                      |





**Table 5 - Flood Risk Management Plan 2023 actions/projects Implementation Strategy**

| <b>ID No.</b> | <b>Description</b>  | <b>Goals Addressed</b> | <b>Anticipated Completion Schedule</b> | <b>Primary Agency Responsible for Implementation</b> | <b>Funding Source(s)</b> |
|---------------|---|------------------------|--|--|--------------------------|
| 1             | Install flashing signage for key low water crossings on county-maintained highways at identified locations.                                 | 1, 3                   | On-going or As-Needed                  | Public Works / FCD                                   | HURF/FCD                 |
| 2             | Identify, preliminarily size and prioritize drainage crossings along Stockton Hill Road (phase 1 in review by FEMA ; Ph.2 awaiting funding) | 1, 3                   | by Year 2027                           | Public Works / FCD                                   | HURF                     |
| 3             | Identify preliminarily size and prioritize drainage crossings along Pearce Ferry Road   | 1, 3                   | by Year 2027                           | Public Works / FCD                                   | HURF                     |
| 4             | Pursue flood risk mapping and study funding through FEMA CTP program  | 1, 2, 3                | Annually                               | FCD  | FCD                      |
| 5             | Pursue mitigation project funding through FEMA HMA programs (HMGP, BRIC, FMA)   | 1, 2                   | Annually                               | FCD  | FCD                      |







**Table 5 - Flood Risk Management Plan 2023 actions/projects Implementation Strategy**

| <b>ID No.</b> | <b>Description</b>  | <b>Goals Addressed</b> | <b>Anticipated Completion Schedule</b> | <b>Primary Agency Responsible for Implementation</b> | <b>Funding Source(s)</b> |
|---------------|---|------------------------|--|--|--------------------------|
| 6             | Provide real time data to emergency management personnel during a response event  | 4                      | On-going or As-Needed                  | FCD / EM   | FCD                      |
| 7             | Facilitate opening and operation of the EOC/DOC and participate in both real time and practice exercises.               | 4                      | On-going or As-Needed                  | FCD / EM   | FCD                      |
| 8             | Support Public Works Road Department with real time data for potential road closures.                                   | 1, 4                   | On-going or As-Needed                  | FCD / EM / PW  | FCD                      |
| 9             | Provide hydrologic analysis for flooding issues associated with post-wildfire related floods during the wildfire event. | 1, 3, 4                | On-going or As-Needed                  | FCD / EM   | FCD                      |
| 10            | Maintain stormwater management plan/ordinance to satisfy the MS4 designation for Unincorporated areas of Mohave County. | 1, 3                   | On-going                               | FCD  | FCD                      |
| 11            | Provide continued floodplain management assistance and help to incorporated communities.                                | 1, 3, 4                | On-going or As-Needed                  | FCD  | FCD                      |





**Table 5 - Flood Risk Management Plan 2023 actions/projects Implementation Strategy**

| <b>ID No.</b> | <b>Description</b>   | <b>Goals Addressed</b> | <b>Anticipated Completion Schedule</b> | <b>Primary Agency Responsible for Implementation</b> | <b>Funding Source(s)</b>           |
|---------------|--|------------------------|--|--|------------------------------------|
| 12            | Work with incorporated cities to pursue grant funds for flood control projects.  | 1, 2, 3                | On-going or As-Needed                  | FCD  | FCD                                |
| 13            | Collaborate with FEMA on a regional and national level regarding working with local jurisdictions.   | 1, 2, 3                | On-going or As-Needed                  | FCD  | FCD                                |
| 14            | Continued expansion and refinement of the county ALERT system by cooperating with Federal, Tribal, State and local agencies and officials.   | 1, 3, 4                | On-going or As-Needed                  | FCD  | FCD with cost sharing as available |
| 15            | Perform a DCR to analyze the drainage at Hillcrest and Stockton Hill Road. Known issues include undersized culverts, sediment deposition on the roads, and inadequate upstream drainage control. | 3                      | By Year 2027                           | City of Kingman                                      | City of Kingman                    |





**Table 5 - Flood Risk Management Plan 2023 actions/projects Implementation Strategy**

| ID No. | Description   | Goals Addressed | Anticipated Completion Schedule | Primary Agency Responsible for Implementation | Funding Source(s) |
|--------|---|-----------------|---------------------------------|---|-------------------|
| 16     | Perform a DCR to analyze the drainage at the intersection of Stockton Hill Road near the Shadow Mountain alignment. Known issues include a large box culvert that is not hydraulically connected to flood flows it is intended to convey. | 3               | By Year 2025                    | City of Kingman                               | City of Kingman   |
| 17     | Perform a DCR to analyze the drainage at the intersection of Western and Airway. Known drainage issues include a retention basin that is not hydraulically connected to flood flows.  | 3               | 2027                            | City of Kingman                               | City of Kingman   |
| 18     | Perform floodplain analysis for the Golden Shores watershed. Known issues include widespread, unanalyzed drainage problems, a need for mapping, floodplain analysis, and a ROW acquisition program. Soils in the area are highly erosive. | 3               | As funded by FEMA CTP           | FCD   | FCD               |
| 19     | Design and construct American Business Park retention basins.   | 3               | by Year 2027                    | FCD   | FCD               |





**Table 5 - Flood Risk Management Plan 2023 actions/projects Implementation Strategy**

| <b>ID No.</b> | <b>Description</b>   | <b>Goals Addressed</b> | <b>Anticipated Completion Schedule</b> | <b>Primary Agency Responsible for Implementation</b> | <b>Funding Source(s)</b>                     |
|---------------|--|------------------------|--|--|--|
| 20            | Design and construction project for infiltration basins on Rattlesnake Wash, West Kingman, and Grace Neal Channel/Mohave Wash. Project would be a joint venture between Mohave County and BLM or ASLD. | 1, 3                   | by Year 2027                           | FCD  | FCD / HMGP / BRIC / Congressional Allocation |
| 21            | Perform floodplain mapping for Havasu Heights.   | 3                      | by Year 2026                           | FCD  | FCD / CTP grant.                             |
| 22            | Perform floodplain mapping for Meadview.   | 3                      | by Year 2027                           | FCD  | FCD / CTP grant.                             |
| 23            | Perform DCR for the Latigo Lane drainage issues in area in the City of Kingman.  | 1, 3                   | By Year 2027                           | City of Kingman                                      | City of Kingman                              |







**Table 5 - Flood Risk Management Plan 2023 actions/projects Implementation Strategy**

| <b>ID No.</b> | <b>Description</b>   | <b>Goals Addressed</b> | <b>Anticipated Completion Schedule</b> | <b>Primary Agency Responsible for Implementation</b> | <b>Funding Source(s)</b> |
|---------------|--|------------------------|--|--|--------------------------|
| 24            | Jagerson Suffock: The purpose of this project is to widen Jagerson Avenue to improve access in the area while also providing drainage improvements. The portion of Jagerson Avenue from the Kingman City Limits to just past Bond Street will be widened and curb, gutter and sidewalk will be added to the north side of Jagerson Avenue in the area fronting Mohave Community College. | 3                      | by Year 2030                           | FCD  | FCD / PDM                |





**Table 5 - Flood Risk Management Plan 2023 actions/projects Implementation Strategy**

| <b>ID No.</b> | <b>Description</b>   | <b>Goals Addressed</b> | <b>Anticipated Completion Schedule</b> | <b>Primary Agency Responsible for Implementation</b> | <b>Funding Source(s)</b>           |
|---------------|--|------------------------|--|--|------------------------------------|
| 25            | Grace Neal Channel: Grace Neal Parkway is bordered on the north and south by undeveloped land, although subdivisions are being developed at the western side of the intersection of Banks St. and Grace Neal Parkway and another near Township 17 and Section 19 line called Eagle View. There are several washes crossing the existing alignment. Flooding issues in the north portion of Kingman will be reduced by intercepting the flows and conveying them the Mohave Wash in an improved channel | 3                      | by Year 2027                           | FCD  | FCD / Grants                       |
| 26            | Obtain topographic mapping for southeast Mohave County, approximately 3,000 sq. mi. expected.  | 3                      | by Year 2024                           | FCD  | FCD / FEMA Grants /USGS            |
| 27            | County-wide ALERT2 upgrades.   | 3,4                    | On-going or As-Needed                  | FCD  | FCD with cost sharing as available |





**Table 5 - Flood Risk Management Plan 2023 actions/projects Implementation Strategy**

| <b>ID No.</b> | <b>Description</b>  | <b>Goals Addressed</b> | <b>Anticipated Completion Schedule</b> | <b>Primary Agency Responsible for Implementation</b> | <b>Funding Source(s)</b> |
|---------------|---|------------------------|--|--|--------------------------|
| 28            | Bank Street storm drain. North of Gordon to Mohave Wash.  | 2 , 3                  | by Year 2025                           | FCD  | FCD / EPA / PW           |
| 29            | DCR level analysis for Kingman Air-Rail Manor area (greater Kingman addition DCR). Area surrounding Yavapai Street directly north of I40. | 1,3                    | by Year 2028                           | City of Kingman                                      | FCD / City of Kingman    |
| 30            | Lee Williams Highschool flood mitigation design project   | 2,3                    | by Year 2028                           | City of Kingman                                      | City of Kingman          |
| 31            | Grace-Neal Parkway bridge over Mohave Wash.   | 3                      | by Year 2028                           | FCD / PW   | FCD / Grants / HURF      |





**MOHAVE COUNTY FLOOD CONTROL DISTRICT**  
**FY 2023 Annual Flood Risk Management Plan Review**

---

**APPENDIX**





## Cole Cooper

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**From:** Jon Ortman <OrtmaJ@mohave.gov>  
**Sent:** Thursday, July 6, 2023 12:51 PM  
**To:** Engineering; Angie Johnson; Greg Froslic; TOCC Manager; firemarshal@goldenvalleyfire.org; fairvine@aol.com; kathy.zach@ptaaz.com; lbauer@farmersagent.com; travin@anglehomes.com; R. L. Morse; Kathy Ortman; Michael Smith; Luke Brazdys; Mike Browning; Joseph Dorner; Steven Latoski; Scott Holtry; Paul Baughman; Gilbert Smaby  
**Cc:** Kat Fish; Cole Cooper; Scott Ogden; Mike Kellogg  
**Subject:** Mohave County Flood Risk Management Plan 2023 Annual Review

CAUTION: [EXTERNAL] : this e-mail originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Good Afternoon,

It is time for the annual review and update of the Mohave County Flood Risk Management Plan. Part of the annual review is pulling together a review committee made up of individuals within the County government, local communities, and municipalities that are interested in reviewing the existing plan and providing feedback on potential changes/updates.

We would like to invite you to participate in the Mohave County Flood Risk Management Plan 2023 annual review.

Tasks of a committee member are the following:

- Receive (via email) and respond to a questionnaire and assessment worksheet. (Expected the week of July 17)
- Attend an in-person workshop at the Mohave County Development Services building in Kingman. (Expected the week of August 7)

If you are interested, but only able to participate in one of the tasks, that is still very beneficial to our review. If you personally are unable to participate, but know of someone else that can, please provide their name and contact info and I will reach out.

A reply by Friday, July 14, would be greatly appreciated.

A copy of the current plan can be found here:

<https://resources.mohave.gov/file/DevelopmentServices/FloodControl/FRMP/FRMP.pdf>

Thank you for your time and consideration.



## Cole Cooper

---

**From:** Jon Ortman <OrtmaJ@mohave.gov>  
**Sent:** Wednesday, July 19, 2023 12:54 PM  
**To:** Gilbert Smaby; Paul Baughman; Matthew Gunderson; Scott Holtry; Hien Nguyen; Luke Brazdys; Michael Smith; awareofall@gmail.com; travin@anglehomes.com; kathy.zach@pioneeritileagency.com; 'fairvine@aol.com'; Juan Loera; TOCC Manager  
**Cc:** Kat Fish; Cole Cooper  
**Subject:** Flood Risk Management Plan (FRMP) Annual Review Questionnaire  
**Attachments:** FRMP 2023 Review Questionnaire.docx

CAUTION: [EXTERNAL] : this e-mail originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Good Afternoon,

Thank you again for agreeing to participate in the FRMP Annual Review.

Attached is the review questionnaire.

In order to process the responses in a timely manner, we are requesting the completed questionnaire returned by Friday, August 4. Any input you can provide is greatly appreciated.

I can be reached at 928-757-0925, Ext. 5836, if you have any questions.

Respectfully,





# MOHAVE COUNTY FLOOD CONTROL DISTRICT

## DEPARTMENT OF DEVELOPMENT SERVICES

P. O. Box 7000, Kingman, Arizona 86402-7000 3250 E Kino Ave, Kingman, AZ 86409 Telephone (928) 757-0925 FAX (928) 757-0912

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Randall Gremlich, P.E.  
District Engineer

Scott Holtry  
Development Services Director

### MEMORANDUM

**To:** Mohave County Board of Supervisors

**From:** Mohave County Flood Control District Staff

**Date:** September 13<sup>th</sup>, 2024

**Re:** Fiscal Year 2024 Annual Flood Risk Management Plan Review

In 2015, the Mohave County Flood Control District (District) convened a planning team and prepared the *Mohave County Flood Risk Management Plan* (FRMP), which was presented to and adopted by the Mohave County Board of Supervisors (Board) on March 21, 2016. The FRMP for Mohave County (County) assesses the flooding hazards within the unincorporated areas of the County, summarizes previous and current County programs, describes potential mitigation strategies, and presents a plan for future actions of the County to build resilience to flood related risks. It was prepared with input from County residents, responsible County officials and staff, and consultants.

Mohave County currently participates in the Federal Emergency Management Agency's (FEMA) Community Rating System (CRS) Program, which is a sub-section of the National Flood Insurance Program (NFIP). The FRMP planning process, content and scope are generally arranged to comply with Section 510 of the latest CRS guidelines, and is a part of the overall CRS program package that is maintained, administered and reported on by the Flood Control District. FEMA requires an annual audit of the CRS program elements to maintain eligibility and rating. The provisions for the annual review of the FRMP are set forth in Section 7.1 of the FRMP. In response, the Flood Control District performed the following steps:

- Contacted and updated the Advisory Committee discussed in Section 3.1 of the FRMP.
- Prepared a questionnaire that generally followed the Section 7.1 provisions and distributed the questionnaire to the Advisory Committee for comment and response.
- Convened an Advisory Committee meeting to review and discuss the questionnaire and responses, and to assess and update the Flood Risk Mitigation Action Plan in Section 6.3 of the FRMP.

A Section 7 annual review process was performed in August-September of 2017, 2018, 2019, and 2023, and a report summarizing the review and recommended updates was prepared, presented to, and approved by the Mohave County Board of Supervisors (Board) in September of those years. The annual review for 2024 followed a similar process, and the following report is a summary of the 2024 annual review conducted for the FRMP. The above bullet actions are discussed in more detail in the following sections.





## **ADVISORY COMMITTEE**

In July 2024, the District reached out to the past Advisory Committee members and/or their position replacements, to reconvene the committee for the review process. A list of the contacted participants is provided in Table 1.

| <b>TABLE 1 – Advisory Committee Members for FY 2024 Review</b> |  |  |   |
|--|--|--|---|
| <b>Advisory Committee Member</b>                               | <b>County Department</b>   | <b>Questionnaire Response Provided</b> | <b>Attendance at Advisory Committee Mtg</b> |
| <b>Mohave County Staff</b>                                     |  |  |   |
| Randy Gremlich   | Flood Control District Engineer                                      |  | ✓   |
| Jon Ortman   | Flood Control District   |  | ✓   |
| Katherine Fish   | Flood Control District   |  | ✓   |
| Matthew Gunderson  | Zoning   | ✓                                      | ✓   |
| Jason Garner   | Public Works   |  | ✓   |
| Luke Brazdys   | Environmental Protection   |  |   |
| Lauren Wellborn  | Emergency Management   |  | ✓   |
| Mike Browning  | Emergency Management   | ✓                                      |   |
| Michael Smith  | Housing/Community Development  |  |   |
| <b>Public / Private Members</b>                                |  |  |   |
| <b>Advisory Committee Member</b>                               | <b>Public</b>  | <b>Questionnaire Response Provided</b> | <b>Attendance at Advisory Committee Mtg</b> |
| Kathy Helton   | Realtor  | ✓                                      | ✓   |
| Michael Garmon   | City of Kingman  | ✓                                      |   |
| Johnny Loera   | Bullhead City  | ✓                                      | ✓   |
| Mike Wolfe   | Lake Havasu City   | ✓                                      | ✓   |
| John Barlow  | Colorado City  | ✓                                      |   |
| Travin Pennington  | Developer  | ✓                                      | ✓   |
| Don Dallman  | Northern Arizona Fire District                                       | ✓                                      | ✓   |
| Pete Proffit   | Engineer   | ✓                                      |   |
| Mary Slusser   | Realtor  | ✓                                      | ✓   |
| Cole Cooper (consultant)                                       | Project Consultant on behalf of Mohave County Flood Control District |  | ✓   |







The Advisory Committee was engaged to perform this annual review in two ways. The first was via the email distribution of an invitation that was sent out July 17<sup>th</sup>, 2024 (provided in the Appendix). Those who responded to the invitation were then sent a brief questionnaire to fill out. The second was via a review meeting that was convened on August 15<sup>th</sup>, 2024 at the District's office. Details of both activities are summarized in the discussions below. A copy of the agenda and sign-in sheet for the Advisory Committee Meeting are provided in the Appendix.

## **QUESTIONNAIRE**

The District prepared a brief questionnaire that was designed to solicit responses from the Advisory Committee members pertaining to the review items listed in Section 7.1 of the FRMP. The questions posed to each of the Advisory Committee members in an email sent out on July 22<sup>nd</sup>, 2024 are listed in Table 2, along with the responses received via reply emails. The individual responses to the questionnaire are on-file at the District's office.

**TABLE 2 – 2024 Questionnaire Responses**

**Question 1. Have the flood risks and/or hazard areas in your area increased or decreased significantly since the last evaluation? Please tell us how.**

- They are about the same.
- No significant change in Bullhead City since September 2023.
- There has not been much rain in the past year, so I have no reference.
- Personally, where I live, there is quite a flood risk when heavy rains hit my area. I live on N. Yavapai St., behind Maverick. At the South end of the street, only a couple of blocks from my house, there is a culvert under I-40, which funnels water right down Yavapai St. The risk is only there when alot of rain falls south of I-40.
- No change in risk, we experienced fewer monsoon storm systems across Mohave County during the 2023-2024 seasons. Storms were smaller, moved quicker and werw isolated across the region.
- There has been recent residential development in my area. After the construction of these subdivisions, it seems as if drainage problems have gotten better and the streets are cleaner after a storm event. That said, I have noticed that the area around the Airway underpass and the new hospital seems as if the flood risks have increased.
- No
- No noted changes.
- 2023 - LHC saw a decrease in events, however deferred mitigations from previous events were the focus for identified hazard areas- Continued CIP Wash projects and had increase wash management and small project mitigations from previous sediment transport and slot scouring. Pavement protections and replacements at crossings, patching at major vertical concrete drop structures and sediment removals and haul.





**TABLE 2 – 2024 Questionnaire Responses**

**Question 2. Have there been any significant flooding events since October 2021 that you are aware of occurring over the last year? If so, describe the event and its impacts.**

- Monsoons of 2022 - July, Aug, Sep
- No significant flooding events since October 2021 that impacted public or private property. Several smaller events have required road cleanup, wash maintenance, etc., but received no reports of significant damage to structures.
- No.
- Yes, N. Yavapai St. has flooded twice since October 2021. The water was to the back wheels of everyone's cars in their driveways. The first time was at night, there was about 5 inches of rain that fell and my vehicle was flooded, an inch of water on the floorboard. The water also moved and flooded other cars. The second time, in August 2022, it was much worse, higher water, a portapotty floated down Yavapai on its side with the door open and Airway was flooded under the train bridge near Maverick, probably about 4 feet of water and cars were floating.
- Northeast Golden Valley Region and North Stockton Hill.
- Yes, in 2022 there was some major flooding that occurred in the area of Airway and the new hospital. There were many houses that were damaged by the flood. Airway Ave was closed for many hours and access to that entire area was cut off, including the hospital. The box culverts under I-40 were at capacity and water was running over the top of I-40 and dumping large amounts of water into the residential area just to the north.
- There was major flooding in the Kingman Crossing area in 2023 I believe it was. It appeared that runoff overtopped the freeway and inundated the downstream roads, flooding many homes.
- Monsoonal flooding of streets, Bank St. by the high school is often Overwhelmed by water often closing the roadway. Drainage on Northern floods the gutter system spanning across the roadway. Castlerock Ave, Roadway dips along drainage locations to allow water across the roadways. This has happened several time where vehicles attempt to cross and are swept away due to the flow.
- Primarily LHC experienced higher frequency flow events well into 2022 which created nearly 9 months of backlog for clean up and improvement mitigation work related to sediment transport and continued deepening of "canyon slot cutting" in the alluvial washes. Slot Cutting increased side slope instability hazards for maintenance operations and adjacent private property hazards



**TABLE 2 – 2024 Questionnaire Responses**

**Question 3.** *For flood events listed in response to Question No. 2, please note the effectiveness of any existing drainage facilities or improvements that were impacted or activated by the flood.*

- None
- N/A
- No response
- The drainage is making it worse in the area, because the water is funneled right down the street.
- Holy Moses Wash Crossing (Golden Valley)
- It seemed that all of the drainage facilities in the area were undersized to handle the volume of water that the Airway Ave area received in the storms of 2022.
- It appears that the structures on the south side of I-40 where overwhelmed and the runoff overtopped the freeway.
- Improvements have been minimal over the past years, often traffic barriers are put into place often on soon enough, and don't stop everyone.
- Washes that had been improved through the LHC CIP Program performed well such as the Avalon Drain projects. Wash crossings where pavement and scour protection had been placed, and where an upstream sediment transport capture was implemented performed well. Those areas allowed maintenance crews the ability to focus more on the loading and haul of sediments out of the wash. The events also raised priorities for current CIP Wash projects such as El Dorado Wash Crossing for emergency all weather access, Queens Bay Wash crossing where vehicles and public were stranded and stalled in the flood water and the Dayonta Wash Reach 4, where side slope instability existed from slot cutting and side bank deterioration occurred from a side channel high velocity flow.



**TABLE 2 – 2024 Questionnaire Responses**

**Question 4. Are the goals listed in Section 6.1 of the FRMP still applicable and able to address current and expected conditions?**

- Yes.
- Goals are still applicable.
- Yes.
- They will address the issues, as long as follow through work takes place.
- Yes
- Yes, I think in general terms that the goals set out in Section 6.1 still apply.  
I feel like the listed "Goal 2" could be modified (see redline below).  
GOAL 2: Identify and pursue all reasonable avenues of funding for implementing flood risk reduction activities.  
GOAL 2: Identify and pursue all reasonable avenues of funding and possible partnerships with local developers and projects for implementing flood risk reduction activities. Ask developers to be partners in regional drainage solutions that benefit them and the surrounding area.
- Yes
- Appear to be.
- Yes. I would like to emphasize the potential to consider the wildlife aspects of the washes here in LHC. Because of the canyon nature of our washes, the Burrowing Owl is a reality to deal with for Wash Improvements. LHC coordinates with the local ASU Campus expert for pre-construction notification so that impacts are eliminated. Lake Havasu issues are typically related to flow velocities, scour and sediment transport. All indicative of the alluvial nature of our localized region. Existing alluvial grades of 4% to 6% and above create goals for LHC to be focused towards velocity mitigations that decrease velocities such as drop structures, increase channel roughness coefficients and sediment capture depressions at upstream road crossings.

The posed questions were further discussed with County staff after the Advisory Committee Meeting on August 15<sup>th</sup>, 2024. Notable discussions are summarized as follows:

- It appears that the consensus among those who responded to the questionnaire is that the flood risks/flood hazard areas have not changed significantly since the last update. A common theme among the responses received was that there were fewer than normal rain/runoff events this past year than in previous years.
- The following areas were mentioned as having experienced significant flooding since October of 2021:
  - 1) N. Yavapai Street (October 2021).
  - 2) Northeast Golden Valley Region and North Stockton Hill (year unspecified).
  - 3) Airway Ave. near the new hospital (in 2022).
  - 4) Kingman Crossing Area (2023).
  - 5) Bank Street near the high school (year unspecified).







6) Castlerock Ave. low-water crossings where several cars were swept away during runoff events (year unspecified).

- Lake Havasu City was mentioned as having experienced a higher frequency of flow events throughout 2022, creating a significant backlog of clean-up and mitigation work in the community.
- Some responses mentioned that infrastructure along Airway Ave and along the south side of I-40 appear to have been overwhelmed (specific dates not provided).
- Recent Lake Havasu City CIP projects such as the Avalon Drain project were mentioned and described as having performed well over the past few years. Sediment capture components of these improvement projects were reported as having functioned well, isolating sediment deposition related maintenance to these areas.
- The goals listed in section 6.1 of the FRMP are still applicable.

### **FLOOD RISK MITIGATION ACTION PLAN – ASSESSMENT AND UPDATE**

The Advisory Committee reviewed and assessed each of the action/projects (A/P) listed in Tables 6.5 and 6.6 from the 2023 Mohave County FRMP (represented at Tables 4 and 5 in this report respectively). Each A/P was reviewed and discussed regarding its current status and the future disposition of the A/P for the coming year. Table 3 represents only A/Ps from the 2023 update. New projects recommended during the 2024 advisory committee meeting are included in Tables 4 and 5 below. A summary of that review/assessment is provided in Table 3.

| <b>TABLE 3 – 2024 Mitigation Action Plan Assessment</b> |   |                        |                     |  |
|---|---|------------------------|---------------------|--|
| <b>ID No.</b>   | <b>Description</b>  | <b>STATUS</b>          | <b>DIS-POSITION</b> | <b>EXPLANATION</b>   |
| 1   | Install flashing signage for key low water crossings on county-maintained highways at identified locations.                                 | Complete / In-Progress | Keep                | 4 signs at two locations were installed. Additional sites desired to be installed. Currently experiencing supply chain issues. Sacramento, Vock, and Archibald Wash. Other locations being considered around Big Sandy Wash. |
| 2   | Identify, preliminarily size and prioritize drainage crossings along Stockton Hill Road (phase 1 in review by FEMA ; Ph.2 awaiting funding) | In-progress            | Keep                | Study awaiting FEMA approval.  |





**TABLE 3 – 2024 Mitigation Action Plan Assessment**

| <b>ID No.</b> | <b>Description</b>  | <b>STATUS</b> | <b>DIS-POSITION</b> | <b>EXPLANATION</b>   |
|---------------|---|---------------|---------------------|--|
| 3             | Identify, preliminarily size and prioritize drainage crossings along Pierce Ferry Road                                  | In-progress   | Keep                | Detrital Watershed mapping study currently under 90 day appeal period with FEMA. |
| 4             | Pursue flood risk mapping and study funding through FEMA CTP program  | In-progress   | Keep                | Still a desired A/P.   |
| 5             | Pursue mitigation project funding through FEMA HMA programs (HMGP, BRIC, FMA)   | In-progress   | Keep                | Still a desired A/P.   |
| 6             | Provide real time data to emergency management personel during a response event   | In-progress   | Keep                | Still a desired A/P.   |
| 7             | Facilitate opening and operation of the EOC/DOC and participate in both real time and practice excercises.              | In-progress   | Keep                | Still a desired A/P.   |
| 8             | Support Public Works Road Department with real time data for potential road closures.                                   | In-progress   | Keep                | Still a desired A/P.   |
| 9             | Provide hydrologic analysis for flooding issues associated with post-wildfire related floods during the wildfire event. | In-progress   | Keep                | Still a desired A/P.   |
| 10            | Maintain stormwater management plan/ordinance to satisfy the MS4 designation for Unincorporated areas of Mohave County. | In-progress   | Keep                | No new census data has been provided since previous census.                      |
| 11            | Provide continued floodplain management assistance and help to incorporated communities.                                | In-progress   | Keep                | Still a desired A/P.   |
| 12            | Work with incorporated cities to pursue CTP grant funds for flood control projects.                                     | In-progress   | Keep                | Still a desired A/P.   |
| 13            | Collaborate with FEMA on a regional and national level regarding working with local jurisdictions.                      | In-progress   | Keep                | Still a desired A/P.   |





**TABLE 3 – 2024 Mitigation Action Plan Assessment**

| ID No. | Description   | STATUS      | DIS-POSITION | EXPLANATION   |
|--------|---|-------------|--------------|---|
| 14     | Continued expansion and refinement of the county ALERT system by cooperating with Federal, Tribal, State and local agencies and officials.  | In-progress | Keep         | Still a desired A/P.  |
| 15     | Perform a DCR to analyze the drainage at Hillcrest and Stockton Hill Road. Known issues include undersized culverts, sediment deposition on the roads, and inadequate upstream drainage control.  | No Action   | Delete       | Still a desired A/P.  |
| 16     | Perform a DCR to analyze the drainage at the intersection of Stockton Hill Road near the Shadow Mountain alignment. Known issues include a large box culvert that is not hydraulically connected to flood flows it is intended to convey. | No Action   | Delete       | Still a desired A/P.  |
| 17     | Perform a DCR to analyze the drainage at the intersection of Western and Airway. Known drainage issues include a retention basin that is not hydraulically connected to flood flows.  | No Action   | Delete       | Still a desired A/P.  |
| 18     | Perform floodplain analysis for the Golden Shores watershed. Known issues include widespread, unanalyzed drainage problems, a need for mapping, floodplain analysis, and a ROW acquisition program. Soils in the area are highly erosive. | In-progress | Keep         | Still a desired A/P.  |
| 19     | Design and construct American Business Park retention basins.   | No Action   | Keep         | Still a desired A/P.  |
| 20     | Design and construction project for infiltration basins on West Kingman (Crestwood, Raita, and Feldspar). Project would be a joint venture  | In-progress | Keep         | West Kingman basins being funded through WIFA via ARPA funding. |





**TABLE 3 – 2024 Mitigation Action Plan Assessment**

| ID No. | Description   | STATUS      | DIS-POSITION | EXPLANATION              |
|--------|---|-------------|--------------|--------------------------|
|        | between Mohave County and BLM or ASLD.  |             |              |                          |
| 21     | Perform floodplain study for Havasu Heights.  | In-progress | Keep         | Still a desired A/P.     |
| 22     | Perform floodplain study for Meadview.  | In-progress | Keep         | Still a desired A/P.     |
| 23     | Perform DCR for the Latigo Lane drainage issues in area in the City of Kingman.   | No Action   | Delete       | Still a desired A/P.     |
| 24     | Jagerson Suffock: The purpose of this project is to widen Jagerson Avenue to improve access in the area while also providing drainage improvements. The portion of Jagerson Avenue from the Kingman City Limits to just past Bond Street will be widened and curb, gutter and sidewalk will be added to the north side of Jagerson Avenue in the area fronting Mohave Community College.  | No Action   | Delete       | No longer a desired A/P. |
| 25     | Grace Neal Channel: Grace Neal Parkway is bordered on the north and south by undeveloped land, although subdivisions are being developed at the western side of the intersection of Banks St. and Grace Neal Parkway and another near Township 17 and Section 19 line called Eagle View. There are several washes crossing the existing alignment. Flooding issues in the north portion of Kingman will be reduced by intercepting the flows and conveying them the Mohave Wash in an improved channel. | In-progress | Keep         | Still a desired A/P.     |





**TABLE 3 – 2024 Mitigation Action Plan Assessment**

| <b>ID No.</b> | <b>Description</b>  | <b>STATUS</b> | <b>DIS-POSITION</b> | <b>EXPLANATION</b>   |
|---------------|---|---------------|---------------------|----------------------|
| 26            | Obtain topographic mapping for southeast Mohave County, approximately 3,000 sq. mi. expected.   | In-progress   | Keep                | Still a desired A/P. |
| 27            | County-wide ALERT2 upgrades.  | In-progress   | Keep                | Still a desired A/P. |
| 28            | Bank Street storm drain. North of Gordon to Mohave Wash.  | In-progress   | Keep                | Still a desired A/P. |
| 29            | DCR level analysis for Kingman Air-Rail Manor area (greater Kingman addition DCR). Area surrounding Yavapai Street directly north of I40. | No Action     | Delete              | Still a desired A/P. |
| 30            | Lee Williams Highschool flood mitigation design project   | No Action     | Delete              | Still a desired A/P. |
| 31            | Grace-Neal Parkway bridge over Mohave Wash.   | In-progress   | Keep                | Still a desired A/P. |

Following the A/P assessment, the Advisory Committee brainstormed the need for new A/Ps to be added to the list which resulted in four new A/Ps (labeled with ID Nos. 18, 19, 21, 22, 26, 27, and 28 in tables 4 and 5 below). The A/P ID Nos. 15, 16, 17, 23, 24, 29, and 30 were removed from the prior year's list (Table 3 above) as the action/projects having either been completed or otherwise identified for removal. The Advisory Committee rated and ranked the four new A/Ps and developed the implementation strategy for each. The remaining A/Ps were reviewed and updated as needed to reflect changes in funding, priority, or implementation.

The fully reviewed and updated Flood Risk Mitigation Action Plan A/Ps for the coming year are summarized below in Tables 4 and 5. The A/Ps considered in Tables 4 and 5 have been re-numbered to reflect the current/active list.





## SUMMARY

The District was able to successfully reconvene the Advisory Committee and perform the 5<sup>th</sup> annual review of the FRMP, including a full assessment and update of the Flood Risk Mitigation Strategy. Tables 4 and 5 summarize the updated Flood Risk Mitigation Strategy for the next year. The next annual review will occur around the July/August 2025 timeframe.

Table 6-4 (below) from the County's Flood Risk Management Plan defines the different project priority rankings (A-E) assigned to each project in Table 4.

| <i>Table 6-4 - Priority ranking criteria for MCFCD projects</i> |  |
|---|--|
| Project Priority Ranking  | Project Priority Criteria Description  |
| A   | <b>Highest priority project:</b> Areas of significant flooding and/or sedimentation problems. MCFCD has all the information needed to proceed with this study design or construction project. The projects are either underway or will begin typically within the next fiscal year depending on available budget.  |
| B   | <b>High priority project:</b> Areas of significant flooding and/or sedimentation problems. MCFCD considers this to be an important project but is actively gathering information. These projects are planned to begin in the next 2-5 fiscal years (depending on available budget) and include projects such as aerial mapping, hydrology studies, and design concept reports (DCR). |
| C   | <b>Medium priority project:</b> Areas of moderate flooding and/or sedimentation problems. These represent projects in which MCFCD will continue to gather information. Based on that information, these projects may become higher priority in the future. The timeline for these projects is typically 3-10 fiscal years  |
| D   | <b>Low priority project:</b> These projects benefit a limited number of individual residents. In some cases these projects will be driven by development and would be generally funded by developers.  |
| E   | <b>Lowest priority project:</b> These projects either offer minor benefit to the residents of Mohave County or they are outside the jurisdiction of the MCFCD. Some of these projects may be a higher priority to other jurisdictions such as cities or Indian communities. No timeline is projected for these projects.   |



**Table 4 - Flood Risk Management Plan 2024 actions/projects List**

| ID No. | Description   | Goals Addressed | Estimated Cost   | Favorable = F<br>Neutral = N<br>Less Favorable = L |                           |              |                          |                      | Action/<br>Project<br>Priority<br>Rank |
|--------|---|-----------------|------------------|--|---------------------------|--------------|--------------------------|----------------------|--|
|        |   |                 |                  | Technical Feasibility                              | Regulatory Administration | Cost/Benefit | Support Public/Political | Environmental Impact |  |
| 1      | Install flashing signage for key low water crossings on county maintained highways at identified locations.                                 | 1, 3            | \$8,000/location | F  | N                         | F            | F                        | F                    | B                                      |
| 2      | Identify, preliminarily size and prioritize drainage crossings along Stockton Hill Road (phase 1 in review by FEMA ; Ph.2 awaiting funding) | 1, 3            | Staff Time       | F  | N                         | F            | F                        | F                    | B                                      |
| 3      | Identify, preliminarily size and prioritize drainage crossings along Pierce Ferry Road  | 1, 3            | Staff Time       | F  | N                         | F            | F                        | F                    | B                                      |
| 4      | Pursue flood risk mapping and study funding through FEMA CTP program  | 1, 2, 3         | Staff Time       | F  | N                         | F            | F                        | F                    | A                                      |





**Table 4 - Flood Risk Management Plan 2024 actions/projects List**

| ID No. | Description   | Goals Addressed | Estimated Cost | Favorable = F<br>Neutral = N<br>Less Favorable = L |                           |              |                          |                      | Action/<br>Project<br>Priority<br>Rank |
|--------|---|-----------------|----------------|--|---------------------------|--------------|--------------------------|----------------------|--|
|        |   |                 |                | Technical Feasibility                              | Regulatory Administration | Cost/Benefit | Support Public/Political | Environmental Impact |  |
| 5      | Pursue mitigation project funding through FEMA HMA programs (HMGP, BRIC, FMA)                             | 1, 2            | Staff Time     | F  | N                         | F            | F                        | F                    | A                                      |
| 6      | Provide real time data to emergency management personnel during a response event                          | 4               | Staff Time     | F  | N                         | F            | F                        | F                    | A                                      |
| 7      | Facilitate opening and operation of the EOC/DOC and participate in both real time and practice exercises. | 4               | Staff Time     | F  | N                         | F            | F                        | F                    | A                                      |
| 8      | Support Public Works Road Department with real time data for potential road closures.                     | 1, 4            | Staff Time     | F  | N                         | F            | F                        | F                    | A                                      |







Table 4 - Flood Risk Management Plan 2024 actions/projects List

| ID No. | Description   | Goals Addressed | Estimated Cost | Favorable = F<br>Neutral = N<br>Less Favorable = L |                           |              |                          |                      | Action/<br>Project<br>Priority<br>Rank |
|--------|---|-----------------|----------------|--|---------------------------|--------------|--------------------------|----------------------|--|
|        |   |                 |                | Technical Feasibility                              | Regulatory Administration | Cost/Benefit | Support Public/Political | Environmental Impact |  |
| 9      | Provide hydrologic analysis for flooding issues associated with post-wildfire related floods during the wildfire event. | 1, 3, 4         | Staff Time     | F  | N                         | F            | F                        | F                    | A                                      |
| 10     | Maintain stormwater management plan/ordinance to satisfy the MS4 designation for Unincorporated areas of Mohave County. | 1, 3            | Staff Time     | F  | N                         | N            | N                        | F                    | A                                      |
| 11     | Provide continued floodplain management assistance and help to incorporated communities.                                | 1, 3, 4         | Staff Time     | F  | N                         | F            | F                        | N                    | A                                      |





**Table 4 - Flood Risk Management Plan 2024 actions/projects List**

| ID No. | Description  | Goals Addressed | Estimated Cost | Favorable = F<br>Neutral = N<br>Less Favorable = L |                           |              |                          |                      | Action/<br>Project<br>Priority<br>Rank |
|--------|--|-----------------|----------------|--|---------------------------|--------------|--------------------------|----------------------|--|
|        |  |                 |                | Technical Feasibility                              | Regulatory Administration | Cost/Benefit | Support Public/Political | Environmental Impact |  |
| 12     | Work with incorporated cities to pursue CTP grant funds for flood control projects.                | 1, 2, 3         | Staff Time     | F  | N                         | F            | F                        | N                    | A                                      |
| 13     | Collaborate with FEMA on a regional and national level regarding working with local jurisdictions. | 1, 2, 3         | Staff Time     | F  | N                         | F            | F                        | N                    | A                                      |





**Table 4 - Flood Risk Management Plan 2024 actions/projects List**

| ID No. | Description   | Goals Addressed | Estimated Cost             | Favorable = F<br>Neutral = N<br>Less Favorable = L |                           |              |                          |                      | Action/<br>Project<br>Priority<br>Rank |
|--------|---|-----------------|----------------------------|--|---------------------------|--------------|--------------------------|----------------------|--|
|        |   |                 |                            | Technical Feasibility                              | Regulatory Administration | Cost/Benefit | Support Public/Political | Environmental Impact |  |
| 14     | Continued expansion and refinement of the county ALERT system by cooperating with Federal, Tribal, State and local agencies and officials.  | 1, 3, 4         | \$10k to \$15k per station | F  | F                         | N            | F                        | F                    | A                                      |
| 15     | Perform floodplain analysis for the Golden Shores watershed. Known issues include widespread, unanalyzed drainage problems, a need for mapping, floodplain analysis, and a ROW acquisition program. Soils in the area are highly erosive. | 3               | \$124K                     | F  | N                         | F            | F                        | N                    | A                                      |





**Table 4 - Flood Risk Management Plan 2024 actions/projects List**

| ID No. | Description   | Goals Addressed | Estimated Cost     | Favorable = F<br>Neutral = N<br>Less Favorable = L |                           |              |                          |                      | Action/<br>Project<br>Priority<br>Rank |
|--------|---|-----------------|--------------------|--|---------------------------|--------------|--------------------------|----------------------|--|
|        |   |                 |                    | Technical Feasibility                              | Regulatory Administration | Cost/Benefit | Support Public/Political | Environmental Impact |  |
| 16     | Design and construct American Business Park retention basins.   | 3               | \$150K             | F  | N                         | N            | F                        | N                    | D                                      |
| 17     | Design and construction project for infiltration basins on West Kingman (Crestwood, Raita, and Feldspar). Project would be a joint venture between Mohave County and BLM or ASLD. | 1, 3            | Varies by Location | F  | N                         | N            | F                        | N                    | A                                      |
| 18     | Design and construction project for infiltration basin at Rattlesnake/Mohave Wash. Project to be funded through WIFA grant / congressional allocation.                            | 1, 3            | \$2.65M            | F  | N                         | N            | F                        | N                    | A                                      |
| 19     | Design and construction project for Rattlesnake/BLM infiltration basin.   | 1, 3            | Approx. \$7M       | F  | N                         | N            | F                        | N                    | A                                      |







Table 4 - Flood Risk Management Plan 2024 actions/projects List

| ID No. | Description                                  | Goals Addressed | Estimated Cost | Favorable = F<br>Neutral = N<br>Less Favorable = L |                              |              |                             |                         | Action/<br>Project<br>Priority<br>Rank |
|--------|--|-----------------|----------------|--|------------------------------|--------------|-----------------------------|-------------------------|--|
|        |  |                 |                | Technical<br>Feasibility                           | Regulatory<br>Administration | Cost/Benefit | Support<br>Public/Political | Environmental<br>Impact |  |
| 20     | Perform floodplain study for Havasu Heights. | 3               | \$63K          | F  | F                            | F            | F                           | N                       | A                                      |
| 21     | Perform floodplain study for Yucca (Ph. II). | 3               | \$640K         | F  | F                            | F            | F                           | N                       | A                                      |





Table 4 - Flood Risk Management Plan 2024 actions/projects List

| ID No. | Description  | Goals Addressed | Estimated Cost | Favorable = F<br>Neutral = N<br>Less Favorable = L |                              |              |                             |                         | Action/<br>Project<br>Priority<br>Rank |
|--------|--|-----------------|----------------|--|------------------------------|--------------|-----------------------------|-------------------------|--|
|        |  |                 |                | Technical<br>Feasibility                           | Regulatory<br>Administration | Cost/Benefit | Support<br>Public/Political | Environmental<br>Impact |  |
| 22     | Perform floodplain study for Meadview.   | 3               | \$220k         | F  | F                            | F            | F                           | N                       | B                                      |
| 23     | Grace Neal Channel: Grace Neal Parkway is bordered on the north and south by undeveloped land, although subdivisions are being developed in the area. There are several washes crossing the existing alignment. Flooding issues in the north portion of Kingman will be reduced by intercepting the flows and conveying them the Mohave Wash in an improved channel. | 3               | \$8.0M         | F  | N                            | N            | F                           | N                       | A                                      |





Table 4 - Flood Risk Management Plan 2024 actions/projects List

| ID No. | Description   | Goals Addressed | Estimated Cost           | Favorable = F<br>Neutral = N<br>Less Favorable = L |                           |              |                          |                      | Action/<br>Project<br>Priority<br>Rank |
|--------|---|-----------------|--------------------------|--|---------------------------|--------------|--------------------------|----------------------|--|
|        |   |                 |                          | Technical Feasibility                              | Regulatory Administration | Cost/Benefit | Support Public/Political | Environmental Impact |  |
| 24     | Obtain topographic mapping for southeast Mohave County, approximately 3,000 sq. mi. expected. | 3               | \$0                      | F  | F                         | F            | F                        | N                    | A                                      |
| 25     | County-wide ALERT2 upgrades.  | 3,4             | \$1k to \$3k per station | F  | F                         | N            | F                        | F                    | A                                      |
| 26     | Bank Street storm drain. North of Gordon to Mohave Wash.                                      | 2 , 3           | \$1.25 million           | F  | F                         | F            | F                        | N                    | A                                      |
| 27     | Grace-Neal Parkway bridge over Mohave Wash.   | 3               | \$8.0M                   | F  | N                         | N            | F                        | N                    | B                                      |





Table 4 - Flood Risk Management Plan 2024 actions/projects List

| ID No. | Description   | Goals Addressed | Estimated Cost | Favorable = F<br>Neutral = N<br>Less Favorable = L |                              |              |                             |                         | Action/<br>Project<br>Priority<br>Rank |
|--------|---|-----------------|----------------|--|------------------------------|--------------|-----------------------------|-------------------------|--|
|        |   |                 |                | Technical<br>Feasibility                           | Regulatory<br>Administration | Cost/Benefit | Support<br>Public/Political | Environmental<br>Impact |  |
| 28     | Interim Bull Mountain Channel Improvements to address flooding on Belcourt Circle and around the Kingman Movie Theater. | 1,3,4           | \$658K         | F  | N                            | F            | F                           | F                       | A                                      |







**Table 5 - Flood Risk Management Plan 2024 actions/projects Implementation Strategy**

| <b>ID No.</b> | <b>Description</b>  | <b>Goals Addressed</b> | <b>Anticipated Completion Schedule</b> | <b>Primary Agency Responsible for Implementation</b> | <b>Funding Source(s)</b> |
|---------------|---|------------------------|--|--|--------------------------|
| 1             | Install flashing signage for key low water crossings on county-maintained highways at identified locations.                                 | 1, 3                   | On-going or As-Needed                  | Public Works / FCD                                   | HURF/FCD                 |
| 2             | Identify, preliminarily size and prioritize drainage crossings along Stockton Hill Road (phase 1 in review by FEMA ; Ph.2 awaiting funding) | 1, 3                   | by Year 2029                           | Public Works / FCD                                   | HURF                     |
| 3             | Identify, preliminarily size and prioritize drainage crossings along Pierce Ferry Road  | 1, 3                   | by Year 2029                           | Public Works / FCD                                   | HURF                     |
| 4             | Pursue flood risk mapping and study funding through FEMA CTP program  | 1, 2, 3                | Annually                               | FCD  | FCD                      |
| 5             | Pursue mitigation project funding through FEMA HMA programs (HMGP, BRIC, FMA)   | 1, 2                   | Annually                               | FCD  | FCD                      |
| 6             | Provide real time data to emergency management personel during a response event   | 4                      | On-going or As-Needed                  | FCD / EM   | FCD                      |





**Table 5 - Flood Risk Management Plan 2024 actions/projects Implementation Strategy**

| <b>ID No.</b> | <b>Description</b>  | <b>Goals Addressed</b> | <b>Anticipated Completion Schedule</b> | <b>Primary Agency Responsible for Implementation</b> | <b>Funding Source(s)</b> |
|---------------|---|------------------------|--|--|--------------------------|
| 7             | Facilitate opening and operation of the EOC/DOC and participate in both real time and practice exercises.               | 4                      | On-going or As-Needed                  | FCD / EM   | FCD                      |
| 8             | Support Public Works Road Department with real time data for potential road closures.                                   | 1, 4                   | On-going or As-Needed                  | FCD / EM / PW  | FCD                      |
| 9             | Provide hydrologic analysis for flooding issues associated with post-wildfire related floods during the wildfire event. | 1, 3, 4                | On-going or As-Needed                  | FCD / EM   | FCD                      |
| 10            | Maintain stormwater management plan/ordinance to satisfy the MS4 designation for Unincorporated areas of Mohave County. | 1, 3                   | On-going                               | FCD  | FCD                      |
| 11            | Provide continued floodplain management assistance and help to incorporated communities.                                | 1, 3, 4                | On-going or As-Needed                  | FCD  | FCD                      |
| 12            | Work with incorporated cities to pursue CTP grant funds for flood control projects.                                     | 1, 2, 3                | On-going or As-Needed                  | FCD  | FCD                      |





**Table 5 - Flood Risk Management Plan 2024 actions/projects Implementation Strategy**

| <b>ID No.</b> | <b>Description</b>  | <b>Goals Addressed</b> | <b>Anticipated Completion Schedule</b> | <b>Primary Agency Responsible for Implementation</b> | <b>Funding Source(s)</b>           |
|---------------|---|------------------------|--|--|------------------------------------|
| 13            | Collaborate with FEMA on a regional and national level regarding working with local jurisdictions.  | 1, 2, 3                | On-going or As-Needed                  | FCD  | FCD                                |
| 14            | Continued expansion and refinement of the county ALERT system by cooperating with Federal, Tribal, State and local agencies and officials.  | 1, 3, 4                | On-going or As-Needed                  | FCD  | FCD with cost sharing as available |
| 15            | Perform floodplain analysis for the Golden Shores watershed. Known issues include widespread, unanalyzed drainage problems, a need for mapping, floodplain analysis, and a ROW acquisition program. Soils in the area are highly erosive. | 3                      | by end of 2026                         | FCD  | ARPA                               |
| 16            | Design and construct American Business Park retention basins.   | 3                      | by Year 2030                           | FCD  | FCD                                |





**Table 5 - Flood Risk Management Plan 2024 actions/projects Implementation Strategy**

| <b>ID No.</b> | <b>Description</b>  | <b>Goals Addressed</b> | <b>Anticipated Completion Schedule</b> | <b>Primary Agency Responsible for Implementation</b> | <b>Funding Source(s)</b>                     |
|---------------|---|------------------------|--|--|--|
| 17            | Design and construction project for infiltration basins on West Kingman (Crestwood, Raita, and Feldspar). Project would be a joint venture between Mohave County and BLM or ASLD. | 1, 3                   | by Year 2027                           | FCD  | FCD / HMGP / BRIC / Congressional Allocation |
| 18            | Design and construction project for infiltration basin at Rattlesnake/Mohave Wash. Project to be funded through WIFA grant / congressional allocation.                            | 1, 3                   | by Year 2027                           | FCD  | FCD / WIFA                                   |
| 19            | Design and construction project for Rattlesnake/BLM infiltration basin.   | 1, 3                   | by Year 2030                           | FCD  | TBD  |
| 20            | Perform floodplain study for Havasu Heights.  | 3                      | by Year 2026                           | FCD  | FCD / CTP grant.                             |







**Table 5 - Flood Risk Management Plan 2024 actions/projects Implementation Strategy**

| <b>ID No.</b> | <b>Description</b>   | <b>Goals Addressed</b> | <b>Anticipated Completion Schedule</b> | <b>Primary Agency Responsible for Implementation</b> | <b>Funding Source(s)</b> |
|---------------|--|------------------------|--|--|--------------------------|
| 21            | Perform floodplain study for Yucca (Ph. II).   | 3                      | by Year 2026                           | FCD  | FCD / ARPA               |
| 22            | Perform floodplain study for Meadview.   | 3                      | by Year 2028                           | FCD  | FCD / CTP grant.         |
| 23            | Grace Neal Channel: Grace Neal Parkway is bordered on the north and south by undeveloped land, although subdivisions are being developed in the area. There are several washes crossing the existing alignment. Flooding issues in the north portion of Kingman will be reduced by intercepting the flows and conveying them the Mohave Wash in an improved channel. | 3                      | by Year 2027                           | FCD  | FCD / Grants             |
| 24            | Obtain topographic mapping for southeast Mohave County, approximately 3,000 sq. mi. expected.  | 3                      | by Year 2025                           | FCD  | FCD / FEMA Grants /USGS  |





**Table 5 - Flood Risk Management Plan 2024 actions/projects Implementation Strategy**

| <b>ID No.</b> | <b>Description</b>  | <b>Goals Addressed</b> | <b>Anticipated Completion Schedule</b>                         | <b>Primary Agency Responsible for Implementation</b> | <b>Funding Source(s)</b>           |
|---------------|---|------------------------|--|--|------------------------------------|
| 25            | County-wide ALERT2 upgrades.  | 3,4                    | On-going or As-Needed  | FCD  | FCD with cost sharing as available |
| 26            | Bank Street storm drain. North of Gordon to Mohave Wash.  | 2 , 3                  | by Year 2025   | FCD  | FCD / EPA / PW                     |
| 27            | Grace-Neal Parkway bridge over Mohave Wash.   | 3                      | by Year 2030   | FCD / PW   | FCD / Grants / HURF                |
| 28            | Interim Bull Mountain Channel Improvements to address flooding on Belcourt Circle and around the Kingman Movie Theater. | 1,3,4                  | DCR/Preliminary Plans FY25<br><br>Design and Construction FY27 | FCD / EM   | TBD                                |





**MOHAVE COUNTY FLOOD CONTROL DISTRICT FY**  
**2024 Annual Flood Risk Management Plan Review**

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**APPENDIX**





## Mohave County Flood Control District

### Flood Risk Management Plan (FRMP) Advisory Committee Meeting Roster

August 15<sup>th</sup>, 2024

2:00 pm– 4:00 pm

| Initials | Name/ Role   | Organization                         | E-mail Address                           |
|----------|--|--------------------------------------|--|
| Jo       | Jon Ortman<br>Engineering Technician Supervisor          | Mohave County Flood Control District | ortmaj@mohave.gov                        |
| KF       | Kat Fish<br>Floodplain Programs Manager                  | Mohave County Flood Control District | fishk@mohave.gov                         |
| RKG      | Randy Gremlich<br>Flood Control District Engineer        | Mohave County Flood Control District | gremlr@mohave.gov                        |
| MA       | Matthew Gunderson<br>Zoning                              | Mohave County                        | gundem@mohave.gov                        |
| JKG      | Jason Garner<br>Public Works                             | Mohave County                        | garnej@mohave.gov                        |
| MB       | Mike Browning / LAUREN WEINBERG<br>Emergency Coordinator | Mohave County                        | WEINBERG@MOHAVE.GOV<br>brownm@mohave.gov |
|          | Luke Brazdys<br>Environmental Protection                 | Mohave County Flood Control District | brazdl@mohave.gov                        |
|          | Michael Smith<br>Housing/Community Development           | Mohave County Flood Control District | smitmi@mohave.gov                        |
|          | Michael Garmon   | City of Kingman                      | mgarmon@cityofkingman.gov                |
| X        | Juan Loera   | Bullhead City                        | jloera@bullheadcityaz.gov                |
| X        | Mike Wolfe   | Lake Havasu City                     | wolfem@lhcaz.gov                         |
|          | John Barlow  | Colorado City                        | johnb@tocc.us                            |
| TP       | Travin Pennington  | Outside Local Government             | travin@anglehomes.com                    |
| DD       | Don Dallman  | Outside Local Government             | d.dallman@northernazfire.com             |

X = virtual attendance.





## Cole Cooper

---

**From:** Cole Cooper  
**Sent:** Tuesday, September 10, 2024 4:14 PM  
**To:** Cole Cooper  
**Subject:** FW: Mohave County Flood Risk Management Plan 2024 Annual Review

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**From:** Jon Ortman  
**Sent:** Wednesday, July 17, 2024 10:55 AM  
**To:** FRMPCommittee  
**Subject:** Mohave County Flood Risk Management Plan 2024 Annual Review

Good Morning,

Each year we put together a committee for the annual review of the Mohave County Flood Risk Management Plan. We attempt to get various representatives from the community on the committee.

Are you or someone you know interested in being on this year's committee?

Being on the committee consists of completing a questionnaire and worksheet and attending an in-person workshop, in our Kingman office, around the week of August 12, if available.

Here is a link to the most current Flood Risk Management Plan.

<https://resources.mohave.gov/file/DevelopmentServices/FloodControl/FRMP/FRMP.pdf>

Thank you for your time and consideration.





## **Mohave County Flood Risk Management Plan 2024 Annual Review Questionnaire**

In general, please give the FRMP a brief review on the whole, and in particular, the District would greatly appreciate your input and feedback by answering the following questions:

***1. Have the flood risks and/or hazard areas in your area increased or decreased significantly since September of last year? Please tell us how.***

***2. Have there been any significant flooding events since October 2021 that you are aware of occurring? If so describe the event and its impacts.***

***3. For flood events listed in response to Question No. 2, please note the effectiveness of any existing drainage facilities or improvements that were impacted or activated by the flood.***

***4. Are the goals listed in Section 6.1 of the FRMP (SEE BELOW) still applicable and able to address current and expected conditions?***

Please return to [ortmaj@mohave.gov](mailto:ortmaj@mohave.gov) by August 9<sup>th</sup>, 2024. Thank you for your participation!



## SECTION 6: FLOOD MITIGATION STRATEGY

### 6.1 2015 Flood Risk Management Planning Goals

The 2015 planning team formulated specific goals for this FRMP during the second Advisory Committee meeting. The first step in the goal setting process was to review the stated goals of other planning documents and efforts to ensure that goals set for the FRMP will be consistent with other Mohave County efforts. The current MJHMP has only one stated goal with four clarifying objectives as follows:

**MJHMP GOAL:** Reduce or eliminate the risk to people and property from natural hazards.

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

The 2015 Advisory Committee also reviewed the list of public involvement related goals developed by the Outreach Projects Strategy Advisory Committee (OPSAC) in 2014, as follows:

- **OPSAC Goal 1:** Address transportation problems during flood events.
- **OPSAC Goal 2:** Keep children out washes during both dry and flooding conditions.
- **OPSAC Goal 3:** Better inform the community of flood insurance options. Target the communities that are not currently within a mapped FEMA Special Flood Hazard Area (SFHA), but may be at risk of flooding.
- **OPSAC Goal 4:** Educate the public on the importance of flood hazards, flood preparedness, and proper response.
- **OPSAC Goal 5:** Maintain, enhance, and develop regional inter-jurisdictional communication, coordination, and education in San Bernardino County (CA), Clark County (NV), and Washington County (UT) for flooding and other emergencies.

After reviewing the above, the 2015 Advisory Committee then performed an exercise wherein each person was provided sticky notes upon which they were to write down a minimum of three problem statements (one per sticky note) relating to flooding and flood risk in the county. The problem statements were collected and then grouped into common themes or topics. The groupings of problem statements then served as a basis for formulating the goals for this FRMP. The common group topics included: flood response, interagency coordination, education and outreach, funding sources,





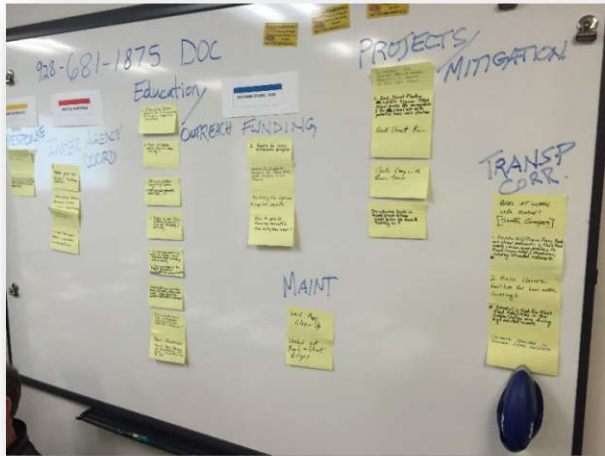


## MOHAVE COUNTY FLOOD RISK MANAGEMENT PLAN

2022

maintenance, projects and mitigation, and transportation flooding. Using the results of the sticky-note exercise, the Advisory Committee formulated the following goals:

- **GOAL 1:** Pursue continued coordination and cooperation among agencies and jurisdictions with floodplain management responsibilities and interest in Mohave County.
- **GOAL 2:** Identify and pursue all reasonable avenues of funding for implementing flood risk reduction activities.
- **GOAL 3:** Actively identify and implement projects and activities that reduce or eliminate flood risk in Mohave County.
- **GOAL 4:** Coordinate with and support emergency management with data and services to aid in effective flood hazard related emergency response.
- **GOAL 5:** Perform and strategize public outreach and involvement activities and projects per the CRS Activity 330 Program for Public Information (PPI) Committee recommendations.



### 6.1.1 2022 Update

The 2022 Advisory Committee reviewed the 2015 FRMP goals during the third meeting and discussed the need to make any modifications. The committee unanimously determined that the goals were still relevant and no modifications were needed.

## 6.2 Flood Risk Management Activity Review

FEMA has established six general categories of activities that a community may choose to pursue as a part of its flood risk management programs and process. Each of the six categories are discussed in the following sections.

### 6.2.1 Preventive

Preventive activities usually involve planning or regulatory measures and are usually administered by building, zoning, planning, and/or code enforcement departments and officials. The goal of preventive activities is to keep flood problems from getting worse through purposeful limitation of land use and development of flood-prone areas.

Mohave County has implemented and enforces several preventive activities, with a majority of the effort being accomplished through the Development Services Department and





## **APPENDIX F**

### **County-Wide Level 1 HAZUS Loss Analysis Report**



# Hazus: Flood Global Risk Report

**Region Name:** MohvCty\_FRMPU\_2022

**Flood Scenario:** County-Wide

**Print Date :** Tuesday, March 15, 2022

**Disclaimer:**

*This version of Hazus utilizes 2010 Census Data.*

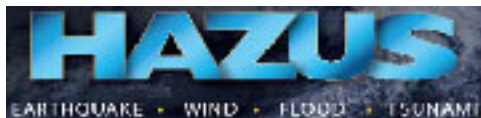
*Totals only reflect data for those census tracts/blocks included in the user's study region.*

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



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## General Description of the Region

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

- Arizona

**Note:**

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

The geographical size of the region is approximately 13,460 square miles and contains 15,677 census blocks. The region contains over 83 thousand households and has a total population of 200,186 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 106,215 buildings in the region with a total building replacement value (excluding contents) of 17,395 million dollars. Approximately 95.48% of the buildings (and 85.16% of the building value) are associated with residential housing.



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## Building Inventory

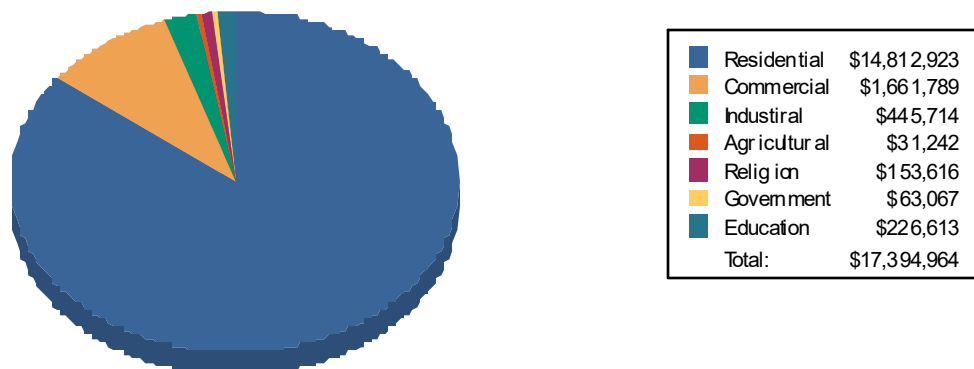
### General Building Stock

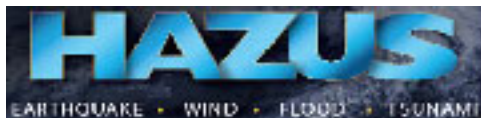
Hazus estimates that there are 106,215 buildings in the region which have an aggregate total replacement value of 17,395 million dollars. Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

**Table 1**  
**Building Exposure by Occupancy Type for the Study Region**

| Occupancy    | Exposure (\$1000) | Percent of Total |
|--------------|-------------------|------------------|
| Residential  | 14,812,923        | 85.2 %           |
| Commercial   | 1,661,789         | 9.6 %            |
| Industrial   | 445,714           | 2.6 %            |
| Agricultural | 31,242            | 0.2 %            |
| Religion     | 153,616           | 0.9 %            |
| Government   | 63,067            | 0.4 %            |
| Education    | 226,613           | 1.3 %            |
| <b>Total</b> | <b>17,394,964</b> | <b>100 %</b>     |

Building Exposure by Occupancy Type for the Study Region  
(\$1000's)





**Table 2**  
**Building Exposure by Occupancy Type for the Scenario**

| Occupancy    | Exposure (\$1000) | Percent of Total |
|--------------|-------------------|------------------|
| Residential  | 2,314,541         | 86.9 %           |
| Commercial   | 227,425           | 8.5 %            |
| Industrial   | 58,671            | 2.2 %            |
| Agricultural | 6,117             | 0.2 %            |
| Religion     | 21,961            | 0.8 %            |
| Government   | 10,315            | 0.4 %            |
| Education    | 23,200            | 0.9 %            |
| <b>Total</b> | <b>2,662,230</b>  | <b>100 %</b>     |

Building Exposure by Occupancy Type for the Scenario (\$1000's)



### Essential Facility Inventory

For essential facilities, there are 7 hospitals in the region with a total bed capacity of 588 beds. There are 88 schools, 45 fire stations, 17 police stations and 1 emergency operation center.



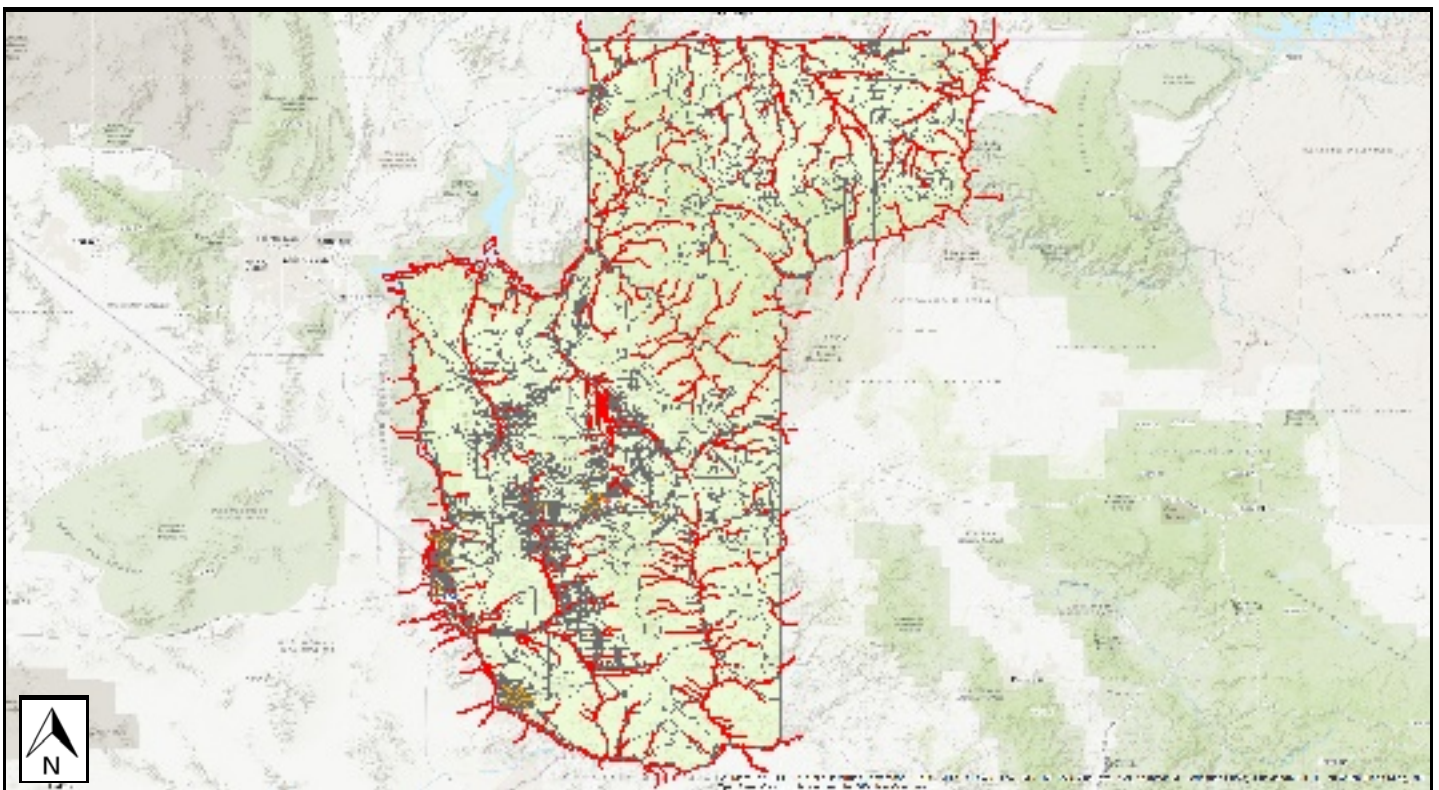
## Flood Scenario Parameters

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

|                                   |                    |
|-----------------------------------|--------------------|
| <b>Study Region Name:</b>         | MohvCty_FRMPU_2022 |
| <b>Scenario Name:</b>             | County-Wide        |
| <b>Return Period Analyzed:</b>    | 100                |
| <b>Analysis Options Analyzed:</b> | No What-Ifs        |

### Study Region Overview Map

Illustrating scenario flood extent, as well as exposed essential facilities and total exposure



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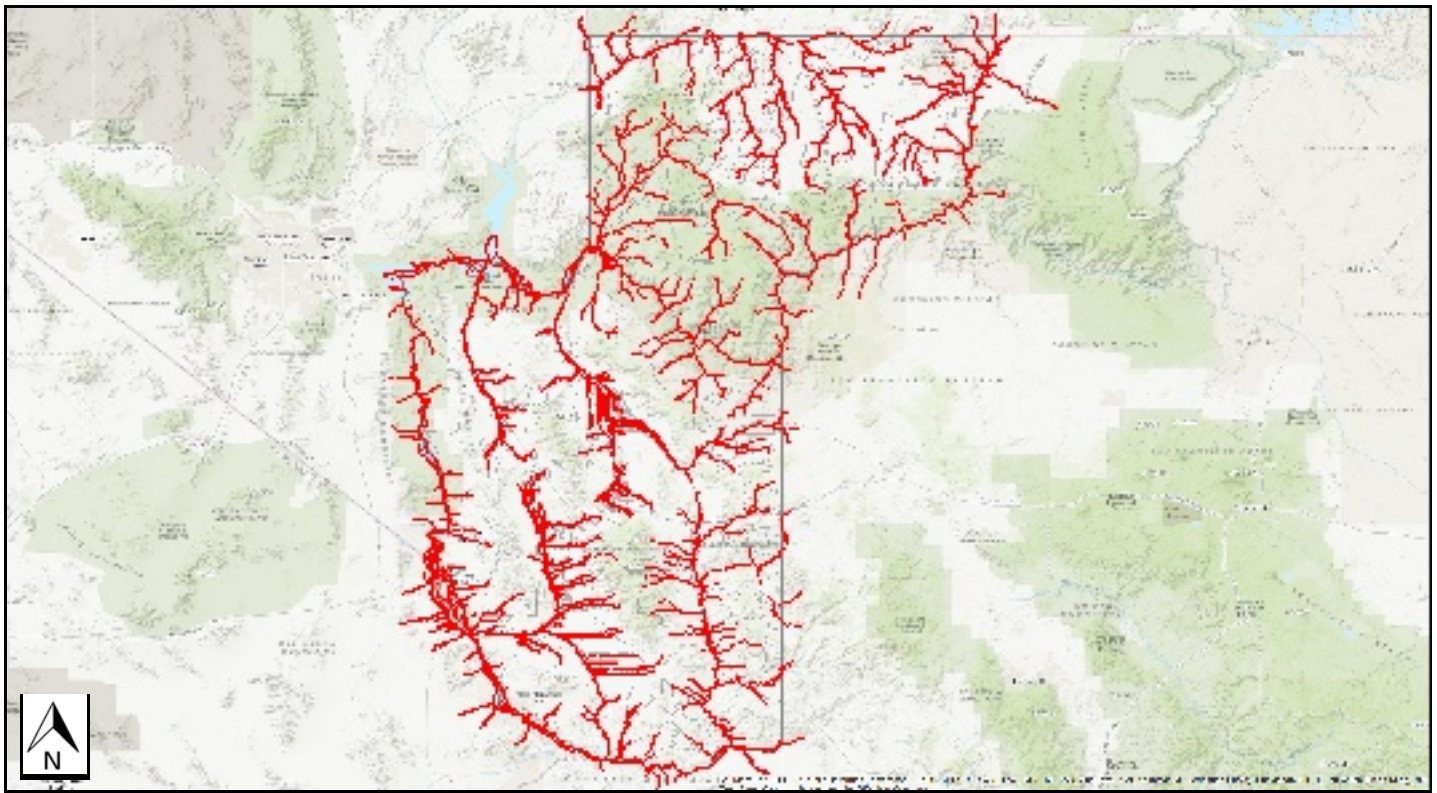


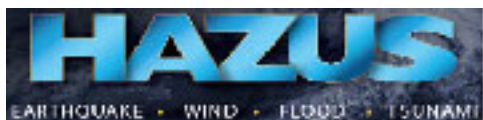
## Building Damage

### General Building Stock Damage

Hazus estimates that about 3,457 buildings will be at least moderately damaged. This is over 23% of the total number of buildings in the scenario. There are an estimated 2,229 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

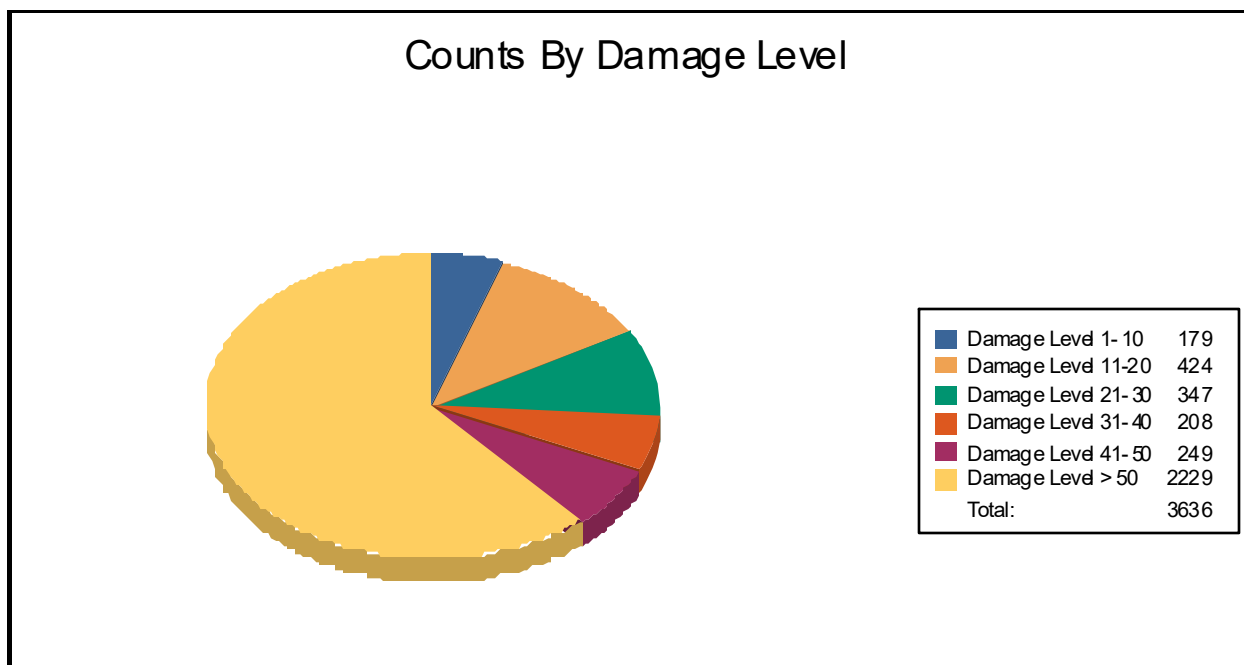
**Total Economic Loss (1 dot = \$300K) Overview Map**





**Table 3: Expected Building Damage by Occupancy**

| Occupancy    | 1-10       |     | 11-20      |     | 21-30      |     | 31-40      |     | 41-50      |     | >50          |     |
|--------------|------------|-----|------------|-----|------------|-----|------------|-----|------------|-----|--------------|-----|
|              | Count      | (%) | Count      | (%) | Count      | (%) | Count      | (%) | Count      | (%) | Count        | (%) |
| Agriculture  | 0          | 0   | 0          | 0   | 0          | 0   | 0          | 0   | 0          | 0   | 0            | 0   |
| Commercial   | 1          | 50  | 1          | 50  | 0          | 0   | 0          | 0   | 0          | 0   | 0            | 0   |
| Education    | 0          | 0   | 0          | 0   | 0          | 0   | 0          | 0   | 0          | 0   | 0            | 0   |
| Government   | 0          | 0   | 0          | 0   | 0          | 0   | 0          | 0   | 0          | 0   | 0            | 0   |
| Industrial   | 0          | 0   | 0          | 0   | 0          | 0   | 0          | 0   | 0          | 0   | 0            | 0   |
| Religion     | 0          | 0   | 0          | 0   | 0          | 0   | 0          | 0   | 0          | 0   | 0            | 0   |
| Residential  | 178        | 5   | 423        | 12  | 347        | 10  | 208        | 6   | 249        | 7   | 2,229        | 61  |
| <b>Total</b> | <b>179</b> |     | <b>424</b> |     | <b>347</b> |     | <b>208</b> |     | <b>249</b> |     | <b>2,229</b> |     |



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**Table 4: Expected Building Damage by Building Type**

| Building Type | 1-10  |     | 11-20 |     | 21-30 |     | 31-40 |     | 41-50 |     | >50   |     |
|---------------|-------|-----|-------|-----|-------|-----|-------|-----|-------|-----|-------|-----|
|               | Count | (%) | Count | (%) | Count | (%) | Count | (%) | Count | (%) | Count | (%) |
| Concrete      | 0     | 0   | 0     | 0   | 0     | 0   | 0     | 0   | 0     | 0   | 0     | 0   |
| Manuf Housing | 44    | 2   | 44    | 2   | 53    | 3   | 0     | 0   | 58    | 3   | 1,833 | 90  |
| Masonry       | 37    | 8   | 104   | 24  | 72    | 16  | 58    | 13  | 50    | 11  | 116   | 27  |
| Steel         | 0     | 0   | 0     | 0   | 0     | 0   | 0     | 0   | 0     | 0   | 0     | 0   |
| Wood          | 97    | 8   | 275   | 24  | 221   | 19  | 150   | 13  | 141   | 12  | 279   | 24  |



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## Essential Facility Damage

Before the flood analyzed in this scenario, the region had 588 hospital beds available for use. On the day of the scenario flood event, the model estimates that 588 hospital beds are available in the region.

**Table 5: Expected Damage to Essential Facilities**

| Classification              | Total | # Facilities      |                      |             |
|-----------------------------|-------|-------------------|----------------------|-------------|
|                             |       | At Least Moderate | At Least Substantial | Loss of Use |
| Emergency Operation Centers | 1     | 0                 | 0                    | 0           |
| Fire Stations               | 45    | 2                 | 0                    | 2           |
| Hospitals                   | 7     | 0                 | 0                    | 0           |
| Police Stations             | 17    | 1                 | 0                    | 1           |
| Schools                     | 88    | 2                 | 0                    | 2           |

If this report displays all zeros or is blank, two possibilities can explain this.

- (1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.
- (2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.





## Induced Flood Damage

### Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

**Analysis has not been performed for this Scenario.**



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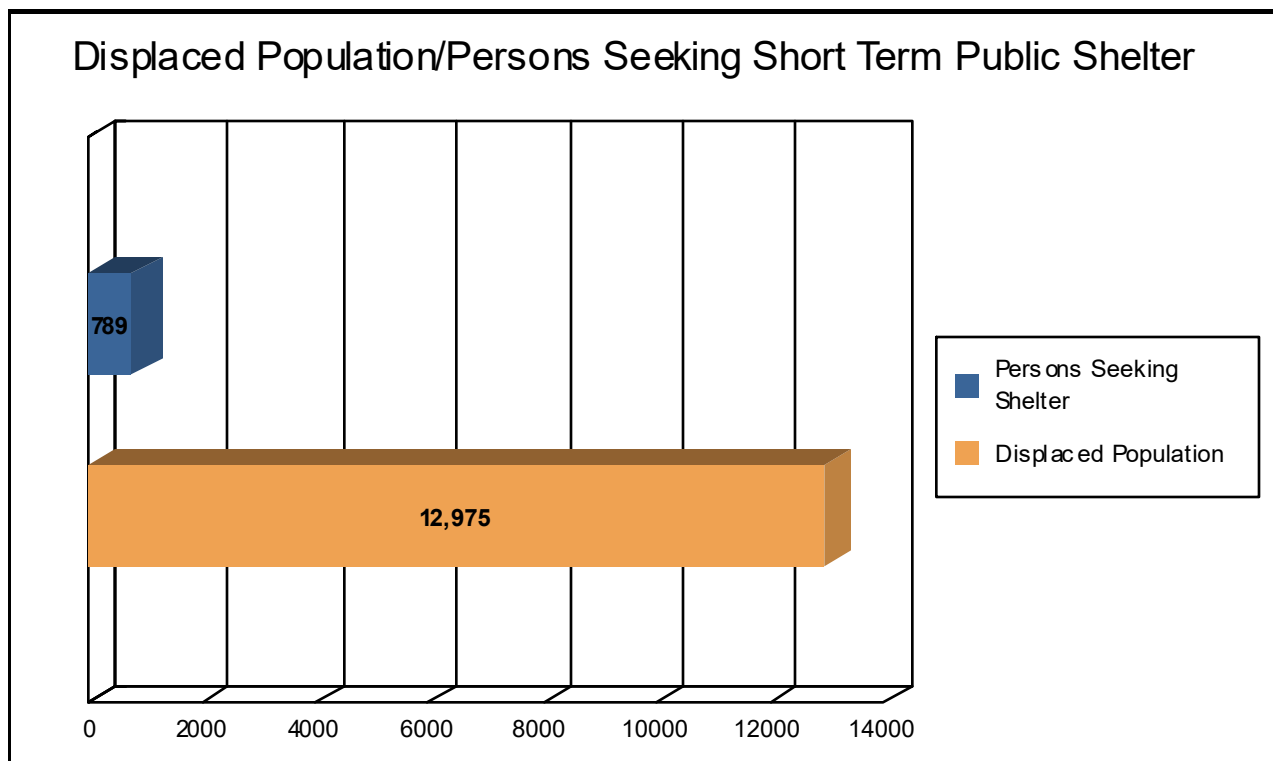
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## Social Impact

### Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 4,325 households (or 12,975 of people) will be displaced due to the flood. Displacement includes household evacuated from within or very near to the inundated area. Of these, 789 people (out of a total population of 200,186) will seek temporary shelter in public shelters.





## Economic Loss

The total economic loss estimated for the flood is 866.31 million dollars, which represents 32.54 % of the total replacement value of the scenario buildings.

### Building-Related Losses

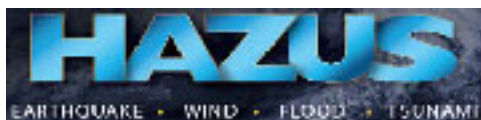
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the

The total building-related losses were 611.47 million dollars. 29% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 79.20% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.



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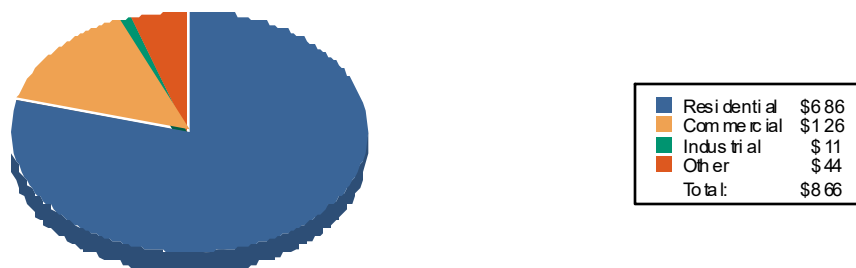
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**Table 6: Building-Related Economic Loss Estimates**  
(Millions of dollars)

| Category                     | Area             | Residential   | Commercial    | Industrial   | Others       | Total         |
|------------------------------|------------------|---------------|---------------|--------------|--------------|---------------|
| <b>Building Loss</b>         |                  |               |               |              |              |               |
|                              | Building         | 356.50        | 13.67         | 3.22         | 2.23         | 375.62        |
|                              | Content          | 178.88        | 37.14         | 5.84         | 12.13        | 233.99        |
|                              | Inventory        | 0.00          | 0.63          | 0.99         | 0.24         | 1.86          |
|                              | <b>Sub total</b> | <b>535.38</b> | <b>51.44</b>  | <b>10.05</b> | <b>14.61</b> | <b>611.47</b> |
| <b>Business Interruption</b> |                  |               |               |              |              |               |
|                              | Income           | 2.26          | 31.54         | 0.15         | 4.19         | 38.14         |
|                              | Relocation       | 111.66        | 5.74          | 0.15         | 1.86         | 119.40        |
|                              | Rental Income    | 31.47         | 4.10          | 0.02         | 0.12         | 35.71         |
|                              | Wage             | 5.34          | 32.84         | 0.31         | 23.10        | 61.59         |
|                              | <b>Sub total</b> | <b>150.73</b> | <b>74.22</b>  | <b>0.62</b>  | <b>29.27</b> | <b>254.83</b> |
| ALL                          | <b>Total</b>     | <b>686.11</b> | <b>125.65</b> | <b>10.67</b> | <b>43.88</b> | <b>866.31</b> |

Losses by Occupancy Types (\$M)



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## **Appendix A: County Listing for the Region**

Arizona

- Mohave



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## Appendix B: Regional Population and Building Value Data

|                           | Population     | Building Value (thousands of dollars) |                  |                   |
|---------------------------|----------------|---------------------------------------|------------------|-------------------|
|                           |                | Residential                           | Non-Residential  | Total             |
| <b>Arizona</b>            |                |                                       |                  |                   |
| Mohave                    | 200,186        | 14,812,923                            | 2,582,041        | 17,394,964        |
| <b>Total</b>              | <b>200,186</b> | <b>14,812,923</b>                     | <b>2,582,041</b> | <b>17,394,964</b> |
| <b>Total Study Region</b> | <b>200,186</b> | <b>14,812,923</b>                     | <b>2,582,041</b> | <b>17,394,964</b> |



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