Flood Control District of Maricopa County

2020 Floodplain Management Plan for Unincorporated Maricopa County

DRAFT

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2020 Floodplain Management Plan for Unincorporated Maricopa County

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Adopted on _____, 2020

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The Flood Control District of Maricopa County (District) administers the National Flood Insurance Program's (NFIP) Community Rating System (CRS) for unincorporated Maricopa County. As part of the program, the District is required to update its Floodplain Management Plan (FMP). Development of the FMP was based on input from a committee representing the District, Maricopa County Planning & Development Department along with other county departments, various stakeholders, and the public. The committee consisted of one staff member from the District, four members from various other Maricopa County departments, representatives from eighteen stakeholders, and three residents.

The 2020 update will serve as a road map for addressing flooding issues in unincorporated Maricopa County over the next five years. It also addresses public education about loss reduction measures and the beneficial functions of floodplains to reduce flood-related hazards within the county. The purpose of this FMP is to identify flood hazards in the community, set goals, and recommend a program of activities to address the county's vulnerability to flooding.

Assessment of Community Hazards *(Sections 2 and 3)*

The assessment of the hazards and problems were reviewed by the FMP Committee in order to analyze and identify the sources, extent, and causes of flooding and to address the impacts of flooding caused by these hazards.

The hazard assessment involved reviewing and summarizing data from existing flood studies, historical records, and the knowledge and experiences of District staff and the FMP Committee members. The assessment of the problems included evaluating the impacts of flooding on people, property, infrastructure, the economy, and natural floodplain functions.

Some of the identified hazards in unincorporated areas include flash flooding; transportation, development, and recreational activities within floodplains; downstream inundation from embankment failures; single-lot development with no coordinated drainage system; interruptions to and channelization of natural flow paths; lateral (side-to-side) migration and erosion of washes; sediment-laden floodwaters; loss of habitat; and worsening of flood conditions caused by drought, subsidence, earth fissures, and wildfires.

Goals *(Section 4)*

Five goals were identified for floodplain management in unincorporated Maricopa County:

1. Transportation and Low Water Crossing Mitigation

The District will work with transportation agencies and the communities to address public concerns on transportation routes that result in interruptions to normal operating conditions, delays of emergency services, negatively impact the economy, or pose safety risks due to flooding.

2. Funding Evaluation of Process and Dedicated Resources

The District shall work in partnership with stakeholders to evaluate its various programs, fiscal opportunities, and funding processes to assure funds continue to be invested back into the communities.

3. Education and Technical Resources

The District shall work with stakeholders and local organizations on consistent county-wide technical and educational materials for flood preparedness with materials available in physical locations as well as electronically.

4. Managed Open Space

The District shall continue pursuing nature-based solutions for flood mitigation, wherever practical, working with stakeholders to maximize a full range of community co-benefits of flood control projects, which may include open space, wildlife corridors and recreational opportunities.

5. Regional Leadership

The District shall continue to perform duties as the regional leader in floodplain management. The District shall provide and communicate information, guidelines, and regulations to agencies and communities throughout Maricopa County and to adjacent Counties.

Action Plan *(Section 5)*

An action plan was developed to accomplish the 2020 goals. Specific activities were identified within the categories of flood prevention, property protection, natural resource protection, emergency services, structural flood control projects, and public information. The FMP Committee identified two areas that should be given the highest priority. The first is to evaluate, prioritize, and mitigate impacts to transportation caused by flooding (Action Items #1 and #2). The second category is delineations and re-delineations of floodplains throughout Maricopa County (Action Item #27).

Implementation *(Section 6)*

Funding for implementation of the action plan will be provided annually as resources permit under the District's operating and CIP budgets. The District Divisions with responsibility for implementing the action plan will provide annual progress reports for review by the FMP Committee and the District's Board of Directors.

1. Introduction

The Flood Control District of Maricopa County (District) administers the National Flood Insurance Program's (NFIP) Community Rating System (CRS) for unincorporated Maricopa County. As part of the program, the District is updating its Floodplain Management Plan (FMP). The 2020 update will serve as a road map for addressing flooding issues in unincorporated Maricopa County over the next five years. It also addresses public education about loss reduction measures and the beneficial functions of floodplains to reduce flood-related hazards within the county.

1.1 Purpose and Need

The purpose of this FMP is to identify flood hazards in the community, set goals, and recommend a program of activities to address the county's vulnerability to flooding. The District developed the previous FMP in 2015, titled *2015 Floodplain Management Plan for Unincorporated Maricopa County* (2015 FMP). An update to the 2015 FMP is required as part of the District's participation in the NFIP and is a prerequisite of a CRS Class 4 community. As a CRS Class 4 community, properties within unincorporated Maricopa County are eligible for a 10% flood insurance premium reduction if outside the Special Flood Hazard Area (SFHA) and 30% flood insurance premium reduction if in the SFHA.

This 2020 update incorporates information collected from recent District studies and projects and changes in watershed conditions, population, and community expectations. It is intended to be used in guiding future development and is compatible with the comprehensive planning documents of the County, cities, and other agencies. The FMP includes background data to help District leadership, in partnership with other agencies, prioritize funding for future studies and projects.

1.2 Geographic and Jurisdictional Scope

As shown on **Map 1** of **Appendix A**, the geographic and jurisdictional scope of the 2020 FMP includes all unincorporated areas of Maricopa County. The District has regulatory authority for floodplain management in unincorporated Maricopa County. Additionally, the District currently performs floodplain management services for 14 incorporated municipalities that have not assumed the powers and duties of floodplain management for their jurisdiction. For purposes of the CRS administered under the NFIP, only the areas in unincorporated Maricopa County are considered in the insurance credits awarded for this FMP and other floodplain management activities.

1.3 Acknowledgements

Kelli Sertich, AICP, CFM, District Project Manager, headed the effort and was supported by, Sharon McGuire, Joseline Castañeda, and Tim Murphy. Mark Fountain, PE, CFM, ENV SP and Matt Hann, PE, CFM of Black & Veatch Corporation (B&V) prepared the 2020 FMP on behalf of the District under Contract FCD 2019C019.

1.4 Plan Organization and Development

Maricopa County staff from the following departments provided information and input during the development of the 2020 FMP:

Department	Representative	Title
1. Department of Transportation	David Fritz	Engineering Branch Manger
2. Department of Emergency Management	Jesus Haro	Emergency Services Planner
3. Department of Emergency Management	Rudy Perez	Emergency Services Planner
4. District, Engineering Division	Scott Vogel	Division Manager
5. District, Executive Division	Michael Fulton	Director
6. District, Finance & Contracts	Karen Scott	Division Manager
7. District, Floodplain Permitting Division	Cathy Regester	Division Manager
8. District, Flood Warning Branch	Steve Waters	Branch Manager
9. District, Planning and Project Management Division	Don Rerick	Division Manager
10. District, Planning Branch	Hasan Mushtaq	Branch Manager
11. District, Planning Branch	Mark Frago	Project Manager
12. District, Planning Branch	Spencer Bolen	Project Manager
13. District, Planning Branch	Theresa Pinto	Project Manager
14. District, Policy, Planning and Coordination Branch	Joseline Castaneda	Planner
15. District, Policy, Planning and Coordination Branch	Kelli Sertich	Branch Manager
16. District, Policy, Planning and Coordination Branch	Sharon McGuire	Program Coordinator
17. District, Project Management Branch	Tim Murphy	Branch Manager
18. District, Operations & Maintenance	Charlie Klenner	Division Manager
19. District, Public Information	Kim McMahon	Public Information Officer
20. District, Public Information	Lisa Blyler	Division Manager
21. District, Work Control Center	Erik Arntz	Work Control Center Inspection Supervisor

Department	Representative	Title
22. Parks and Recreation Department	Ken Vonderscher	Planning and Development Manager
23. Planning and Development Department	Tom Ewers	Division Manager Plan Review, Chief Building Official
24. Office of Enterprise Technology/GIS	Kevin LaVallee	GIS Supervisor
25. Office of Enterprise Technology/GIS	Tennille Blair	GIS Analyst

1.5 FMP Committee

On September 25, 2019 the Flood Control Advisory Board (FCAB) approved formation of the committee for development of the 2020 FMP. This approval included information on the steps involved for developing the 2020 FMP, proposed committee members, schedule, and having staff provide information on flood mitigation efforts. Additional information on the FCAB's approval of the committee is provided in Appendix B.

As identified in **Table 1**, the committee members represent some 26 different stakeholder and agency affiliations. This included representatives from 5 different County agencies or departments, 9 cities and towns located in Maricopa County, 1 adjacent county, 3 state agencies, 5 outside associations or organizations, and 3 citizens.

The 5 different Maricopa County agencies and departments represented were Emergency Management, Flood Control, Parks & Recreation, Planning & Development, and Transportation. These County agencies and departments are involved in the variety of activities that help to mitigate flooding, including:

- Preventive measures (mapping, regulations, planning, zoning, building codes, drainage system maintenance, building codes, stormwater management),
- Property protection (acquisition, retrofitting information, building elevation, flood insurance information),
- Natural resource protection (preservation, water quality, sediment control, low-impact development),
- Emergency services (threat recognition, warning, response, post-disaster-mitigation),
- Structural flood control projects (storm drains, basins, channel modifications, levees, dams),
- Public information (map information, outreach projects, real estate information, library, technical resources).

Table 1: 2020 Floodplain Management Plan Committee

Affiliation	Member
Arizona Department of Transportation	Sam Patton *Project Manager*
Arizona Department of Water Resources	Mike Shelton *Risk Map Coordinator*
Arizona Rock Products Association	Gregg Monger *Manager*
Arizona State Land Department	Mark Edelman *Planning & Engineering Manager*
Audubon Society of Arizona	Tice Supplee *Director of Bird Conservation*
Central Arizona Project	Sami Korpelainen *Supervisor*
City of Buckeye	Robert Eroh *Project Engineer*
City of Glendale	Kelly Hargadin *Engineering Project Manager*
City of Mesa	Lance Webb *Deputy Engineer*
City of Peoria	Dan Nissen *Deputy Engineering Director*
City of Phoenix	Ray Dovalina *Assistant PW Director*
City of Surprise	Nuning Lemka *Public Works Manager*
Flood Control District of Maricopa County	*Kelli Sertich *Policy, Planning and Coordination Branch Manager*
Irrigation District & Electrical District Association	Noel Carter Buckeye Water Conservation & Drainage District
Maricopa County Department of Transportation	David Fritz *Engineering Branch Manager*
Maricopa County Farm Bureau	Liz Foster *Executive Director*
Maricopa County Emergency Management	*Jesus Haro *Emergency Services Planner*
Maricopa County Parks & Recreation	*Ken Vonderscher *Planning & Development Manager*
Maricopa County Planning & Development	*Tom Ewers *Division Manager Plan Review, Chief Building Official*

Affiliation	Member
Maricopa County Resident	Ed Taylor *New River/Desert Hills Community Association*
Maricopa County Resident	Patti Trites *Southern Hills HOA &* *South Mountain Village Planning Committee*
Maricopa County Resident	Randy Goettsche *Rio Verde Horsemen's Association*
Town of Gila Bend	Brandon Espinosa *Development Services & Code Compliance Officer*
Town of Gilbert	Tom Condit *Development Engineer* Pete Weaver *Emergency Management Coordinator*
Town of Youngtown	Gregory Arrington *Community Development Manager*
Yavapai County	Lynn Whitman *Flood Control District Director* Tony Angueira *Stormwater Engineer*

* Maricopa County Staff

The FMP Committee met five times to address each of the following needs:

1. Assess the hazard
2. Assess the problem
3. Set goals
4. Review possible activities
5. Draft an action plan

The discussion and outcomes of each meeting are presented in subsequent sections of this FMP. Meeting agendas, attendance sheets, and summaries are included in **Appendix B**.

1.6 Public Involvement

All FMP Committee meetings were advertised on the District's website and were open to the public. In addition, two public meetings were held during the development of the FMP. The first, held early in the planning process on November 4, 2019, was an open-house format and included information on the plan's development process and progress-to-date. A second public meeting was held on February 13, 2020, to present the draft FMP goals and action plan and obtain input from the public.

Additional public information activities included:

1. Development of the FMP was featured on the home screen of the District's website with a link to information on the purpose and planning process, the FMP Committee meeting dates, and discussion topics. The page also included a link for residents to a questionnaire to obtain input on flooding concerns that should be included in developing the plan.
2. District staff presented the draft plan at a public meeting of the Maricopa County Flood Control Advisory Board (FCAB) on September 23, 2020. The presentation included information on the planning process, hazard identification, plan goals, and the action plan for the next five years. The FCAB voted to recommend adoption of the plan to the District's Board of Directors.

Documentation of these public outreach activities and summaries of input from the public and stakeholder questionnaires are provided in **Appendix C**.

1.7 Coordination with Other Agencies

Representatives from the following agencies were contacted for input to the 2020 FMP, offered an opportunity to be part of the committee, and to review the Plan:

Federal

- Bureau of Land Management (BLM)
- Bureau of Reclamation (BOR)
- Central Arizona Project (CAP)/Central Arizona Water Conservation District (CAWCD)
- Natural Resources Conservation Service (NRCS)
- U.S. Army Corps of Engineers (USACE)
- U.S. Forest Service (USFS)

State

- Arizona Department of Emergency and Military Affairs (ADEMA)
- Arizona Department of Transportation (ADOT)
- Arizona Department of Water Resources (ADWR)
- Arizona Game and Fish (AZGF)
- Arizona State Land Department (ASLD)

Maricopa County

- Maricopa County Department of Emergency Management (MCDEM)
- Maricopa County Department of Transportation (MCDOT)
- Maricopa County Parks & Recreation Department (MCPRD)
- Maricopa County Planning & Development Department (MCPDD)

Surrounding Counties

- Gila County
- La Paz County
- Pinal County
- Yavapai County

Municipal

- Apache Junction
- Avondale
- Buckeye
- Carefree
- Cave Creek
- Chandler
- El Mirage
- Fountain Hills
- Gila Bend
- Gilbert
- Glendale
- Goodyear
- Guadalupe
- Litchfield Park
- Mesa
- Paradise Valley
- Peoria
- Phoenix
- Queen Creek
- Scottsdale
- Surprise
- Tempe
- Tolleson
- Wickenburg
- Youngtown

Other

- AK-CHIN Indian Community
- American Council of Engineering Companies of AZ (ACECA)
- Arizona Farm Bureau – Maricopa County
- Arizona Rock Products Association (ARPA)
- Audubon Society of Arizona
- Central Arizona Conservation Alliance (CAZCA)
- Fort McDowell Yavapai Nation
- Gila River Indian Community
- Home Builders Association of Central Arizona
- Irrigation and Electrical Districts Association of Arizona
- Salt River Pima-Maricopa Indian Community
- Salt River Project (SRP)
- San Lucy District – Gila Bend / Tohono O'odham Nation
- The Nature Conservancy

1.8 Review of Other Planning Studies

Since the previous plan was completed, the District has continued developing and updating Area Drainage Master Studies (ADMS) and Area Drainage Master Plans (ADMP) throughout the county. The following District studies and plans were reviewed:

- Pinnacle Peak West ADMS (JE Fuller, 2015)
- Gila Bend ADMP Update Phase II (Wood/Patel, 2015)

- Tempe ADMS Update (J2, 2016)
- Ahwatukee ADMS/P (TY LIN, 2017)
- Upper East Fork Cave Creek ADMS (ATKINS, 2017)
- Lower Indian Bend Wash ADMS/P (Gavan Barker, 2017)
- Laveen ADMP (Stantec, 2017)
- Gillespie Phase II ADMS (AECOM, 2018)
- San Tan ADMS (TY LIN, 2018)
- Middle Indian Bend Wash ADMS (KHA, 2019)

In addition to the District studies and plans, the following documents were revised:

- Flood Control District of Maricopa County Standard Procedures and Details (2015)
- Drainage Design Manual for Maricopa County, Volume I Hydrology (2018)
- Drainage Design Manual for Maricopa County, Volume II Hydraulics (2018)
- Drainage Design Manual for Maricopa County, Volume III Erosion (2018)
- Drainage Policies and Standards Manual for Maricopa County (2018)
- Flood Control District of Maricopa County Standard Details (2019)

1.8.1 Goals Identified in Planning Studies

Goals identified in the various ADMP/S documents include:

- Identify and mitigate flooding and erosion hazards in order to protect the built environment
- Identify potential flood hazards associated with existing structures within the planning area
- Identify stream reaches that have experienced long-term degradation, aggradation, or lateral migration
- Develop recommendations that would provide an adequate regional drainage system that maximizes the use of existing infrastructure
- Encourage design and planning efforts that mitigate potential disruptions to the predevelopment function of a watershed
- Minimize disturbances to natural watercourses in order to preserve the natural and beneficial floodplain function
- Leverage multi-use opportunities of watercourses to achieve both flood control objectives and the passive/active recreation desires of the surrounding community
- Design flood control facilities to enhance and complement the beauty of the natural desert landscapes and character of local communities within the planning area

1.9 Disaster Damage Reports

No flooding disasters in Maricopa County were declared by FEMA from 2015 through the end of 2019.

Wickenburg home flooded in August 2014

1.9.1 Identified Flood Control Needs

On an annual basis incorporated communities and other agencies submit proposed projects to be added to the District's Capital Improvement Program (CIP). The District usually takes the lead for submitting projects in unincorporated Maricopa County, although other county agencies can also propose projects. The communities and agencies primarily use the results of ADMS and ADMP studies done by the District to help identify potential projects, along with other information they may have. The proposed projects are evaluated for the area they protect, the level of protection provided, along with ancillary benefits (protection of natural habitats and landscape, multi-use opportunities) and partner(s) level of participation. Many projects submitted for inclusion in the District's CIP program have the potential to benefit multiple communities. The projects listed in Table 2 have been reviewed, scored, and met the CIP program's minimum requirements for funding approval. The District's Board of Directors has approved funding all the projects in Table 2 and adding them to the District's CIP program. The projects in Table 2 are the projects that will have an impact on reducing flooding hazards within unincorporated Maricopa County. Several of these projects also benefit areas located within incorporated communities

The projects in Table 2 have already been included in the CIP budget and identifies the Fiscal Year (FY) that design and construction are scheduled to begin. The primary funding source for most of these projects will be the District's secondary property tax, some projects will also be funded by other agencies.

Table 2: Flood Control Needs Identified for Unincorporated Maricopa County

Project	Project Control Number	Description	ADMS/P Study	Funding Source	Design	Construction
Hidden Valley Basins & Storm Drain	117.01.31	Construct two detention basins (Carver and Highline) & storm drain system	Laveen	FCDMC CIP Budget	FY21	FY22
51st Avenue and Dobbins Road Drainage Improvement Project	117.04.31	Construct detention basin & storm drain	Laveen	FCDMC CIP Budget, and City of Phoenix	FY22	FY23
27th Avenue & Olney Avenue Storm Drain	117.05.31	Construct storm drain	Laveen	FCDMC CIP Budget and, City of Phoenix	FY20	FY21
McMicken Dam Outlet Channel Improvements (Phase 2)	204.01.30	Complete the enlargement and realign of the outlet channel begun in Phase 1	Wittmann	FCDMC CIP Budget	FY20	FY21
Oak Street Basin and Storm Drain	420.04.31	Construct a detention basin and storm drain system	Spook Hill	FCDMC CIP Budget	FY20	FY21
Olive Avenue Channel (103 Avenue to 99 Avenue	337.01.30	Reconstruct damaged channel	Structure Assessment, Sun City Drains	FCDMC CIP Budget	FY20	FY21
Sun City West – Unit 9 Channel Bend	338.01.30	Reconstruct channel at scour hole north of Bell Rd west of RH Johnson Blvd	Structure Assessment, Sun City West Drains	FCDMC CIP Budget	FY21	FY22

Project	Project Control Number	Description	ADMS/P Study	Funding Source	Design	Construction
Sun City West – Unit 9 Straight Channel	337.01.30	Reconstruct channel along Bell Road, add access locations	Structure Assessment, Sun City West Drains	FCDMC CIP Budget	FY21	FY21
Sun City – Units 15A, 15B, 15C	337.01.30	Reconstruct channel along north side of Grand Avenue from 107th Avenue to the Agua Fria River	Structure Assessment, Sun City Drains	FCDMC CIP Budget	FY21	FY21
White Tanks FRS No. 4 Outlet	201.01.31	Construct storm drain system for draining White Tanks FRS	Buckeye	FCDMC CIP Budget	FY19	FY20

1.10 Overview of 2015 Floodplain Management Plan

The 2015 FMP was the first time the District utilized a Committee consisting of District staff, representatives from other County agencies, and members of the public to help develop the FMP. The identified goals and progress to date on the action items are described below.

1.10.1 2015 Strategic Goals

The goals established in the 2015 FMP were to:

1. Continue/Expand Public Outreach
2. Protect Natural Resources
3. Improve Quality of Life
4. Strengthen role as regional leader
5. Develop List of Resources
6. Enforce/Enhance Regulatory Standards

1.10.2 Assessment of Progress: 2015 – 2019

A summary of action items, responsibilities, and progress are summarized in **Table 3**.

Table 3: Progress of Action Plan Items from the 2015 Floodplain Management Plan for Unincorporated Maricopa County

ACTION	PROGRESS	STATUS
Preventive		
1. Enforce current floodplain regulations	The Regulations were updated in January 2018. Enforcement, implementation, and administration are ongoing activities.	Completed (1)
2. Offer technical assistance to 14 of the 24 municipalities in Maricopa County as their Floodplain Management Agency, to residents seeking information and at the request of municipalities that perform their own floodplain management	Technical Assistance is provided by issuance of floodplain use permits, answering public inquiries via telephone and email from residents of the 14 district-dependent communities. This also includes other communities that do their own floodplain management, and unincorporated county.	Completed (1)

ACTION	PROGRESS	STATUS
3. Improve flood risk information by evaluating the merits of converting approximate (Zone A) floodplain delineations to detailed studies based on need and benefit to existing and new development: - Re-delineate existing Zone A floodplains identified in approximate studies - Delineate floodplains downstream of embankments that were recently declared by FEMA as Zone A - Revise regulatory floodplain remnants whose level of risk has been altered by surrounding development	The District normally includes the conversion of Zone A floodplains to detailed zones during floodplain delineation studies. A guidance document has been completed for determining BFE's in Zone A areas. Currently working with the City of Mesa to identify floodplains within Zone D areas. The 2020 Action Items in Table 22 include similar actions to be addressed.	Completed (1)
4. Encourage the Maricopa County Planning & Development Department to continue to propose/discuss "good ideas" at pre-application meetings for all proposed development (i.e., mitigation measures and approaches to reduce the risk of flooding)	Discussions occur during Maricopa County Planning & Development Department's pre-application and Technical Advisory Committee meetings with customers. FCDMC and P&D staff inform applicants of flood studies, and in Entitlement case letters during the planning process.	Completed (1)
5. Create a nontechnical booklet with photos and illustrations of examples of good vs. poor floodplain management practices and a fact sheet with resources on floodproofing for distribution by inspectors and staff	In December 2019 the District issued a revised version of "Reduce Your Flood Risk; A Resource Guide". The previous version was issued in 2016.	Completed (1)
6. Provide annual funding for the Floodprone Properties Assistance Program (FPAP) and floodproofing activities	Review of the needed funding level is part of the District's annual budgeting process.	Completed (1)
7. Continue preparing and updating Area Drainage Master Studies/Plans (ADMS/Ps) and pursue implementation with local jurisdictions	This is part of District's routine operations, as of June 2020 there were 12 ongoing studies.	Completed (1)

ACTION	PROGRESS	STATUS
8. Evaluate and implement improvements to methodologies, where feasible, to better identify flood hazards	Evaluations were conducted by the District's Engineering Division. The District will continue this effort has new methods and technologies are developed.	Completed (1)
9. Develop a benchmark of risks to evaluate current conditions and quantify how risk changes over time and the associated demand for services	The District will pick this up again after FEMA begins to implement their Risk Rating 2.0 methodology. This action will no longer be tracked.	Drop
10. Continue participation in the Community Rating System, which provides residents with discounts on flood insurance premiums	The District is committed to continue participating in CRS.	Completed (1)
11. Collaborate with other agencies and master-planned developments to meet floodplain management goals and integrate with other plans (e.g., transportation, planning, land-use zoning)	Discussions with jurisdictions and developers occur on an on-going basis during the development of plans and prior to their submittal. The District also regularly shares the results from various floodplain and planning studies with other agencies for their use.	Completed (1)
Property Protection		
12. Implement flood warning systems to prevent unsafe crossings of washes and flooded streets	The District entered into an IGA with MCDOT to implement flood warning systems for crossing flooded washes and streets. The Flood Warning Branch installed 5 new flashing warning signs. There are similar action items in the 2020 FMP.	Completed (1)
13. Continue inspection and maintenance of District structures	Programs are in place for continued inspection and regular maintenance of District structures by the Operations & Maintenance Division. The Civil Structures and Dam Safety Branches also inspect FCDMC structures.	Completed (1)

ACTION	PROGRESS	STATUS
Natural Resource Protection		
14. Recognize natural resource benefits (use of water and aggregate; outdoor activity) within the ADMS/P program	The District recognizes and incorporates the natural benefits of floodplains into new and updates to ADMS/P's.	Completed (1)
15. Support multi-use/multi-benefit approaches to floodplain management	The District recognizes and incorporates the multi-use benefits into new and updates to ADMS/P.	Completed (1)
16. Incorporate low-flow stormwater conservation and explore partnerships for best use of water	The District has investigated various approaches for incorporating low flow stormwater conservation practices into projects. The District has also engaged with several partners to develop methods to encourage others to integrate GI/LID and water conservation strategies into other projects.	Completed (1)
17. Identify and accommodate wildlife corridors, habitat, and recreational opportunities as part of the ADMS/P program and during the planning and construction of flood control projects	Throughout the planning, design, and construction of flood control projects, the District seeks to identify and incorporated opportunities for multiple-use, wildlife habitat and corridors, and native landscape restoration. The 2020 Action Items in Table 22 include a similar action to be looked at.	Completed (1)
18. Evaluate floodplains and District-owned lands for ground water recharge potential and explore public/private partnerships to support ground water recharge	The District's evaluated existing facilities for proposed recharge abilities. In the future proposed facilities will also be evaluated for potential recharge. The District also has included water harvesting features on projects.	Completed (1)

ACTION	PROGRESS	STATUS
19. Promote restoration of natural habitat by replacing invasive species with native species where feasible	The District's El Rio Project is one example where this is be accomplished through the removal of invasive species and the planting of natural vegetation and trees. The District uses native vegetation for its projects.	Completed (1)
Emergency Services		
20. Prepare a ready-to-use Flood Response Kit for District staff - Include brochures, how to find information and resources, post-flood field documentation form	The District's Public Information Office was not fully staffed to participate in this action.	Carry forward
21. Construct a web page with information that can be uploaded during flood events	There is content throughout the District's web pages on preparedness and a "Sandbag Location" page is maintained.	Completed (1)
22. Stockpile material at 11 structures for emergency repairs	The District Operations & Maintenance Division continues to stockpile material at structures for emergency repairs.	Completed (1)
23. Continue to update and support Emergency Action Plans for District dams and levees	The District supports the development and updating of EAPs for the District's dams and levees. There were four dam EAPs and five Levee EAP's completed in 2019.	Completed (1)
24. Continue annual flood emergency drills	Flood drills continue to be conducted annually and involve many District branches, several other county agencies, various communities, and other outside agencies.	Completed (1)
25. Continue to provide reliable weather data, water level and stream flow data to other jurisdictions and the community	As part of its normal business practice the District's Flood Warning Branch gathers weather, water level, and stream flow data via the ALERT System providing information to other agencies, the public, and the news media.	Completed (1)

ACTION	PROGRESS	STATUS
26. Identify the need for new Flood Response Plans and develop new or update existing plans as needed	The Flood Warning Branch is responsible for the development of new Flood Response Plans (FRP) and when applicable updates to existing plans. The District works with communities and other agencies to identify areas where a new FRP may be needed, and where an update to a current plan might be needed.	Completed (1)
Structural Projects		
27. Adjust criteria for Small Projects Assistance Program (SPAP), which provides funding for drainage infrastructure, to allow projects for areas that have a demonstrated flood risk but have not previously experienced structural flooding	The SPAP program has been revised to extend eligibility for projects into the program to include those with a demonstrated risk of flooding, and not just to those areas that have experienced flooding. The criteria for the FY21 SPAP program included a longer time frame and larger contribution by the District. Modifications to the procedures are expected to improve the number of submittals in the future.	Completed (1)
28. Develop a process to act as an advocate for unincorporated areas that lack funding partnerships	District staff developed a list of projects located primarily in the unincorporated areas, and they are presented in Table 2.	Completed (1)
29. Explore avenues to expand the CIP budget for infrastructure to meet the demands of identified flood risks	The FY20 CIP was expanded to include additional District Only projects which will provide flood risk reduction and improve existing conditions on older projects thereby reducing O&M costs. For FY21 project submittals the District is introducing several revisions to the CIP program broaden the range of projects.	Completed (1)

ACTION	PROGRESS	STATUS
30. Partner with sand and gravel operations to implement mutually beneficial activities in the river corridors	This was looked at and no specific mutually beneficial activities have been identified to date. The District will continue exploring this item again in the future.	Carry Forward
31. Incorporate ongoing Best Management Practices (BMPs) and emerging Low Impact Development (LID) technologies in design projects	BMP and LID green infrastructure are being incorporated into construction and design projects. Also working on expanding collaboration with other agencies, universities and municipalities.	Completed [(1)]

ACTION	PROGRESS	STATUS
Public Information		
32. Develop a marketing plan to promote sound floodplain management practices and personal responsibility a. - Include multiple communication venues b. - Convey a "greater good" message on responsible floodplain management approaches c. - Convey the message that flood hazards are present, regardless of the FEMA FIRM zone classification d. - Include benchmark information of flood risks in education efforts from surveys and public outreach e. - Recognize the potential economic benefits from reduced flood losses and disruptions to commerce f. - Visit schools in unincorporated county to discuss flood safety and awareness	a. The District uses traditional media sources, direct mailing approaches, updates to the website, Facebook, and the use of Twitter. b. Accomplished through the development and mailing of the annual CRS newsletter "Flood Facts". c. Annual CRS newsletter "Flood Facts", and "Reduce Your Flood Risk; A Resource Guide". d. The District hasn't conducted any widespread public surveys since the ones conducted in 2012 and in 2013. Results from these surveys have been included in District publications. e. Some publications recognize the direct savings to policyholders because of the District's participation in CRS. f. In June 2018 the District developed a STEM program that includes flood safety and awareness demonstrations at schools and other venues, use of a water simulation model, and development of classroom material.	Completed (1)
33. Educate the public & officials on floodplain management needs and benefits	Accomplished using the CRS Newsletter, a variety of public meetings, outreach campaigns in the media, and an assortment of official meetings like BOS/BOD, FCAB, and FSG.	Completed (1)
34. Develop multi-hazard educational material on the effects of long- and short-term changes to the watersheds	The District wasn't able to accomplish this, and it will be carried forward.	Carry forward

ACTION	PROGRESS	STATUS
35. Develop a strategy to publicize the benefits of past floodplain management practices, flood control efforts, and the potential economic benefits from reduced flood losses and disruption to commerce.	The strategy utilized TV spots (English & Spanish), internet banners, District website and Interactive Flood Simulation (IFS) Program.	Completed [(1)]
36. Develop educational material and guidelines for fencing to promote lot-to-lot drainage functions.	Marked as completed because there are several action items in the 2020 FMP that are similar to this.	Completed [(1)]

[(1)] Item has been completed or is part of the District's procedures and won't be in any future reviews.

As indicated in the table, the District has completed most of the activities identified in the 2015 FMP. Many of the action items were previously part of the District's procedures. However, in some cases revisions were made to bring them more in line with the action item.

The FMP Committee reviewed the 2015 information, and several goals and activities were brought forward for consideration in the 2020 update. The goals and development of the action plan for the 2020 FMP are presented in Sections 4 and 5, respectively.

1.11 Evaluation of Current Floodplain Management Activities

As described below, a number of existing planning and floodplain management activities were reviewed to evaluate their effectiveness in lowering flood hazard risks in unincorporated Maricopa County.

1.11.1 Current Regulatory Activities

1.11.1.1 Land Use Plans

Maricopa County developed its first comprehensive plan in October 1997. The *Vision 2030, Maricopa County Comprehensive Plan* was adopted in January 2016. According to the 2016 document, countywide land use issues were identified as follows:

- Urban Development in Unincorporated Areas
- Balanced Land Use Patterns
- Urban/Rural Interface
- Federal and State Property
- Effects of the "Great Recession"
- County Islands
- Development in High Risk Areas
- Reducing Environmental Impacts
- Healthy Community Design
- Unique Land Uses

In addition to the comprehensive plan, area land use plans were developed for unincorporated county lands. These plans are more specific to the local areas they cover in relation to community characteristics, topography, and special conditions:

- East Mesa Area Land Use Plan
- Estrella Area Land Use Plan
- Goldfield Area Plan
- Laveen Area Land Use Plan
- Mobile Area Plan
- Daisy Mountain/New River Area Plan
- Old U.S. Highway 80 Area Plan
- Queen Creek Area Land Use Plan
- Rainbow Valley Area Plan
- Rio Verde Foothills Area Plan
- State Route 85 Area Plan
- Tonopah/Arlington Area Plan
- White Tanks/Grand Avenue Area Plan

The area-specific plans offer development guidance by providing an inventory and analysis on natural resources (physical characteristics, hydrology, vegetation, wildlife, and archeology), social and economic characteristics (population composition and projections and economic data), and land use (development patterns and zoning). It also identifies goals, policies, (natural resources, socioeconomic development, and land use), and resident issues.

The *Vision 2030, Maricopa County Comprehensive Plan* includes an Open Space land use category that denotes areas best suited for permanent open space preservation. It includes uses such as scenic areas, mountain preserves, and washes. Development is not allowed in this category (Maricopa County, 2016).

1.11.1.2 Building Code

Maricopa County Local Additions & Addenda was adopted October 2014 and names the 2012 International Building Codes (IBC) as the official building codes for new and existing construction. The amendments do not impact drainage or other flood-related hazards. The IBC is widely accepted as appropriate requirements for new and remodeling construction activities.

1.11.1.3 Zoning Ordinance

The *Zoning Ordinance for the Unincorporated Area of Maricopa County* was implemented in May 1969 and was most recently updated in May 2017. Section 1205, Drainage Provisions, states:

> "The purpose of this section is to promote and protect the health, peace, safety, comfort, convenience and general welfare of the citizens of Maricopa County by

regulating grading and drainage of all land within the unincorporated area of Maricopa County, Arizona and to minimize the possible loss of life and property through careful regulation of development, to protect watershed, natural waterways, and to minimize soil erosion, to ensure that all new development is free from adverse drainage conditions."

Section 1205 of the development regulations covers administrative duties, permits, the process for requesting waivers, and drainage submittal requirements for proposed development. It requires compliance with the Maricopa County Drainage Design Manual, including volumes for hydrology, hydraulics, and erosion control. It also requires compliance with the Maricopa County Drainage Policies and Standards Manual. These documents are comprehensive and provide excellent guidelines for analysis and design for new development.

1.11.1.4 Floodplain Regulations

Maricopa County adopted floodplain regulations in February 1974 and last updated them in January 2018. The regulations require compliance with the Maricopa County Drainage Design Manual, including volumes for hydrology, hydraulics, and erosion control. Items of note that exceed minimum standards for floodplain management include:

- Section 305 Watercourse Master Plans, authorizes the District to submit plans for river or drainage systems that provide for uniform development standards to the Board of Directors for adoption. It also requires that the plans consider ground water recharge techniques.
- Section 306, Publication of Flood Hazard Boundaries, includes erosion control zones, watercourse master plans, moveable bed watercourses, and alluvial fan zones.
- Article 6, Development Standards, requires that the lowest floor elevation of structures be at least one foot above the Base Flood Elevation (BFE), which is the water surface elevation of the 100-year flood. This requirement is one foot higher than that required by the NFIP.
- Section 601, General Development Standards, requires that "in order to control erosion and preserve the natural and beneficial functions of the floodplain, removal of vegetation shall be the minimum necessary for the development".
- Zone AE Floodplain: The lowest floor of structures must be elevated two feet above the BFE if no floodway has been established. Otherwise, the requirement is one foot above the floodway elevation or one foot above the BFE, whichever is higher.
- Zone A Floodplain: The lowest floor must be elevated two feet above the BFE.
- Zone A Shallow Flooding: The lowest floor of structures must be elevated two feet above the community-determined BFE.
- Zone AH Ponding: The lowest floor elevation must be at least one foot above the BFE. Any volume displacement must be compensated within the same ponding area, and lateral flow must be preserved.

- Zone AO Ponding: The lowest floor elevation must be at least one foot above the flood depth. Any volume displacement must be compensated within the same ponding area, and lateral flow must be preserved.
- Zone AO Shallow Flooding: The lowest floor elevation must be at least one foot above the flood depth.
- Zone AO Alluvial Fan: The lowest floor elevation must be at least one foot above the flood depth.
- Zone A Alluvial Fan High Hazard Area Administrative Floodway: Only major engineering measures per the Piedmont Manual (Hjalmarson, 1997) may be used to mitigate the flood hazard.
- Zone A Alluvial Fan Uncertain Flow Distribution Area Administrative Floodway: Only major engineering measures per the Piedmont Manual may be used to mitigate the flood hazard.
- Zone A Approximate Alluvial Fan Administrative Floodway: Only major engineering measures per the Piedmont Manual may be used to mitigate the flood hazard.
- Zone A Alluvial Fan: Only major engineering measures per the Piedmont Manual may be used to mitigate the flood hazard.

1.11.1.5 Drainage Regulations

The *Drainage Regulations for Maricopa County* are listed in Section 1205 of the Maricopa County Zoning Ordinance was most recently updated in May 2017. It is noted that Section 1205.7.6, Design Parameters, requires that all development retain the 100-year, 2-hour storm volume onsite. This requirement results in a significant net decrease in discharge from development. The regulations further require that the retention volume be drained within 36 hours in order to prevent nuisance standing water and vector growth.

1.11.1.6 Subdivision Regulations

The *Maricopa County Subdivision Regulations* were adopted in November 1965 and were most recently updated in June 2016. The regulations apply to subdivisions in the unincorporated areas of the county. The regulations require that all development be in accordance with Maricopa County's floodplain and drainage regulations. As with the zoning ordinance and floodplain regulations, the subdivision regulations require compliance with the Maricopa County Drainage Design Manual, including volumes for hydrology, hydraulics, and erosion control.

1.11.1.7 Stormwater Management Regulations

The *Maricopa County Stormwater Quality Management and Discharge Control Regulation* was adopted in May 2009 and meets the requirements of the Clean Water Act as a Small Municipal Separate Storm Sewer System operator (MS4). The regulation serves to reduce the discharge of pollutants into the wash and river drainage systems in unincorporated Maricopa County. It requires that the first half-inch of rainfall be prevented from entering the drainage system in order to avoid contamination by substances such as oil, antifreeze, pool chemicals, and many other pollutants. Stormwater pollution prevention is to be

addressed through the use of Best Management Practices (BMPs) to the greatest extent practicable.

1.11.1.8 Impacts of Regulations

The current floodplain regulations for existing development are considered to have a positive impact on people, property, and natural floodplain functions. As a whole, the regulations diminish flood hazard risks through uniform practices that allow the wash and river systems to move flood waters through and away from the county and to support wildlife habits and other beneficial functions such as open space and recreation. Future conditions are expected to improve because of the requirement to retain the 100-year, 2-hour storm volume onsite. Hydrology studies consistently report a significant reduction in peak flow rates and runoff volumes of future conditions (full build-out) compared to existing conditions. Additionally, zoning restrictions and open-space requirements help mitigate the effects of development on the natural floodplain functions.

As noted previously, Maricopa County's floodplain regulations for lowest floor elevations require a minimum one additional foot above that required by the NFIP. The more stringent requirement further reduces the flood risk and also result in lower flood insurance premiums.

The current regulations also address other flood-related special hazards such as alluvial fans, lateral (side-to-side) movement of stream beds, and land subsidence/earth fissures as follows:

- The floodplain regulations allow the District to identify and provide requirements for erosion control, moveable bed watercourses, and alluvial fan zones.
- The Watercourse Master Plan requirement to consider ground water recharge techniques is an important component of ensuring a long-term water supply that will also help to mitigate land subsidence. Land subsidence in this region is caused by significant withdrawal of ground water which, in turn, can cause earth fissures to develop. Ground water recharge lessens our dependence on ground water and helps build a sustainable community.

The current regulations meet or exceed the requirements of the NFIP and the Clean Water Act and encourage the realization of full beneficial use of the floodplains in Maricopa County. Ideally, regulations carefully weigh the rights of property owners, public safety, economic interests, recreation, and environmental stewardship to achieve a balanced, resilient community.

No gaps or issues were identified in the review of the regulations and Maricopa County will continue to have regulatory standards that exceed the NFIP's minimum criteria.

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2. Assessment of Flood Hazards

The FMP Committee performed a two-step process in assessing flood hazards in unincorporated Maricopa County. The first step was to ascertain the types of flood hazards present throughout Maricopa County, and the second step identified the approximate locations of those hazards.

2.1 Description of Known Flood Hazards

The following hazards are present in unincorporated Maricopa County:

Step 1
Initial Assessment of Flood Hazards

Special Flood Hazard Areas (SFHA): FEMA defines an SFHA as the area where the NFIP's floodplain management regulations must be enforced and the area where the mandatory purchase of flood insurance applies to structures backed by federally-insured mortgages. Existing delineated floodplains in the county are shown on **Map 2a**. The figure also includes pending floodplains, which have been accepted by FEMA but are not yet shown on flood insurance rate maps (FIRMs). Floodplain regulations apply to pending floodplains in the same way as existing floodplains shown on the FIRMs.

Un-Delineated Floodplains: Flood hazards are still present even in areas not identified on a FEMA FIRM. These areas are most frequent in the rural portions of Maricopa County and pose unknown risks to developing areas in rural unincorporated Maricopa County.

Dams: Dams and flood retarding structures (FRS) provide valuable flood control benefits for residential and commercial property, transportation infrastructure, critical facilities, and farming operations. The structures typically provide additional incidental protection that is significantly greater than for the 100-year flood. Dams require a rigorous program of inspection and maintenance to ensure that they will continue to provide the intended flood protection.

Embankment overtopping: Major surface water transport systems such as the CAP Canal and local irrigation district canals typically are protected by earthen berms along the upstream side. These berms collect upstream runoff and create local ponding. Additionally, downstream hazards exist if ponded stormwater breaches the berms.

Levees: The District operates 24 levees on 9 watercourses. The levees provide 100-year protection and were designed to be at least three feet higher than the expected water surface elevation (freeboard). Similar to dams, levees require regular inspection and maintenance to ensure that they will continue to provide the intended flood protection.

Single-lot development with no coordinated drainage system: Lots that are owned by individual landowners are often improved at different times and result in a patchwork drainage system. Frequently, the drainage is interrupted, and the flow path is shifted from pre-development conditions.

Recreation hazards along floodplains: Much of the county's extensive trails system is within or adjacent to floodplains. Human presence during periods of runoff poses a threat to personal safety. All-terrain vehicle (ATV) activity is prevalent in river corridors and can exacerbate erosion and lateral migration. ATV use has also been noted on the sides of earthen dams; such activity exacerbates erosion and can compromise the integrity of the structures.

Repetitive losses: The location of farmlands in floodplains, lack of drainage infrastructure, and irrigation berms' susceptibility to failure results in repetitive flooding and associated damage to crops and structures. Seven repetitive loss areas have been identified in the unincorporated county (**Map 2a)**.

Flash flooding: Maricopa County is subject to quick-forming thunderstorms and intense rainfall. The regional climate, steep terrain, and sparse vegetation make the county susceptible to flash flooding with short reaction times.

High runoff potential of soils: The runoff potential of a watershed is partly determined by the types of soil present. Rocky outcrops have a very low capacity to absorb rainfall, while sandy soil has a very high capacity.

Flooding of transportation corridors: Much of the freeway infrastructure in the urban areas is depressed, i.e., below the elevation of adjacent land. During heavy rains, the freeway drainage system can be overwhelmed, and roadway flooding ensues.

At-grade road crossings: Normally-dry washes commonly cross over roadway surfaces (dip crossings). During flash flooding, the washes fill quickly and flood the road crossing; this condition is an ongoing serious threat to public safety.

Sheet flow channelized by development: Sheet flow is broad, shallow runoff with little or no defined flood path. Any disruption to the natural flow tends to concentrate the runoff and create channels where none had previously existed.

Split flows: Braided washes convey floodwaters in two or more directions around in-channel islands. The flow distribution among the different paths can vary from storm to storm and make it difficult to determine the true flood risk to adjacent property.

Alluvial fans: Alluvial fans are cone-shaped deposits that form when runoff exits mountainous terrain and is slowed by milder slopes of the valley plains. Runoff continues downward, but the depth of water, location, and drainage path on an alluvial fan are uncertain (**Map 2a**).

Lateral migration and erosion: Lateral migration is the side-to-side movement of the main channel within a watercourse over time. Lateral erosion is the widening of a wash from floodwaters that eat away at the channel sides. Lateral migration and erosion of washes can endanger adjacent structures, roads, or other infrastructure.

Sediment-laden floodwaters: Fast-moving floodwaters over sparsely-vegetated land have a high capacity for carrying loose soil and rocks. The material can cause clogs in storm drainage systems and result in high clean-up costs.

Loss of habitat: As the urban areas expand, valuable flora and fauna habitats shrink. Consequently, the full benefits of natural floodplains are reduced.

Flooding exacerbated by agricultural interruptions to natural drainage patterns: Farming has historically occurred along the floodplains of the Gila, Salt, and Verde Rivers and on similar terrain such as along the Queen Creek floodplain (**Map 2b**).

Subsidence and earth fissures: Land subsidence is the lowering of the ground surface caused by pumping groundwater extensively from the underlying aquifer. Land subsidence can cause long, narrow cracks in the ground called earth fissures. Often, the location of fissures is at the edges of mountainous areas where the land subsidence is not as severe as the adjacent alluvial valley plain. During floods, fissures can open up and create new paths for floodwaters. Subsidence can reduce the capacity of channels by reducing their downward slope. Also, increased fissure activity caused by subsidence may damage drainage structures and other infrastructure.

Wildfires: Wildfires can cause dramatic increases in runoff from a watershed as a result of removal of vegetation, increased erosion potential, and reduced infiltration of the charred ground. In addition, storm runoff from a burn area brings with it considerable vegetation, soil, and other debris. With the increase in runoff and debris flow, the impact of flooding to areas downstream of a burn area can be severe for several years.

Drought: Extended periods of drought can increase the risk of wildfire and compromise the health and habitats of wildlife. Drought conditions may also cause an increase on ground water pumping, which aggravates subsidence conditions. In turn, increased subsidence can reduce the capacity of channels by reducing slope. Additionally, increased fissure activity caused by subsidence may damage drainage structures and other infrastructure.

Localized flooding: Localized flooding is a concern due to inadequate drainage infrastructure within developed portions of unincorporated Maricopa County. Inadequate drainage infrastructure could be lack of storm drain network, undersized storm drain network, lack of curb and gutter, or lack of retention facilities within the area.

Invasive Vegetation Species: As invasive species spread throughout waterways, washes, and rivers throughout Maricopa County, they become a hindrance to conveyance. The reduction of conveyance capacity could have adverse impacts to the adjacent and upstream areas. Invasive species can take over native plant species causing destructions of ecosystems.

Managing Proposed Development: As development goes into areas that were not previously developed, developers do not typically work together to make sure the drainage corridors and infrastructure is fluid from development to development. Frequently, the drainage is interrupted, and the flow path is shifted from pre-development conditions.

Urban-Suburban Interface: As dense urban development continues to sprawl from incorporated areas of Maricopa County, the interface between low- to moderately developed suburban areas tend to no work cohesively with higher density urban developments. Increase impervious areas in the urban areas create an increased potential for flooding.

Block Walls/Property Fences: Obstructions to the historic flow of waters within floodplains are a cause of concern. The diverted water could concentrate and cause significant flooding to property owners further downstream.

Lack of Storm Drainage Infrastructure: As areas develop and re-develop, constructing storm drainage infrastructure should be implemented. Storm drainage infrastructure could reduce flooding in areas that have historically been a concern or reduce the risk of flooding of roadways.

Step 2:

Identify Locations of Flood Hazards

The hazards described above were evaluated for all land in the unincorporated county. Maricopa County covers 9,226 square miles and is drained by the Gila River and five principal tributaries. Eight watersheds contribute to these major river systems:

- Agua Fria River
- Cave Creek south of the Arizona Canal and Salt River
- Centennial Wash
- Gila River and Queen Creek system
- Hassayampa River
- Lower Gila River
- Verde River
- Waterman Wash

Each watershed has unique characteristics that determine the flooding risk and influence activities that the District can employ to mitigate risk. The information in the following subsections includes physical descriptions and features for each watershed that were

documented in the 2015 FMP (FCDMC, 2015). Summary tables are provided of hazards that were identified by the FMP Committee and by supplemental research.

2.2 Agua Fria River Watershed Hazards

The Agua Fria River watershed is located in and beyond north-central Maricopa County and covers 2,329 square miles (**Map 3**). About half of the watershed is unincorporated. The Arizona Canal Diversion Channel (ACDC), completed in 1993, marks the southern boundary of the watershed. Several dams and FRSs provide protection in the Agua Fria River watershed: White Tanks FRS No. 3 and Adobe, Cave Buttes, Cave Creek, Dreamy Draw, McMicken, New River, and New Waddell dams. White Tanks FRS No. 3 was rehabilitated in 2011 and White Tanks FRS No. 4 was rehabilitated in 2017 to address safety deficiencies. All or portions of Avondale, Carefree, Cave Creek, El Mirage, Glendale, Goodyear, Litchfield Park, New River, Peoria, Phoenix, and Youngtown are within the watershed. Major transportation features include I-17, US 60 (Grand Avenue), SR 101, SR 303, and SR 74.

Major rivers and washes include reaches of Cave Creek, Skunk Creek, the New River, and the Agua Fria River. The Agua Fria River is ephemeral downstream of Lake Pleasant and New Waddell Dam. It is the main watercourse for conveying flows during flood events from the New River down to the Gila River. Cave Creek and Skunk Creek are highly prone to flash flooding. The 100-year flow depths of Cave Creek at wash crossings of major roads in the town of Cave Creek range from 2.5 to 8.5 feet and velocities from 4.5 to 10.5 feet per second (fps). Corresponding lead time is estimated to be 30 minutes based on rain and stream gage thresholds, but earlier notifications are made based on NWS storm watches and warnings (LTM, 2007). The 100-year flow depths on Skunk Creek are estimated to be above five feet with corresponding velocities of 4.5-5 fps (JEF, 2009). The areas draining to the Agua Fria and New Rivers are larger and lead time is longer. As expected, flow depths are greater than that for the smaller watercourses.

Gila River near the Agua Fria River

Valuable wildlife habitat exists in the watershed, particularly along the Agua Fria River just below Lake Pleasant and at its confluence with the Gila River.

The Phoenix Sonoran Preserve in north Phoenix encompasses more than 5,000 acres of pristine desert land. The land in the preserve is unique, characterized by lush and diverse plant and animal life.

The central and southern portions of the Agua Fria River watershed are comparatively flat. The northern part and southwest corner contain several mountain ranges with slopes greater

than 10%. The watershed has significant natural vegetation in the north and western areas. The river channel is carved into hard rock north of the CAP Canal to Lake Pleasant. However, during flood events, the river channel south of the crossing of the CAP Canal siphon tends to shift from side to side (lateral migration) and erode its banks. Hazards identified in the watershed are presented in **Table 4**.

Table 4: Hazards Affecting the Agua Fria River Watershed in Unincorporated Maricopa County

Hazard	Description
Dams	White Tanks FRS No. 3 and Adobe, Cave Buttes, Cave Creek, Dreamy Draw, McMicken, New River and New Waddell dams provide downstream flood protection for large metropolitan areas and farmlands, Luke AFB, and major transportation corridors (I-17, US 60, SR 101, SR L303). White Tanks FRS No. 3 was rehabilitated in 2011 to address safety deficiencies.
Embankment overtopping	The CAP Canal traverses the watershed; the Beardsley Canal is located in the southwest portion.
Levee	None in unincorporated county. In the urban areas, levees exist on Scatter Wash and Skunk Creek and the New, Agua Fria River, and Salt Rivers.
Single-lot development	Single-lot development is predominant in unincorporated areas, especially Wittmann, New River, and Desert Hills.
SFHA – watercourses/ponding	Delineated floodplains throughout the Maricopa County pose a risk to properties within and outside the SFHA and to transportation corridors.
Un-delineated floodplains	Large areas of undeveloped land in the northern portion lack delineated floodplains.
Recreation hazards along floodplains	Hiking/biking trails, camping, ATV use, low water crossings, bridges, aggregate mining.
Repetitive losses	Three unincorporated locations: 1) 40th Street and Dynamite Boulevard, Cave Creek; 2) 36th Avenue and Old Stage Road, New River; and 3) Sarival Road and Glendale Avenue, Litchfield Park
Flash flooding	Entire watershed is susceptible.
High runoff potential of soils	About 32% of the watershed has high runoff potential.
Split flows	Significant sheet flow conditions and braided washes.
Sheet flow channelized by development	Newly developing areas concentrating sheet flow and discharging at single discharge location where historically the flow through the area was more evenly distributed.
Alluvial fans	Alluvial fans present in the Hieroglyphic Mountains.
Lateral migration and erosion of natural streams	Significant lateral migration and erosion in the rivers and washes.

Hazard	Description
Sediment-laden floodwaters	Floodwaters off the mountainous ranges in the northern and western portions of the watershed are subject to high sediment loading within floodwaters.
Loss of habitat	Development in the northern half of the watershed is removing vegetated areas and placing homes within the areas. Some areas are master planned communities and others are single-lot developments. All new developments are changing the land use within the watershed.
At-grade crossings	At-grade crossings within the low density developed areas of unincorporated Maricopa County can cause delays to emergency services or keep residents from leaving or coming home.
Flooding of transportation corridors	Problematic in the northern portions of the watershed in rural, unincorporated Maricopa County. Lack of storm drain infrastructure and changes to development in the area can lead to flooding of transportation corridors cause delays and inconveniences.
Agricultural interruptions to natural drainage patterns	Existing agricultural operations in the southwest portion of the watershed.
Localized flooding	Lack of adequate storm drain infrastructure in developed portions of unincorporated Maricopa County.
Managing proposed developments	Master planned communities are being developed in previously undeveloped areas.
Urban-Suburban interface	Locations where development goes from low- to moderate density to highly dense. Changes in land use and development principles cause issues.
Block wall / Property fences	Obstructions and diversions to flow through areas that historically had drainage sheet flow through prior to walls/fences.
Lack of storm water drainage infrastructure	Lack of storm drains, culverts, and other drainage infrastructure lead to roadways flooding and other localized flooding concerns.
Invasive vegetation species	Waterways, such as the Agua Fria River, New River and Skunk Creek, are subject to invasive vegetation species growing rapidly and causing a disruption to the normal conveyance of flow in the waterway. Tamarisk is one of the most frequently found invasive vegetation species in the area.
Fissures	Confirmed and unconfirmed fissures have been identified by the Arizona Geological Survey (AZGS) near SR 303 between Indian School Road and Peoria Avenue and in the vicinity of Luke Air Force Base. Note that a fissure was detected at the south end of McMicken Dam and was remediated in 2005.

Hazard	Description
Wildfires	The draft 2015 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan shows a medium to high hazard rating in the northern portion of the watershed.
Drought	Unincorporated Maricopa County is at risk of flooding due to drought because of the issues that come with it. Increased vulnerability to wildfires, subsidence and fissures are a few of the consequences that can happen from drought.

2.3 Cave Creek/Salt River Watershed Hazards

The Cave Creek/Salt River watershed covers 506 square miles and drains to the Salt River between the Verde and Agua Fria Rivers. It includes Indian Bend Wash and a portion of the Cave Creek watershed south of the ACDC (**Map 4**). It is traversed by the CAP, Arizona, and Crosscut canals. All or portions of Avondale, Glendale, Paradise Valley, Phoenix, and Scottsdale are located within the watershed. Major transportation facilities include Sky Harbor International Airport and portions of I-17, I-10, SR 51, SR 101, and Grand Avenue.

Much of the watershed has been developed or is part of lands governed by the Salt River Pima-Maricopa Indian Community. Mountain preserves in the McDowell, Phoenix, and Papago mountains restrict new development; large tracts of developable areas are primarily located north of the CAP Canal. Alluvial fans in the northern portion of the watershed are associated with large regulatory floodplains.

Hazards identified in the watershed are presented in **Table 5**.

Table 5: Hazards Affecting the Cave Creek/Salt River Watershed in Unincorporated Maricopa County

Hazard	Description
Dams	None in unincorporated county.
Embankment overtopping	The CAP and Grand canals traverse the watershed.
Levee	None in unincorporated county; levees along the Salt River and along Indian Bend Wash.
Single-lot development	Some pockets exist in unincorporated county, but much of the watershed is incorporated and development has been reviewed and approved through the regulatory process for subdivisions.
SFHA – watercourse/ponding	Delineated floodplains throughout the Maricopa County pose a risk to properties within and outside the SFHA and to transportation corridors.
Un-delineated floodplains	Large areas of undeveloped land in the northern portion lack delineated floodplains.

Hazard	Description
Recreation hazards along floodplains	Hiking/biking trails, camping, ATV use, low water crossings, and bridges. Active aggregate mining along the Salt River. Tempe Town Lake within the Salt River has high recreational activity.
Flash flooding	Entire watershed is susceptible.
High runoff potential of soils	About 75% of the watershed has moderately low runoff potential.
Split flows	Significant sheet flow conditions and braided washes in the northern portions, particularly in the alluvial fan areas.
Sheet flow channelized by development	Newly developing areas concentrating sheet flow and discharging at single discharge location where historically the flow through the area was more evenly distributed.
Alluvial fans	North of the CAP Canal in Phoenix, Scottsdale, and unincorporated county.
Lateral migration and erosion of natural streams	Significant lateral migration and erosion in the rivers and washes.
Sediment-laden floodwaters	An issue for mainly the northern and eastern portions of the watershed where undeveloped and developed land border each other along the foothills of mountains and hills.
At-grade crossings	At-grade crossings within the low density developed areas of unincorporated Maricopa County can cause delays to emergency services or keep residents from leaving or coming home.
Flooding of transportation corridors	Problematic in the northern portions of the watershed in rural, unincorporated Maricopa County. Lack of storm drain infrastructure and changes to development in the area can lead to flooding of transportation corridors cause delays and inconveniences.
Agricultural interruptions to natural drainage patterns	Existing agricultural operations in the southwest portion of the watershed.
Urban-Suburban interface	Locations where development goes from low- to moderate density to highly dense. Changes in land use and development principles cause issues.
Block wall / Property fences	Obstructions and diversions to flow through areas that historically had drainage sheet flow through prior to walls/fences.
Lack of storm water drainage infrastructure	Lack of storm drains, culverts, and other drainage infrastructure lead to roadways flooding and other localized flooding concerns.
Fissures	None in unincorporated county. A fissure was confirmed by the AZGS in Scottsdale near Frank Lloyd Wright Blvd/Cactus Rd, and an unconfirmed fissure was identified in Phoenix near 40th St./Cholla St.

Hazard	Description
Wildfires	The 2015 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan shows a low hazard rating for the I-10 corridor in south Phoenix and medium hazard for most of the remainder. Wash corridors and alluvial fan areas with dense vegetation are shown to have high hazard potential.
Drought	Unincorporated Maricopa County is at risk of flooding due to drought because of the issues that come with it. Increased vulnerability to wildfires, subsidence and fissures are a few of the consequences that can happen from drought.

2.4 Centennial Wash Watershed Hazards

The Centennial Wash watershed covers 1,924 square miles in northwest Maricopa County and parts of Yavapai and La Paz counties (**Map 5**) Major transportation features include I-10 and US 60. Grass Wash, which traverses the agricultural community of Aguila in the far northwest corner of the county, is a significant tributary to Centennial Wash. Velocities for the 100-year flood event in Grass Wash are estimated to be 2.5-3 fps with expected lead times ranging from less than 30 minutes to nearly 4 hours (FCDMC, 2015). Much of the watershed is in its natural state and includes the Harquahala Mountains and Signal Mountain wilderness areas. Development in the watershed is primarily agricultural and single-lot residential. Hazards identified in the watershed are presented in **Table 6**.

Table 6: Hazards Affecting the Centennial Wash Watershed in Unincorporated Maricopa County

Hazard	Description
Dams	Harquahala and Saddleback FRSs are located on the north and south sides of I-10, respectively, near the Salome Road crossing.
Embankment overtopping	The CAP Canal and I-10 traverse the watershed. Numerous irrigation berms are located in the agricultural areas.
Levee	Centennial Levee is south of I-10 near the Salome Road crossing.
Single-lot development	Existing development is predominantly single-lot and is located in and around farming operations.
Un-delineated floodplains	Some vacant lands with future development potential in the Aguila area lack delineated floodplains.
Recreation hazards along floodplains	Hiking/biking trails, camping, ATV use, and low water crossings.
Flash flooding	Entire watershed is susceptible.
High runoff potential of soils	46% of the watershed has moderately low runoff potential.
Split flows	Sheet flow conditions and braided washes in the alluvial fan areas and valley plains.

Hazard	Description
Alluvial fans	An area was identified on the west border of the county in the vicinity of Eagle Eye Road.
Lateral migration and erosion of natural streams	Significant lateral migration and erosion in the rivers and washes.
Sediment-laden floodwaters	Limited development within the watershed, limited vegetation, and the steep hill slopes provide a potential for high sediment transport during storm events throughout the watershed.
Loss of habitat	As a mostly undeveloped watershed, the area could provide development opportunities and would remove both vegetation and animal habitats.
At-grade crossings	At-grade crossings within the low density developed areas of unincorporated Maricopa County can cause delays to emergency services or keep residents from leaving or coming home.
Flooding of transportation corridors	Problematic throughout the watershed. Lack of storm drain infrastructure and changes to development in the area can lead to flooding of transportation corridors cause delays and inconveniences.
Agricultural interruptions to natural drainage patterns	Existing agricultural operations in the southern portion of the watershed.
Localized flooding	Lack of storm drain infrastructure in developed portions of the watershed, mainly the Tonopah area.
Managing proposed developments	Master planned communities are being developed in previously undeveloped areas.
Block wall / Property fences	Obstructions and diversions to flow through areas that historically had drainage sheet flow through prior to walls/fences.
Fissures	The AZGS mapped two active fissures south of I-10: one across Aguila Rd near the Maricopa/La Paz County border and another west of Harquahala Valley Rd. Two fissures were also documented in the Wintersburg area.
Wildfires	For the mapped (urban) portion of the watershed, the 2015 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan shows a medium hazard rating for portions of the Harquahala Valley and the Harquahala Mountains Wilderness intermixed with isolated high-hazard areas. Wash corridors with dense vegetation north and south of I-10 in the southwest and south-central portions are shown as medium hazard potential.
Drought	Unincorporated Maricopa County is at risk of flooding due to drought because of the issues that come with it. Increased vulnerability to wildfires, subsidence and fissures are a few of the consequences that can happen from drought.

2.5 Gila River/Queen Creek Watershed Hazards

The Gila River/Queen Creek watershed covers 1,307 square miles in southeast Maricopa County and part of Pinal County (**Map 6**). The Gila River Indian Reservation covers the southwest portion of the watershed. Most of the remaining land includes heavily-developed portions of Chandler, Gilbert, Mesa, Phoenix, and Tempe, as well as a mix of urban/rural/agricultural development in Queen Creek. The unincorporated area of the county consists mostly of small county islands. South Mountain Park, Phoenix-Mesa Gateway Airport, and portions of I-10, US 60, SR 101, and SR 202 are within the watershed.

Queen Creek, Sonoqui Wash, and the East Maricopa Floodway (EMF) are significant watercourses that drain to the Salt River, which is the north boundary of the watershed. Hazards identified in the watershed are presented in **Table 7**.

Table 7: Hazards Affecting the Gila River/Queen Creek Watershed in Unincorporated Maricopa County

Hazard	Description
Dams	Buckhorn-Mesa Structures & floodways: Spook Hill FRS and Floodway are in Mesa and protect several unincorporated county islands as well as portions of Mesa. Signal Butte FRS is in unincorporated county; Apache Junction FRS is in Pinal County and protects several unincorporated islands in Maricopa County. Powerline-Vineyard-Rittenhouse (PVR) FRSs: PVR FRSs are in Pinal County and protect several unincorporated county islands and portions of Mesa, Queen Creek, and Gilbert. Guadalupe FRS is located in Tempe and protects a small county island and portions of Phoenix, Tempe, and Guadalupe.
Embankment overtopping	The CAP, Western, Highline, Consolidated, Eastern, Tempe, and South canals traverse the watershed. Smaller irrigation canals are present in the agricultural areas of Queen Creek.
Levee	The Pass Mountain Diversion Channel Levee is located in unincorporated county as part of the Signal Butte FRS. Levees are also present on the east and west banks of the East Maricopa Floodway in Mesa.
Single-lot development	The Mountain/Erie county island on the east county border is single-lot. Single-lot development is present throughout the developable areas of the watershed.
Un-delineated floodplains	Most of the watershed is developed and there is little opportunity to delineate new floodplains.
Recreation hazards along floodplains	Hiking/biking trails, camping, ATV use, low water crossings, and bridges. Aggregate mining along the Salt River.

Hazard	Description
Repetitive losses	Three unincorporated locations: 1) 43rd Avenue and Carver Road and 51st Avenue and Olney, Laveen; 2) 27th Avenue and Dobbins Road, Phoenix; and 3) 194th Street and San Tan Boulevard, Queen Creek
Flash flooding	Entire watershed is susceptible.
High runoff potential of soils	78% of the watershed has moderately low runoff potential.
Split flows	Sheet flow conditions and braided channels are limited to undeveloped land and low-density development. Queen Creek and Sonoqui Wash are braided in the unimproved reaches.
Sheet flow channelized by development	Existing development and developing areas have altered the historical flow paths to concentrate discharges to a single point through their developments.
Alluvial fans	None have been identified.
Lateral migration and erosion of natural streams	Significant lateral migration and erosion in the unimproved reaches of watercourses.
Sediment-laden floodwaters	South Mountain and San Tan Regional Park are the main contributors to sediment transport within the watershed.
Loss of habitat	As developed areas expand, natural areas along the Salt and Gila Rivers are being lost.
At-grade crossings	Low-density development in the southeastern portion of the watershed with unimproved transportation crossings.
Flooding of transportation corridors	Lack of storm drain infrastructure and changes to development in the area can lead to flooding of transportation corridors cause delays and inconveniences.
Agricultural interruptions to natural drainage patterns	Existing agricultural operations in the eastern portion of the watershed.
Localized flooding	Lack of adequate storm drain infrastructure in developed portions of the watershed.
Managing proposed developments	Master planned communities are being developed in previously undeveloped areas.
Urban-Suburban interface	Locations where development goes from low- to moderate density to highly dense. Changes in land use and development principles cause issues.
Block wall / Property fences	Obstructions and diversions to flow through areas that historically had drainage sheet flow through prior to walls/fences.
Lack of storm water drainage infrastructure	Lack of storm drains, culverts, and other drainage infrastructure lead to roadways flooding and other localized flooding concerns.

Hazard	Description
Fissures	Significant fissure activity was confirmed by the AZGS in the Empire Blvd (Hunt Hwy) corridor. Numerous confirmed and unconfirmed fissures reported by AZGS near US 60/Meridian Rd and in Pinal County between US 60 and Guadalupe Rd. A fissure was detected at the downstream toe of Powerline FRS in Pinal Co. and remediated in 2014.
Wildfires	The 2015 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan shows a medium hazard rating in portions of the watershed and high in the Gila River corridor. The remainder of the watershed has no hazard rating.
Drought	Unincorporated Maricopa County is at risk of flooding due to drought because of the issues that come with it. Increased vulnerability to wildfires, subsidence and fissures are a few of the consequences that can happen from drought.

2.6 Hassayampa River Watershed Hazards

The Hassayampa River watershed covers 1,063 square miles in northwest Maricopa and part of Yavapai counties (**Map 7**). I-10, US 60, and Sun Valley Parkway are the major transportation routes. The watershed includes Buckeye and Wickenburg, and most development is concentrated in these locations. However, more than half of the county land in the watershed is either privately owned or is State Trust Land. Smaller tributaries are very prone to flash flooding. In the town of Wickenburg, typical flood depths range from 2.5 to 8.5 feet and velocities from 4.5 to 10.5 feet per second (fps). Typical corresponding lead time is estimated to be 0-30 minutes based on rain and stream gage thresholds, but earlier notifications are made based on NWS storm watches and warnings. In this area, lead times for flooding on the Hassayampa River are somewhat longer at 75-90 minutes (LTM, 2009).

Jackrabbit Wash drains to the Hassayampa River north of I-10 and is a significant tributary to the river system. Hazards identified in the watershed are presented in **Table 8**.

Table 8: Hazards Affecting the Hassayampa River Watershed in Unincorporated Maricopa County

Hazard	Description
Dams	The Buckeye Structures (Buckeye FRS Nos. 1, 2, and 3 and floodways) are located at the south end of the watershed north of I-10. The Wickenburg Structures (Sunset and Sunnycove FRSs and Casandro Wash Dam) provide protection for the town and surrounding areas.
Embankment overtopping	The CAP Canal traverses the midsection and the Roosevelt Irrigation and Buckeye canals cross the southern tip of the watershed.
Single-lot development	Predominant residential type in unincorporated areas.

Hazard	Description
Un-delineated floodplains	Large areas of undeveloped land in the northern portion lack delineated floodplains.
Recreation hazards along floodplains	Hiking/biking trails, camping, ATV use, low water crossings, and bridges.
Flash flooding	Entire watershed is susceptible.
High runoff potential of soils	About 32% of the watershed has high runoff potential.
Split flows	Significant sheet flow conditions and braided washes.
Sheet flow channelized by development	A rapidly developing area of Maricopa County where master planned communities are being developed within the City of Buckeye concentrating flow through the developments.
Alluvial fans	On the west side of the White Tank Mountains.
Lateral migration and erosion of natural streams	Significant lateral migration and erosion in the river and tributary washes.
Sediment-laden floodwaters	Mountainous areas to the north and the White Tanks to the east provide steep slopes to aid in the transport of sediment down through the watershed.
Loss of habitat	As developed areas expand, natural areas throughout the watershed are being lost.
At-grade crossings	Low-density development throughout the watershed with unimproved transportation crossings. Wickenburg also has quite a few at-grade crossings that pose a risk to residents in the area.
Flooding of transportation corridors	Lack of storm drain infrastructure and changes to development in the area can lead to flooding of transportation corridors cause delays and inconveniences.
Localized flooding	Lack of adequate storm drain infrastructure in developed portions of the watershed, mostly a problem in the low-density developed areas.
Managing proposed developments	Master planned communities are being developed in previously undeveloped areas.
Block wall / Property fences	Obstructions and diversions to flow through areas that historically had drainage sheet flow through prior to walls/fences.
Lack of storm water drainage infrastructure	Lack of storm drains, culverts, and other drainage infrastructure lead to roadways flooding and other localized flooding concerns.
Invasive vegetation species	Waterways, such as the Hassayampa River, Box Wash, and Jackrabbit Wash, are subject to invasive vegetation species growing rapidly and causing a disruption to the normal conveyance of flow in the waterway. Tamarisk is one of the most frequently found invasive vegetation species in the area.
Wildfires	The 2015 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan shows a medium to high hazard rating in the mapped (urban) portion of the watershed.

Hazard	Description
Drought	Unincorporated Maricopa County is at risk of flooding due to drought because of the issues that come with it. Increased vulnerability to wildfires, subsidence and fissures are a few of the consequences that can happen from drought.

2.7 Lower Gila River Watershed Hazards

The Lower Gila River watershed covers 1,522 square miles in southwest Maricopa County (**Map 8**). Major features include the Gila River, Painted Rock Dam, I-8, and MC 85. Very little development has occurred south of I-8, and most of the land is occupied by the Barry M. Goldwater Air Force Range. North of I-8, development is limited to agriculture. Velocity of flow in the portion of the Gila River within the watershed is typically low as a result of relatively flat bed slopes and an abundance of vegetation such as tamarisk trees and reeds. Hazards identified in the watershed are presented in **Table 9**.

Table 9: Hazards Affecting the Lower Gila River Watershed in Unincorporated Maricopa County

Hazard	Description
Dams	The U.S. Army Corps of Engineers' Painted Rock Dam is in the northeast portion of the watershed.
Embankment overtopping	Irrigation canals support farming operations in the watershed.
Single-lot development	Very few, isolated structures that support farming operations.
Un-delineated floodplains	A number of washes are delineated as Zone A (approximate). Natural washes on much of the remaining developed/developable land have been eliminated by farm fields.
Flash flooding	Entire watershed is susceptible.
High runoff potential of soils	About half of the watershed has high runoff potential.
Split flows	Significant sheet flow conditions and braided washes.
Alluvial fans	None have been identified.
Lateral migration and erosion of natural streams	Significant lateral migration and erosion in the river and tributary washes.
Sediment-laden floodwaters	Lack of vegetation poses the risk of high sediment transport throughout the watershed.
Loss of habitat	As a majority of the watershed is undeveloped, any development in the area would remove natural habitats.
At-grade crossings	Low-density development throughout the watershed with unimproved transportation crossings.
Flooding of transportation corridors	Lack of storm drain infrastructure and changes to development in the area can lead to flooding of transportation corridors cause delays and inconveniences.

Hazard	Description
Agricultural interruptions to natural drainage patterns	Existing agricultural operations along the Gila River.
Block wall / Property fences	Obstructions and diversions to flow through areas that historically had drainage sheet flow through prior to walls/fences.
Invasive vegetation species	Waterways, such as the Gila River, Fourth of July Wash, and Copper Wash, are subject to invasive vegetation species growing rapidly and causing a disruption to the normal conveyance of flow in the waterway. Tamarisk is one of the most frequently found invasive vegetation species in the area.
Wildfires	The 2015 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan shows a high hazard rating in the Gila River corridor.
Drought	Unincorporated Maricopa County is at risk of flooding due to drought because of the issues that come with it. Increased vulnerability to wildfires, subsidence and fissures are a few of the consequences that can happen from drought.

2.8 Verde River Watershed Hazards

The Verde River watershed covers 3,216 square miles in northeast Maricopa County, although much of the area lies within Gila County (**Map 9**). Fountain Hills, Rio Verde, and portions of Mesa are within the watershed. Major features include the Salt and Verde Rivers, Sycamore Creek, SR 87, SR 88, and a small segment of SR 202. Much of the watershed is within the Tonto National Forest; developable/developed areas are limited to the southwest portion. Hazards identified in the watershed are presented in **Table 10**.

Table 10: Hazards Affecting the Verde River Watershed in Unincorporated Maricopa County

Hazard	Description
Dams	Bartlett and Horseshoe dams are on the Verde River. Salt River dams include Roosevelt at the eastern tip of the county, Horse Mesa, Mormon Flat, and Stewart Mountain. The Buckhorn-Mesa Structures & floodways form the Verde River and Gila River/Queen Creek watershed boundary.
Single-lot development	The community of Rio Verde is a mix of subdivisions and single-lot development.
SFHA – watercourse/ponding	Delineated floodplains throughout the Maricopa County pose a risk to properties within and outside the SFHA and to transportation corridors.

Hazard	Description
Un-delineated floodplains	A number of floodplains are delineated in the Rio Verde Area. The natural flow exhibits shallow, distributary characteristics and floodplains are difficult to delineate.
Recreation hazards along floodplains	High recreation use in the lakes created by the dams on both rivers.
Flash flooding	Entire watershed is susceptible.
High runoff potential of soils	The watershed has a mix of moderately low, moderately high, and high runoff potential.
Split flows	Significant sheet flow conditions and braided washes.
Sheet flow channelized by development	Issues with sheet flow concentration is a hazard for the developing areas in the Rio Verde area.
Alluvial fans	On the east and north sides of the McDowell Mountains. Other mountainous areas to the north and eastern portions of the watershed have alluvial fan hazards as well.
Lateral migration and erosion of natural streams	Significant lateral migration and erosion in the rivers and tributary washes.
Sediment-laden floodwaters	Lack of vegetation poses the risk of high sediment transport throughout the watershed.
Loss of habitat	As a majority of the watershed is undeveloped, any development in the area would remove natural habitats.
At-grade crossings	Low-density development throughout the watershed with unimproved transportation crossings.
Flooding at transportation corridors	Lack of storm drain infrastructure and changes to development in the area can lead to flooding of transportation corridors cause delays and inconveniences.
Managing proposed developments	Master planned communities are being developed in previously undeveloped areas.
Urban-Suburban interface	Locations where development goes from low- to moderate density to highly dense. Changes in land use and development principles cause issues.
Block wall / Property fences	Obstructions and diversions to flow through areas that historically had drainage sheet flow through prior to walls/fences.
Lack of storm water drainage infrastructure	Lack of storm drains, culverts, and other drainage infrastructure lead to roadways flooding and other localized flooding concerns.
Wildfires	The 2015 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan shows a high hazard rating in the northern and eastern portions of the watershed and moderate for most of the remaining portion.
Drought	Unincorporated Maricopa County is at risk of flooding due to drought because of the issues that come with it. Increased vulnerability to wildfires, subsidence and fissures are a few of the consequences that can happen from drought.

2.9 Waterman Watershed Hazards

The Waterman watershed covers 2,472 square miles in southern Maricopa County and a portion of Pinal County (**Map 10**). The Gila River is the most prominent drainage feature; it flows west through Goodyear and Buckeye and adjacent to Gila Bend. Velocity of flow in the portion of the Gila River within the watershed is typically low as a result of relatively flat bed slopes and an abundance of vegetation such as tamarisk trees and reeds. Major transportation routes include I-8, I-10, and SR 85. Waterman Wash is a large tributary that flows northwest through Goodyear and joins the Gila River near Buckeye. The Sonoran Desert National Monument covers much of the watershed, and development in the remainder of unincorporated county is primarily agricultural with some single-lot residential. The Solana Generating Station, a large solar power facility, is located north of I-8 in the far west portion of the watershed. Hazards identified in the Waterman watershed are presented in **Table 11**.

Table 11: Hazards Affecting the Waterman Watershed in Unincorporated Maricopa County

Hazard	Description
Embankment overtopping	Numerous irrigation berms are located in the agricultural areas near Gila Bend.
Single-lot development	Single-lot development is predominant in Mobile and on the south side of the Gila River near Goodyear.
SFHA – watercourse/ponding	Delineated floodplains throughout the Maricopa County pose a risk to properties within and outside the SFHA and to transportation corridors.
Un-delineated floodplains	Some vacant lands with future development potential in the Waterman Wash corridor and south of Gila Bend lack delineated floodplains.
Repetitive losses	One unincorporated location: Watson Road and MC 85, Buckeye
Flash flooding	Entire watershed is susceptible.
High runoff potential of soils	65% of the watershed has moderately low runoff potential; 24% has high potential.
Split flows	Sheet flow conditions and braided washes in the alluvial fan areas and valley plains.
Alluvial fans	On the west and north sides of the Estrella Mountains. Other mountainous areas throughout the watershed have alluvial fan hazards as well.
Lateral migration and erosion of natural streams	Significant lateral migration and erosion in the river and washes. Waterman Wash and vicinity have highly-erosive soils.
Sediment-laden floodwaters	Lack of vegetation poses the risk of high sediment transport throughout the watershed.
Loss of habitat	As a majority of the watershed is undeveloped, any development in the area would remove natural habitats.

Hazard	Description
At-grade crossings	Low-density development throughout the watershed with unimproved transportation crossings.
Flooding of transportation corridors	Lack of storm drain infrastructure and changes to development in the area can lead to flooding of transportation corridors cause delays and inconveniences.
Agricultural interruptions to natural drainage patterns	Existing agricultural operations along the Gila River.
Managing proposed developments	Master planned communities are being developed in previously undeveloped areas.
Urban-Suburban interface	Locations where development goes from low- to moderate density to highly dense. Changes in land use and development principles cause issues.
Block wall / Property fences	Obstructions and diversions to flow through areas that historically had drainage sheet flow through prior to walls/fences.
Lack of storm water drainage infrastructure	Lack of storm drains, culverts, and other drainage infrastructure lead to roadways flooding and other localized flooding concerns.
Invasive vegetation species	Waterways, such as the Gila River, Waterman Wash, and Rainbow Wash, are subject to invasive vegetation species growing rapidly and causing a disruption to the normal conveyance of flow in the waterway. Tamarisk is one of the most frequently found invasive vegetation species in the area.
Fissures	The AZGS identified an unconfirmed fissure near 78th Ave. north of SR 238 near the community of Mobile.
Wildfires	For the mapped portion of the watershed, the 2015 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan shows a high hazard rating for several reaches of the Gila River and Estrella Mountains. The Luke Wash corridor and Gila River floodplain are shown as medium hazard potential.
Drought	Unincorporated Maricopa County is at risk of flooding due to drought because of the issues that come with it. Increased vulnerability to wildfires, subsidence and fissures are a few of the consequences that can happen from drought.

2.10 Other Hazards

Several other natural and man-made hazards were evaluated to ascertain the likelihood and severity of impacts throughout the entire county. The information was taken from the 2015 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan (JEF, 2015). According to the plan, hazards related to floodplain management and identified for mitigation strategies for unincorporated Maricopa County include:

- Urban Redevelopment and Densification
- Diversion of Local Stormwater
- Impacts to Existing Utilities
- Dam Discharge Inundation
- Fissures
- Flooding
- Levee failure
- Subsidence
- Wildfire
- Severe wind
- Drought
- Tornadoes and earthquakes

Most of these hazards were identified for each watershed in Sections 2.2 – 2.9. The remaining hazards affect the entire county similarly and are discussed below.

2.10.1 Urban Redevelopment and Densification

As Maricopa County continues to grow areas that were previously undeveloped are being developed and areas with older development are being re-developed into higher density developments. The increased impervious areas are cause for concern and are potential sources of increased flooding.

Maricopa County's retention requirements were developed to significantly offset the increase in flooding impacts that can occur with new development or redevelopment.

2.10.2 Diversion of Local Stormwater

Some property owners within Maricopa County have taken it upon themselves to protect their properties through the construction of walls and other features to divert stormwater away from their properties. The issue with this, is it will divert flow to where it was not designed or historically flowed and could cause increased flooding to property owners downstream.

2.10.3 Impacts to Existing Utilities

Stormwater adversely impacting utility services including, but not limited to: irrigation control boxes, telecommunications, electrical cabinets, air conditioning units, and internet services. Challenges with stormwater impacting utilities through exposing utilities during storm events or other damages causing disruptions to services. Improper site design or special provisions for on-site drainage can amplify the potential for impacts and, therefore, should be carefully considered for installation throughout the unincorporated Maricopa County.

2.10.4 Severe Wind

Severe wind often accompanies thunderstorm activity. It can exacerbate flooding conditions by increasing debris flow that blocks natural and constructed drainage systems. Also, the movement of man-made debris through the drainage system could introduce contaminates and degrade the integrity of wildlife habitat.

Severe wind also commonly causes low-visibility dust storms, which can create hazardous driving conditions and increases airborne particulate matter.

2.10.5 Drought

The U.S. Drought Monitor recently estimated Maricopa County to have no drought conditions as of data released February 11, 2020 (Tinker, 2020).

As previously noted, drought can increase the risk of wildfire and compromise the health and habitats of wildlife in the floodplains. Drought conditions cause a decrease in vegetation and may cause increases in ground water pumping, which aggravates subsidence conditions. In turn, increased subsidence can reduce the capacity of channels by reducing slope. Additionally, increased fissure activity caused by subsidence may damage drainage structures and other infrastructure.

2.10.6 Tornadoes and Earthquakes

Tornadoes and earthquakes were also evaluated; however, the occurrence of tornadoes has been historically rare and isolated. Infrequent, mild earthquakes have been recorded in other parts of Arizona, but none have occurred in Maricopa County and none have resulted in any structural damage. Therefore, they are not considered to be a significant threat to the community.

2.11 Less-Frequent Flood Hazards

Outlet gate and crest gages at Harquahala FRS in the Centennial Watershed

Maricopa County has enjoyed significant flood protection for many years from a number of dams and levees. These structures provide valuable flood protection to urban populations, farmlands, the transportation infrastructure, Luke Air Force Base, and many critical facilities. The District operates 22 dams and FRSs in and around Maricopa County (**Table 12**) and 24 levees on nine watercourses (**Table 13**). The

estimated downstream inundation areas of dams and FRSs are shown on **Map 11**, and inundation areas for levees are shown on **Map 12**.

Table 12: Inventory of Flood Control District Dams and FRSs

Structure		Date Constructed	O&M Responsibility	Federal Sponsor
1	Adobe Dam	1982	FCDMC	USACE
2	Apache Junction FRS & Floodway	1988	FCDMC	NRCS
3	Buckeye FRS No. 1 & Floodway	1974	FCDMC	NRCS
4	Buckeye FRS No. 2 & Floodway	1975	FCDMC	NRCS
5	Buckeye FRS No. 3 & Floodway	1975	FCDMC	NRCS
6	Casandro Wash Dam & Outlet	1996	FCDMC	N/A
7	Cave Buttes Dam & Dikes	1980	FCDMC	USACE
8	Dreamy Draw Dam	1974	FCDMC	USACE
9	Guadalupe FRS	1975	FCDMC	NRCS
10	Harquahala FRS & Floodway	1983	FCDMC	NRCS
11	McMicken Dam	1956	FCDMC	USACE
12	New River Dam	1985	FCDMC	USACE
13	Powerline FRS & Floodway	1967	FCDMC	NRCS
14	Rittenhouse FRS	1969	FCDMC	NRCS
15	Saddleback FRS & Diversion Channel	1982	FCDMC	NRCS
16	Signal Butte FRS & Floodway	1987	FCDMC	NRCS
17	Spook Hill FRS & Floodway	1979	FCDMC	NRCS
18	Sunnycove FRS	1976	FCDMC	NRCS
19	Sunset FRS	1976	FCDMC	NRCS
20	Vineyard Road FRS	1968	FCDMC	NRCS
21	White Tanks FRS No. 3	1954	FCDMC	NRCS
22	White Tanks FRS No. 4	1953	FCDMC	NRCS

Table 13: Inventory of Flood Control District Levees

Structure		Constructed by	Date Completed
1	Agua Fria River #3 CBRLN	FCDMC	1998
2	Agua Fria River #8	FCDMC	1988
3	Agua Fria River #11 CBRLS	FCDMC	1998
4	Agua Fria River #16	USACE	1989
5	Agua Fria River #18	FCDMC & USACE	1989
6	Centennial Wash Levee	NRCS	1985
7	East Maricopa Floodway	NRCS	1985

Structure		Constructed by	Date Completed
8	East Maricopa Floodway	NRCS	1987
9	Indian Bend Wash IBW1	USACE	1986
10	Indian Bend Wash IBW2	USACE	1979
11	Indian Bend Wash IBW3	USACE	1986
12	Indian Bend Wash IBW4	USACE	1979
13	Indian Bend Wash IBW5	USACE	1979
14	Indian Bend Wash IBW6	USACE	1979
15	New River #30 NR1	USACE	1989
16	New River #30 NR2	USACE	1989
17	Pass Mountain Diversion	NRCS	1984
18	Salt River #33 North Levee	ADOT	1989
19	Salt River #33 South Levee	ADOT	1989
20	Skunk Creek SK1	USACE	1983
21	Skunk Creek SK2	USACE	1983
22	Scatter Wash North Levee	ADOT	1991
23	Scatter Wash South Levee	ADOT	1991
24	Tres Rios North Levee	USACE	2012

These flood control structures are normally dry and operate only in severe flood events. The District runs a rigorous operations & maintenance program and has a robust real-time 24/7 monitoring system. The likelihood of failure is extremely low. However, if stormwater is released through an emergency spillway or a failure occurs at any of these structures, large areas would potentially be inundated.

New River Levee and multi-use trail

The District has developed emergency action plans for all 22 dams and FRSs to monitor the structures and identify notification and response procedures in the event of a discharge to downstream areas. Additionally, emergency action plans are in place for three of the levee systems and the District intends to develop plans for the remaining levees. Finally, the District has developed a Dam Safety Flood Response Manual that includes detailed procedures for monitoring conditions as they develop and taking measures to stop or minimize any damage that may be occurring to the structure (LTM, 2011).

2.12 Impacts of Potential Future-Condition Changes to Floodplains

The District recognizes that the community's floodplain health is a valuable asset that needs to be maintained into the future. The ability to manage the complex natural and man-made drainage systems is essential to providing sustainable flood control, wildlife habitat, and recreational enjoyment. Potential impacts of future conditions affecting floodplains are described below.

2.12.1 Changes in Demographics

Maricopa County's employment centers are concentrated in the metropolitan Phoenix area. Three employment centers are located in unincorporated Maricopa County: Palo Verde Nuclear Plant, Sun City area hospitals, and the Anthem area developments. As shown on **Maps 13a, 13b, and 13c**, the higher population densities are strongly correlated geographically with the employment centers (MAG, 2017).

Population projections show an increase in total estimated population from just under four and a half million in 2020 to more than six million in 2040. Density estimates for 2030 and 2040 are presented on **Maps 14a and 14b,** respectively (MAG, 2017). Overall, the projected population patterns are stable, with expansion of existing development outward from Phoenix. New growth areas are anticipated in the Waterman, Hassayampa, and Agua Fria watersheds.

A significant portion of projected growth areas has shallow, poorly-defined washes that are sensitive to changes in flow characteristics. Impacts to the floodplains in these areas are expected to be significant, so drainage plans for new development should be coordinated to the greatest extent possible.

2.12.2 Future Development in the Watershed

As development continues in the watersheds, drainage patterns tend to become more concentrated. Fortunately, current subdivision regulations include a requirement to retain runoff from the 100-year, 2-hour storm event. Additionally, any development is required to accommodate offsite runoff; the location, flow rate, and velocity of stormwater leaving a property must be preserved under pre-development conditions. Therefore, impacts of future development are expected to be largely mitigated.

2.13 Past Flood Events: 2015-2019

Several significant flood events have occurred since publication of the previous FMP:

July 18, 2015: Many severe rain events occurred on this day as a result of moisture from Hurricane Delores spinning off the coast of Baja. Notable for Maricopa County was a storm that materialized to the southeast of the Town of Wickenburg and moved slowly to the northwest over a period of two hours. Most rain gages in and around

Wickenburg received between 2 and 4 inches of rain in that two hours. The highest measured amount was 4.88 inches in 90 minutes. Many area stream gages recorded peaks-of-record; most have records back to 1996. The three District flood control dams in the area all experienced record impoundments of more than 75% of spillway capacity (FCDMC Comprehensive Report, 2020).

October 1 to 3, 2018: A surge of tropical moisture followed by the remnants of Hurricane Rosa led to widespread rainfall across south-central Arizona during a three-day period ending on October 3, 2018. Maricopa County rain gauges measured storms totals anywhere from 1 inch - 4.5 inches. Rain from this event ultimately led to areas of flash flooding in Gila Bend, the central Phoenix Valley, portions of Scottsdale, and Fountain Hills. Six monitored flood control dams experienced record impoundments (FCDMC Comprehensive Report, 2020).

September 23 to 27, 2019: A powerful late-season transition event aided by tropical moisture from the remnants of Hurricane Lorena led to widespread rainfall across south-central Arizona during a five-day period beginning September 23 and ending on September 27, 2019. Maricopa County rain gages measured event totals anywhere from 0 inches - 4.5 inches. Residents in Mesa, Apache Junction, Fountain Hills, Buckeye, Tonopah and several other communities experienced significant flash flooding due to heavy rain from this event (FCDMC Comprehensive Report, 2020).

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3. Assessment of Flooding Problems

The hazards identified in the previous section were evaluated to determine what problems, if any, they create within each watershed. Although a hazard may exist, if there is no human activity, no problem is created by the hazard. Summary tables of problems caused by the flood hazards identified in Section 2 are presented in the following subsections.

3.1 Agua Fria River Watershed Flooding Problems

Table 14: Identified Flooding Problems of the Agua Fria River Watershed

	Issue	Impact
Dams	**Life, safety, health, evacuation**	Hiking trails & other recreation along McMicken, Adobe, Cave Buttes, & New River dams. After major events, damage (seen & unseen) should be evaluated and addressed ASAP. Consider redundant systems where needed.
	Public health hazards caused by flooding	Popping manhole lids at some locations. Water and sewer lines in the Adobe Dam reservoir pool could exacerbate emergency conditions.
	Critical facilities	Dams protect numerous hospitals, rescue centers, police/fire stations, airports, Luke AFB.
	Transportation	No downstream ingress/egress if dams discharge or fail; need one lane free from flooding.
	Flood insurance claims	May decrease due to increased flood protection.
	Economic	Support economy by providing flood protection. High negative impact to businesses/employment centers during a dam emergency spillway discharge or dam failure, but likelihood of occurrence is very low.
	Natural floodplain functions	Provides open space. Dams cut off water to downstream reaches of washes but provide habitat in the upstream reservoir pool.
Levees	**Life, safety, health, evacuation**	Recreation along the channelized portion of New River. Aggregate mining operations in bottom of watercourse channels.
	Public health hazards caused by flooding	Flooding of neighborhoods could promote mold growth.
	Critical facilities	Ingress/egress issues could impact emergency response to the downstream community.
	Transportation	Local streets downstream would have ingress/egress issues.
	Flood insurance claims	May increase downstream of the levee.
	Economic	Property damage to residences.
	Natural floodplain functions	N/A

	Issue	Impact
Embankment overtopping	**Life, safety, health, evacuation**	Identify evacuation areas or centers. Skunk Creek & CAP Canal and Beardsley Canal are upstream of large population centers.
	Public health hazards caused by flooding	Canal breaches cause flooding downstream.
	Critical facilities	Rescue centers, hospitals. Consider the use of audible alerts (sirens).
	Transportation	One dry lane needed for ingress/egress.
	Flood insurance claims	Risk for structures upstream & downstream of canals.
	Economic	Damage to Zone X structures (moderate to low flood risk).
	Natural floodplain functions	Recreation in impoundment areas. Canals modify natural floodplains, both beneficially and detrimentally.
Single-lot development	**Life, safety, health, evacuation**	Wittmann, New River, and Desert Hills are affected. Need positive drainage. Streams may be filled in on some lots. Emergency access needed.
	Public health hazards caused by flooding	Flooded streets. Animal waste conveyed downstream in rural/large-lot properties.
	Critical facilities	No significant impact.
	Transportation	Road closures, access issues, high maintenance for road clearing. Limited regulation of floodplains in watershed.
	Flood insurance claims	Uncoordinated drainage system could increase number of claims.
	Economic	Flooded residences.
	Natural floodplain functions	Uncoordinated drainage systems tend to negatively interrupt natural flow patterns and behavior.
SFHA – watercourses/ponding	**Life, safety, health, evacuation**	Identified levels of risk for Zone AE delineations with Base Flood Elevations.
	Public health hazards caused by flooding	Structures could be at risk whether within the floodplain or on the fringes, leading to concerns of mold within impacted structures.
	Critical facilities	Identified risks provide emergency services a chance to be prepared in emergency situations but could still cause delays in responses.
	Transportation	Identified crossings could be at risk if they are at-grade crossings. The identified risks could provide emergency services a chance to close the crossing, potentially saving lives and property but causing a delay in travel.
	Flood insurance claims	Residents within floodplains with federally backed mortgages require flood insurance and many other homes opt to buy flood insurance to protect their property.
	Economic	Flooding interrupts commerce and results in property damage.
	Natural floodplain functions	Would be adversely affected by unregulated development.

	Issue	Impact
Un-delineated floodplains	**Life, safety, health, evacuation**	Approximate Zone A delineations should be restudied with the understanding that adjacent land will be developed.
	Public health hazards caused by flooding	Unidentified level of risk diminishes flood awareness and preparedness, resulting in flooded roadways, residences, and businesses.
	Critical facilities	Unidentified level of risk diminishes flood awareness and preparedness.
	Transportation	Unidentified level of risk diminishes flood awareness and preparedness.
	Flood insurance claims	Many residents are unaware of flooding risk.
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	Would be adversely affected by unregulated development.
Recreation hazards along floodplains	**Life, safety, health, evacuation**	Human activity such as trails, camping, ATV use, low water crossings, bridges. Unpermitted/non-conforming agricultural or mining use. Consider dedicated storage capacity in mining operations.
	Public health hazards caused by flooding	In-channel activity can result in injury or death during a flash flood.
	Critical facilities	N/A
	Transportation	Numerous at-grade road crossings prevent ingress/egress and increase risk to personal safety.
	Flood insurance claims	N/A
	Economic	Aggregate mining equipment and/or recreational facilities could be damaged by floods.
	Natural floodplain functions	Important wildlife habitats and migration corridors may be negatively impacted.
Repetitive losses	**Life, safety, health, evacuation**	Repetitive loss areas located at 36th Avenue and Old Stage Road in New River; 40th Street and Dynamite Boulevard in Cave Creek; and Sarival Road and Glendale Avenue in Litchfield Park.
	Public health hazards caused by flooding	Increases potential exposure to post-flood hazards such as mold growth.
	Critical facilities	Rescue centers needed more often.
	Transportation	Ingress/egress repeatedly flooded.
	Flood insurance claims	Comparatively more claims made.
	Economic	Comparatively more frequent property damages.
	Natural floodplain functions	No significant impact.
Flash flooding	**Life, safety, health, evacuation**	Areas in the New River community were flooded in the 2014 storms. Improve communications listing areas impacted. Show evacuation routes and safe distances from areas impacted. Sun City/Sun City Grand may need special mobilization plans for evacuation.
	Public health hazards caused by flooding	Improve communications listing areas impacted. Animal waste conveyed downstream in rural/large-lot properties.
	Critical facilities	New River Elementary School is adjacent to the New River floodplain.
	Transportation	Major transportation corridors may be impassible. Dove Valley Rd @ Carefree Highway was damaged in 2014 storms & prevented access.
	Flood insurance claims	Increases likelihood of claims.
	Economic	Losses to major employment centers if ingress/egress is compromised.
	Natural floodplain functions	Recreational activity is at risk. Consider user check in/out system at trailheads where flash flood potential is high.

	Issue	Impact
High runoff potential of soils	**Life, safety, health, evacuation**	Mountainous areas in Peoria and Deer Valley have high runoff potential. Construct grade breaks to slow down velocity of the runoff.
	Public health hazards caused by flooding	Increases flash flood risk.
	Critical facilities	Exacerbates access problems.
	Transportation	Short basin response times in & around mountains increase risk at road crossings.
	Flood insurance claims	May increase.
	Economic	Comparatively more frequent property damages.
	Natural floodplain functions	N/A
Single-lot development	**Life, safety, health, evacuation**	Level of risk to life and property is uncertain.
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	Roads interrupt the drainage patterns and concentrate flows.
	Flood insurance claims	Would increase due to greater uncertainty of risk.
	Economic	Population growth has channelized sheet flow and increased flood risk.
	Natural floodplain functions	Very sensitive to development & road crossings. Flow becomes concentrated and downstream system may not accommodate it.
Sheet flow channelized by development	**Life, safety, health, evacuation**	Risk to downstream developments and properties.
	Public health hazards caused by flooding	Unidentified level of risk diminishes flood awareness and preparedness, resulting in flooded roadways, residences, and businesses downstream of channelization.
	Critical facilities	Unidentified level of risk diminishes flood awareness and preparedness.
	Transportation	Unidentified level of risk diminishes flood awareness and preparedness.
	Flood insurance claims	Residents downstream may be unaware of the risk and not have purchased flood insurance.
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	Channelization removes the natural floodplain functions.
Alluvial fans	**Life, safety, health, evacuation**	Alluvial fans present in the Hieroglyphic Mountains. Perceived risk may be lower than actual, so preparedness is diminished.
	Public health hazards caused by flooding	Unidentified level of risk diminishes flood awareness and preparedness, resulting in flooded roadways, residences, and businesses.
	Critical facilities	Unidentified level of risk diminishes flood awareness and preparedness.
	Transportation	Unidentified level of risk diminishes flood awareness and preparedness, resulting in flooded roadways.
	Flood insurance claims	Many residents are unaware of flooding risk and do not have flood insurance.
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	Fans provide important wildlife habitat.

	Issue	Impact
Lateral migration and erosion of natural streams	**Life, safety, health, evacuation**	The Agua Fria River migrates laterally except where it is channelized.
	Public health hazards caused by flooding	Unidentified level of risk diminishes flood awareness and preparedness, resulting in flooded roadways, residences, and businesses.
	Critical facilities	Unidentified level of risk diminishes flood awareness and preparedness.
	Transportation	Bridge abutments may be undermined.
	Flood insurance claims	Claims may increase as changes in the location of the watercourse affect additional properties.
	Economic	High costs to repair roads, bridges. Additional property damage may occur adjacent to the watercourse.
	Natural floodplain functions	Lateral erosion is important to natural floodplain function.
Sediment-laden floodwaters	**Life, safety, health, evacuation**	Sediment-laden floodwater often means fast moving floodwaters which pose a risk to people trying to cross.
	Public health hazards caused by flooding	Sediment-laden floodwater could contain bacteria or hazardous materials that were picked up during the storm, leading to public health risks following the storms when the sediment is still present.
	Critical facilities	N/A
	Transportation	Culvert clogged by sediment and debris could overtop the roadway creating a hazard to vehicular traffic.
	Flood insurance claims	N/A
	Economic	Increased damage from sediment-laden floodwaters
	Natural floodplain functions	Sediment transport is important to natural floodplain function.
Loss of habitat	**Life, safety, health, evacuation**	N/A
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	N/A
	Natural floodplain functions	Natural habitats are vital to natural floodplain functions. As development expands and habitats are lost, the benefits of natural floodplains are also lost.

	Issue	Impact
At-grade crossings	**Life, safety, health, evacuation**	Problematic as the risks are not fully known at all at-grade crossings. Depth gages could provide additional information to drivers before they try to cross a flooded crossing. Stranded vehicles could require emergency rescue services. Stranded vehicles could require emergency rescue services.
	Public health hazards caused by flooding	Potential for vehicles to be carried away by swiftly moving water if the person crosses a flooded at-grade crossing.
	Critical facilities	Potential delays in emergency services to properties that are only accessed by at-grade crossings.
	Transportation	Delays in access in and out of developed areas.
	Flood insurance claims	N/A
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	N/A
Flooding of transportation corridors	**Life, safety, health, evacuation**	Stranded vehicles could require emergency rescue services.
	Public health hazards caused by flooding	Potential for vehicles to be carried away by swiftly moving water.
	Critical facilities	Potential delays for access of emergency services.
	Transportation	Delays in access.
	Flood insurance claims	N/A
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	N/A
Agricultural interruptions to natural drainage patterns	**Life, safety, health, evacuation**	N/A
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	Diversion of floodwater due to agricultural plots could impact roadways causing delays.
	Flood insurance claims	Diversion of floodwater due to agricultural plots could impact homes and create flood insurance claims, if the property has flood insurance.
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	Removal of natural floodplains for agriculture.

	Issue	Impact
Localized flooding	**Life, safety, health, evacuation**	Lack of storm drain infrastructure within developed areas on unincorporated Maricopa County (New River, Carefree, Wittmann, and the scattered unincorporated Maricopa County islands).
	Public health hazards caused by flooding	Localized flooding can damage properties and if homes are impacted, mold could become an issue.
	Critical facilities	Flooding could cause delays to emergency services.
	Transportation	Flooding intersections and roadways could impact vehicular traffic in and out of areas.
	Flood insurance claims	Localized flooding could impact structures and, if insured, cause increases in flood insurance claims.
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	N/A
Managing Proposed Development	**Life, safety, health, evacuation**	Newly developed master planned areas need to plan for emergency service access.
	Public health hazards caused by flooding	Potential damage to properties if stormwater is not managed properly.
	Critical facilities	Inadequate ingress and egress during emergency scenarios.
	Transportation	At-grade crossings, culvert crossings, and intersection flooding.
	Flood insurance claims	If stormwater is not properly managed, flood insurance claims could increase if the areas are within floodplains or the properties have flood insurance.
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	Newly developed areas should consider the natural floodplain functions and weave these into their designs.
Urban-Suburban Interface	**Life, safety, health, evacuation**	Different land use and density along with potentially different storm drain infrastructure features to tie together.
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	Increased runoff due to urban sprawl and increase impervious areas.
	Flood insurance claims	N/A
	Economic	N/A
	Natural floodplain functions	Urban development typically no longer adheres to protecting the natural floodplain functions. Channelization occurs through urban areas to open up more land for development.

	Issue	Impact
Block Wall/Property Fences	**Life, safety, health, evacuation**	Diverted flows will increase concentrated flows at other locations creating potential risks to properties and lives.
	Public health hazards caused by flooding	Risks at locations of diverted flows where flows have increased could cause issues to those attempting to cross where water typically crossing the roadway was less.
	Critical facilities	Reduced ingress/egress if storm water is diverted to previously defined access route.
	Transportation	Increased flows for at-grade crossings and other storm drainage infrastructure. Roadway flooding is a concern.
	Flood insurance claims	Increased claims from higher concentrations of flows.
	Economic	Increased damage to infrastructure and properties which holds up money being spent on other projects elsewhere.
	Natural floodplain functions	Obstruction of historic flow paths which creates a change to flow paths.
Lack of Storm Drainage Infrastructure	**Life, safety, health, evacuation**	Restricts movements of people within areas that get overwhelmed by runoff and no ways to remove water from the surface.
	Public health hazards caused by flooding	Flooding can damage properties and if homes are impacted, mold could become an issue.
	Critical facilities	Flooded roadways could reduce emergency response times.
	Transportation	Flooded roadways and intersections causing re-routes of vehicles and emergency personnel.
	Flood insurance claims	N/A
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	N/A
Invasive vegetation species	**Life, safety, health, evacuation**	N/A
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	N/A
	Natural floodplain functions	Destruction of natural vegetation within waterways, leading to loss of habitats for some animals and potential increased obstruction of flow within the waterway. Tamarisk is the key issue in most Maricopa County waterways.

	Issue	Impact
Fissures	**Life, safety, health, evacuation**	Fissures near SR 303 between Indian School Rd. and Peoria Ave. and in the vicinity of Luke AFB. High localized risk if fissure opens up and creates a new watercourse. Coordination with AZGS is needed.
	Public health hazards caused by flooding	Hazardous materials could be transported if a fissure opens up and creates a new watercourse. Example: trucks transporting hazardous material on SR 303 are at risk if a fissure causes road damage during a storm.
	Critical facilities	SR 303 and Luke AFB are impacted.
	Transportation	Could result in lengthy ingress/egress issues if damage occurs to SR 303 or surrounding roads.
	Flood insurance claims	Could increase if new areas are exposed to flooding.
	Economic	Longer-term ingress/egress interruptions if SR 303 is damaged.
	Natural floodplain functions	Could dramatically alter the location and behavior of drainage and reduce flora and fauna habitats.
Wildfires	**Life, safety, health, evacuation**	Transfer of sediment downstream after a wildfire. Cave Creek Complex Fire resulted in sediment transfer and increases in flash flood potential.
	Public health hazards caused by flooding	Post-fire debris flow increases risk to public health.
	Critical facilities	Downstream flood risk to increases for several years after a wildfire.
	Transportation	Ingress/egress problems increases for several years after a wildfire.
	Flood insurance claims	Could increase in areas downstream of a burn area.
	Economic	Higher post-flood maintenance costs for several years after a wildfire.
	Natural floodplain functions	Wildfires may be a natural process, but man-made debris transported during storms can be detrimental to natural floodplain.
Drought	**Life, safety, health, evacuation**	Increased risk of flooding from prolonged flooding which could have adverse impacts to the soil in the area. The soil could dry out and take in less water during the first storm event.
	Public health hazards caused by flooding	N/A
	Critical facilities	Increased visitations due to the high temperatures that often come with drought conditions.
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	Increased groundwater pumping, which could have adverse impacts, such as land subsidence and increased cost of water. Land subsidence could cause damage to drainage infrastructure.
	Natural floodplain functions	Desert vegetation is resilient to drought; however, extended drought could cause an adverse impact to natural floodplains.

3.2 Cave Creek/Salt River Watershed Flooding Problems

Table 15: Identified Flooding Problems of the Cave Creek/Salt River Watershed

	Issue	Impact
Embankment overtopping	**Life, safety, health, evacuation**	The CAP and Grand canals traverse the watershed. Need to Identify evacuation areas or centers.
	Public health hazards caused by flooding	Canal breaches cause flooding downstream in unpredictable locations.
	Critical facilities	Rescue centers, hospitals may be inundated.
	Transportation	Downstream roads may be inundated. One dry lane needed.
	Flood insurance claims	Risk to structures upstream & downstream of canals is increased.
	Economic	Damage to Zone X structures.
	Natural floodplain functions	Recreation in impoundment areas. Canals modify natural floodplains, both beneficially and detrimentally.
Single-lot development	**Life, safety, health, evacuation**	Flooding is usually unpredictable. Most affected properties are not in an identified floodplain. Pre-FIRM development is typically slab-on-grade and very susceptible to flooding. Exacerbated by roads and more recent developments.
	Public health hazards caused by flooding	Flooded streets. Lots are typically large, and many keep horses. Animal waste conveyed downstream in rural/large-lot properties.
	Critical facilities	No significant impact.
	Transportation	Road closures, access issues, high maintenance for road clearing. Limited regulation of floodplains in watershed.
	Flood insurance claims	Uncoordinated drainage system could increase number of claims.
	Economic	Flooded residences.
	Natural floodplain functions	Uncoordinated drainage systems tend to negatively interrupt natural flow patterns and behavior.
SFHA – watercourses/ponding	**Life, safety, health, evacuation**	Identified levels of risk for Zone AE delineations with Base Flood Elevations.
	Public health hazards caused by flooding	Structures could be at risk whether within the floodplain or on the fringes, leading to concerns of mold within impacted structures.
	Critical facilities	Identified risks provide emergency services a chance to be prepared in emergency situations but could still cause delays in responses.
	Transportation	Identified crossings could be at risk if they are at-grade crossings. The identified risks could provide emergency services a chance to close the crossing, potentially saving lives and property but causing a delay in travel.
	Flood insurance claims	Residents within floodplains with federally backed mortgages require flood insurance and many other homes opt to buy flood insurance to protect their property.
	Economic	Flooding interrupts commerce and results in property damage.
	Natural floodplain functions	Would be adversely affected by unregulated development.

	Issue	Impact
Un-delineated floodplains	**Life, safety, health, evacuation**	Approximate A Zone delineations should be restudied with the understanding that adjacent land will be developed.
	Public health hazards caused by flooding	Unidentified level of risk diminishes flood awareness and preparedness, resulting in flooded roadways, residences, and businesses.
	Critical facilities	Unidentified level of risk diminishes flood awareness and preparedness.
	Transportation	Unidentified level of risk diminishes flood awareness and preparedness. Ingress/egress is restricted and post- flood maintenance is needed.
	Flood insurance claims	Many residents are unaware of flooding risk.
	Economic	Unexpected flooding interrupts commerce and results in property damage. Increased post-flood maintenance costs.
	Natural floodplain functions	Would be adversely affected by unregulated development. More critical to minor and medium-sized washes.
Recreation hazards along floodplains	**Life, safety, health, evacuation**	Human activity such as trails, camping, ATV use, low water crossings, bridges. Unpermitted/non-conforming agricultural or mining use. Consider dedicated storage capacity in mining operations.
	Public health hazards caused by flooding	In-channel activity can result in injury or death during a flash flood.
	Critical facilities	N/A
	Transportation	Numerous at-grade road crossings prevent ingress/egress and increase risk to personal safety.
	Flood insurance claims	N/A
	Economic	Aggregate mining equipment in the Salt River and/or recreational facilities could be damaged by floods.
	Natural floodplain functions	Important wildlife habitats and migration corridors may be negatively impacted.
Flash flooding	**Life, safety, health, evacuation**	Entire watershed is susceptible to flooding. Need effective, consistent communication during floods. Evacuation routes may be interrupted, dictating shelter-in-place.
	Public health hazards caused by flooding	Sanitary sewers may be affected. Animal waste conveyed downstream in rural/large-lot properties. Need to improve communications listing areas impacted.
	Critical facilities	Public transportation and power infrastructures are in unincorporated county. Need to show evacuation routes and safe distances from areas impacted.
	Transportation	Directly affected – most deaths during flooding are transportation-related.
	Flood insurance claims	Increases likelihood of claims.
	Economic	Losses to major employment centers if ingress/egress is compromised.
	Natural floodplain functions	Upper Cave Creek to Carefree Highway is an important bird habitat.

	Issue	Impact
High runoff potential of soils	Life, safety, health, evacuation	Runoff typically includes greater transport of sediment.
	Public health hazards caused by flooding	Increases flash flood risk.
	Critical facilities	Exacerbates access problems.
	Transportation	Short basin response times in & around mountains increase risk at road crossings.
	Flood insurance claims	May increase.
	Economic	Comparatively more frequent property damages. Could be costly. Losses to major employment centers if ingress/egress is compromised.
	Natural floodplain functions	N/A
Split flows	Life, safety, health, evacuation	Level of risk to life and property is uncertain.
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	Roads interrupt the drainage patterns and concentrate flows.
	Flood insurance claims	Would increase due to greater uncertainty of risk.
	Economic	Population growth has channelized sheet flow and increased flood risk.
	Natural floodplain functions	Very sensitive to development & road crossings. Flow becomes concentrated and downstream system may not accommodate it.
Sheet flow channelized by development	Life, safety, health, evacuation	Risk to downstream developments and properties.
	Public health hazards caused by flooding	Unidentified level of risk diminishes flood awareness and preparedness, resulting in flooded roadways, residences, and businesses downstream of channelization.
	Critical facilities	Unidentified level of risk diminishes flood awareness and preparedness.
	Transportation	Unidentified level of risk diminishes flood awareness and preparedness.
	Flood insurance claims	Residents downstream may be unaware of the risk and not have purchased flood insurance.
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	Channelization removes the natural floodplain functions.
Alluvial fans	Life, safety, health, evacuation	Alluvial fans present in the White Tank and Hieroglyphic Mountains. Perceived risk may be lower than actual, so preparedness is diminished.
	Public health hazards caused by flooding	Alluvial fans present north of the CAP Canal in Phoenix and Scottsdale, but none in unincorporated county.
	Critical facilities	Unidentified level of risk diminishes flood awareness and preparedness.
	Transportation	Unidentified level of risk diminishes flood awareness and preparedness, resulting in flooded roadways.
	Flood insurance claims	Many residents are unaware of flooding risk and do not have flood insurance.
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	Fans provide important wildlife habitat.

	Issue	Impact
Lateral migration and erosion of natural streams	**Life, safety, health, evacuation**	Significant lateral migration and erosion in the rivers and washes can increase risk to adjacent properties.
	Public health hazards caused by flooding	Unidentified level of risk diminishes flood awareness and preparedness, resulting in flooded roadways, residences, and businesses.
	Critical facilities	Unidentified level of risk diminishes flood awareness and preparedness.
	Transportation	Bridge abutments may be undermined.
	Flood insurance claims	Claims may increase as changes in the location of the watercourse affect additional properties.
	Economic	High costs to repair roads, bridges. Additional property damage may occur adjacent to the watercourse.
	Natural floodplain functions	Lateral erosion is important to natural floodplain function.
Sediment-laden floodwaters	**Life, safety, health, evacuation**	Sediment-laden floodwater often means fast moving floodwaters which pose a risk to people trying to cross.
	Public health hazards caused by flooding	Sediment-laden floodwater could contain bacteria or hazardous materials that were picked up during the storm, leading to public health risks following the storms when the sediment is still present.
	Critical facilities	N/A
	Transportation	Culvert clogged by sediment and debris could overtop the roadway creating a hazard to vehicular traffic.
	Flood insurance claims	N/A
	Economic	Increased damage from sediment-laden floodwaters
	Natural floodplain functions	Sediment transport is important to natural floodplain function.
At-grade crossings	**Life, safety, health, evacuation**	Problematic as the risks are not fully known at all at-grade crossings. Depth gages could provide additional information to drivers before they try to cross a flooded crossing. Stranded vehicles could require emergency rescue services.
	Public health hazards caused by flooding	Potential for vehicles to be carried away by swiftly moving water if the person crosses a flooded at-grade crossing.
	Critical facilities	Potential delays in emergency services to properties that are only accessed by at-grade crossings.
	Transportation	Delays in access in and out of developed areas.
	Flood insurance claims	N/A
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	N/A

	Issue	Impact
Flooding of transportation corridors	Life, safety, health, evacuation	Stranded vehicles could require emergency rescue services.
	Public health hazards caused by flooding	Potential for vehicles to be carried away by swiftly moving water.
	Critical facilities	Potential delays for access of emergency services.
	Transportation	Delays in access.
	Flood insurance claims	N/A
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	N/A
Agricultural interruptions to natural drainage patterns	Life, safety, health, evacuation	N/A
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	Diversion of floodwater due to agricultural plots could impact roadways causing delays.
	Flood insurance claims	Diversion of floodwater due to agricultural plots could impact homes and create flood insurance claims, if the property has flood insurance.
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	Removal of natural floodplains for agriculture.
Urban-Suburban Interface	Life, safety, health, evacuation	Different land use and density along with potentially different storm drain infrastructure features to tie together.
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	Increased runoff due to urban sprawl and increase impervious areas.
	Flood insurance claims	N/A
	Economic	N/A
	Natural floodplain functions	Urban development typically no longer adheres to protecting the natural floodplain functions. Channelization occurs through urban areas to open up more land for development.
Block Wall/Property Fences	Life, safety, health, evacuation	Diverted flows will increase concentrated flows at other locations creating potential risks to properties and lives.
	Public health hazards caused by flooding	Risks at locations of diverted flows where flows have increased could cause issues to those attempting to cross where water typically crossing the roadway was less.
	Critical facilities	Reduced ingress/egress if storm water is diverted to previously defined access route.
	Transportation	Increased flows for at-grade crossings and other storm drainage infrastructure. Roadway flooding is a concern.
	Flood insurance claims	Increased claims from higher concentrations of flows.
	Economic	Increased damage to infrastructure and properties which holds up money being spent on other projects elsewhere.
	Natural floodplain functions	Obstruction of historic flow paths which creates a change to flow paths.

	Issue	Impact
Lack of Storm Drainage Infrastructure	**Life, safety, health, evacuation**	Restricts movements of people within areas that get overwhelmed by runoff and no ways to remove water from the surface.
	Public health hazards caused by flooding	Flooding can damage properties and if homes are impacted, mold could become an issue.
	Critical facilities	Flooded roadways will reduce emergency response times.
	Transportation	Flooded roadways and intersections causing re-routes of vehicles and emergency personnel.
	Flood insurance claims	N/A
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	N/A
Fissures	**Life, safety, health, evacuation**	Fissures near SR 303 between Indian School Rd. and Peoria Ave. and in the vicinity of Luke AFB. High localized risk if fissure opens up and creates a new watercourse. Coordination with AZGS is needed.
	Public health hazards caused by flooding	None in unincorporated county. A fissure was confirmed by the AZGS in Scottsdale near Frank Lloyd Wright Blvd/Cactus Rd, and an unconfirmed fissure was identified in Phoenix near 40th St./Cholla St.
	Critical facilities	N/A
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	N/A
	Natural floodplain functions	N/A
Wildfires	**Life, safety, health, evacuation**	The 2015 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan shows a low hazard rating for the I-10 corridor in south Phoenix and medium hazard for most of the remainder. Wash corridors and alluvial fan areas with dense vegetation are shown to have high hazard potential. Transfer of sediment downstream and increased flash flood potential after a wildfire.
	Public health hazards caused by flooding	Post-fire debris flow increases risk to public health.
	Critical facilities	Downstream risk to ingress/egress problems increases for several years after a wildfire.
	Transportation	Ingress/egress problems increases for several years after a wildfire.
	Flood insurance claims	Could increase in areas downstream of a burn area.
	Economic	Higher post-flood maintenance costs for several years after a wildfire.
	Natural floodplain functions	Wildfires may be a natural process, but man-made debris transported during storms can be detrimental to natural floodplain.

	Issue	Impact
Drought	**Life, safety, health, evacuation**	Increased risk of flooding from prolonged flooding which could have adverse impacts to the soil in the area. The soil could dry out and take in less water during the first storm event.
	Public health hazards caused by flooding	N/A
	Critical facilities	Increased visitations due to the high temperatures that often come with drought conditions.
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	Increased groundwater pumping, which could have adverse impacts, such as land subsidence and increased cost of water. Land subsidence could cause damage to drainage infrastructure.
	Natural floodplain functions	Desert vegetation is resilient to drought; however, extended drought could cause an adverse impact to natural floodplains.

3.3 Centennial Wash Watershed Flooding Problems

Table 16: Identified Flooding Problems of the Centennial Wash Watershed

	Issue	Impact
Dams	**Life, safety, health, evacuation**	Harquahala and Saddleback FRSs are located on the north and south sides of I-10, respectively, near the Salome Road crossing. Limited activity downstream of the structures.
	Public health hazards caused by flooding	N/A
	Critical facilities	The CAP is downstream of the Harquahala FRS.
	Transportation	The Harquahala FRS provides valuable flood protection for I-10, but the freeway would be inundated by a dam failure.
	Flood insurance claims	N/A
	Economic	I-10 is an important route for the region and commerce would be affected if it closed due to failure of the Harquahala FRS.
	Natural floodplain functions	Dams cut off water to downstream reaches of washes but provide habitat in the upstream reservoir pool.
Embankment overtopping	**Life, safety, health, evacuation**	The CAP Canal and I-10 traverse the watershed, as well as numerous irrigation canals. Except for I-10 itself, there is very little activity upstream or downstream of embankments.
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	N/A
	Natural floodplain functions	Canals modify natural floodplains, both beneficially and detrimentally.
Levees	**Life, safety, health, evacuation**	The Centennial Levee is located south of I-10. However, there is very little human activity downstream.
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	A levee failure may disrupt irrigation delivery and farming activity downstream.
	Natural floodplain functions	N/A
Single-lot development	**Life, safety, health, evacuation**	Flooding is usually unpredictable. Pre-FIRM development is typically slab-on-grade and very susceptible to flooding.
	Public health hazards caused by flooding	Development is limited to the community of Aguila. Flooded streets are a frequent problem.
	Critical facilities	No significant impact.
	Transportation	Ingress/egress problems on local streets in Aguila.
	Flood insurance claims	Uncoordinated drainage system could increase number of claims.
	Economic	Flooded residences and post flood road maintenance costs.
	Natural floodplain functions	Uncoordinated drainage systems tend to negatively interrupt natural flow patterns and behavior.

	Issue	Impact
Un-delineated floodplains	**Life, safety, health, evacuation**	Approximate A Zone delineations should be restudied with the understanding that adjacent land will be developed.
	Public health hazards caused by flooding	Unidentified level of risk diminishes flood awareness and preparedness, resulting in flooded roadways, residences, and businesses.
	Critical facilities	Unidentified level of risk diminishes flood awareness and preparedness.
	Transportation	Unidentified level of risk diminishes flood awareness and preparedness. Ingress/egress is restricted and post- flood maintenance is needed.
	Flood insurance claims	Residents are unaware of flooding risk.
	Economic	Unexpected flooding causes property damage and interrupts farming operations. Increased post-flood maintenance costs.
	Natural floodplain functions	Would be adversely affected by unregulated development. More critical to minor and medium-sized washes.
Recreation hazards along floodplains	**Life, safety, health, evacuation**	Human activity such as hiking in the Harquahala Mountains and Signal Mountain wilderness areas. Hikers could be stranded during floods.
	Public health hazards caused by flooding	In-channel activity can result in injury or death during a flash flood.
	Critical facilities	N/A
	Transportation	Numerous at-grade road crossings prevent ingress/egress and increase risk to personal safety.
	Flood insurance claims	N/A
	Economic	N/A
	Natural floodplain functions	Important wildlife habitats and migration corridors may be negatively impacted.
Flash flooding	**Life, safety, health, evacuation**	Entire watershed is susceptible to flooding. Need effective, consistent communication during floods. Evacuation routes may be interrupted, dictating shelter-in-place.
	Public health hazards caused by flooding	Sanitary sewers may be affected. Animal waste conveyed.
	Critical facilities	The Harquahala Fire District's fire station and the Aguila Elementary School are within the floodplain. Public transportation and power infrastructures are in unincorporated county. Need to show evacuation routes and safe distances from areas impacted.
	Transportation	Directly affected – most deaths during flooding are transportation-related. Access to nuclear generating station may be impacted.
	Flood insurance claims	Increases likelihood of claims.
	Economic	Losses to major employment centers if ingress/egress is compromised.
	Natural floodplain functions	Upper Cave Creek to Carefree Highway is an important bird habitat.

	Issue	Impact
High runoff potential of soils	**Life, safety, health, evacuation**	Runoff typically includes greater transport of sediment.
	Public health hazards caused by flooding	Increases flash flood risk.
	Critical facilities	Exacerbates access problems.
	Transportation	Short basin response times in & around mountains increase risk at road crossings.
	Flood insurance claims	May increase.
	Economic	Comparatively more frequent property damages. Could be costly. Losses to major employment centers if ingress/egress is compromised.
	Natural floodplain functions	N/A
Split flows	**Life, safety, health, evacuation**	Level of risk to life and property is uncertain.
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	Roads interrupt the drainage patterns and concentrate flows.
	Flood insurance claims	Would increase due to greater uncertainty of risk.
	Economic	Population growth has channelized sheet flow and increased flood risk.
	Natural floodplain functions	Very sensitive to development & road crossings. Flow becomes concentrated and downstream system may not accommodate it.
Alluvial fans	**Life, safety, health, evacuation**	Alluvial fan along the west county border in the vicinity of Eagle Eye Road. However, there is very little human activity in the area.
	Public health hazards caused by flooding	No significant impact.
	Critical facilities	Unidentified level of risk diminishes flood awareness and preparedness.
	Transportation	Unidentified level of risk diminishes flood awareness and preparedness, resulting in flooded roadways.
	Flood insurance claims	Many residents are unaware of flooding risk and do not have flood insurance.
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	Fans provide important wildlife habitat.
Lateral migration and erosion of natural streams	**Life, safety, health, evacuation**	Significant lateral migration and erosion in the rivers and washes can increase risk to adjacent properties.
	Public health hazards caused by flooding	Unidentified level of risk diminishes flood awareness and preparedness, resulting in flooded roadways, residences, and businesses.
	Critical facilities	Unidentified level of risk diminishes flood awareness and preparedness.
	Transportation	Bridge abutments may be undermined.
	Flood insurance claims	Claims may increase as changes in the location of the watercourse affect additional properties.
	Economic	High costs to repair roads, bridges. Additional property damage may occur adjacent to the watercourse.
	Natural floodplain functions	Lateral erosion is important to natural floodplain function.

	Issue	Impact
Sediment-laden floodwaters	Life, safety, health, evacuation	Sediment-laden floodwater often means fast moving floodwaters which pose a risk to people trying to cross.
	Public health hazards caused by flooding	Sediment-laden floodwater could contain bacteria or hazardous materials that were picked up during the storm, leading to public health risks following the storms when the sediment is still present.
	Critical facilities	N/A
	Transportation	Culvert clogged by sediment and debris could overtop the roadway creating a hazard to vehicular traffic.
	Flood insurance claims	N/A
	Economic	Increased damage from sediment-laden floodwaters
	Natural floodplain functions	Sediment transport is important to natural floodplain function.
Loss of habitat	Life, safety, health, evacuation	N/A
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	N/A
	Natural floodplain functions	Natural habitats are vital to natural floodplain functions. As development expands and habitats are lost, the benefits of natural floodplains are also lost.
At-grade crossings	Life, safety, health, evacuation	Problematic as the risks are not fully known at all at-grade crossings. Depth gages could provide additional information to drivers before they try to cross a flooded crossing. Stranded vehicles could require emergency rescue services.
	Public health hazards caused by flooding	Potential for vehicles to be carried away by swiftly moving water if the person crosses a flooded at-grade crossing.
	Critical facilities	Potential delays in emergency services to properties that are only accessed by at-grade crossings.
	Transportation	Delays in access in and out of developed areas.
	Flood insurance claims	N/A
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	N/A
Flooding of transportation corridors	Life, safety, health, evacuation	Stranded vehicles could require emergency rescue services.
	Public health hazards caused by flooding	Potential for vehicles to be carried away by swiftly moving water.
	Critical facilities	Potential delays for access of emergency services.
	Transportation	Delays in access.
	Flood insurance claims	N/A
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	N/A

	Issue	Impact
Agricultural interruptions to natural drainage patterns	Life, safety, health, evacuation	N/A
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	Diversion of floodwater due to agricultural plots could impact roadways causing delays.
	Flood insurance claims	Diversion of floodwater due to agricultural plots could impact homes and create flood insurance claims, if the property has flood insurance.
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	Removal of natural floodplains for agriculture.
Localized flooding	Life, safety, health, evacuation	Lack of storm drain infrastructure within developed areas on unincorporated Maricopa County (Aguila, Wintersburg and Tonopah).
	Public health hazards caused by flooding	Localized flooding can damage properties and if homes are impacted, mold could become an issue.
	Critical facilities	Flooding could cause delays to emergency services.
	Transportation	Flooding intersections and roadways could impact vehicular traffic in and out of areas.
	Flood insurance claims	Localized flooding could impact structures and, if insured, cause increases in flood insurance claims.
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	N/A
Managing Proposed Development	Life, safety, health, evacuation	Newly developed master planned areas need to plan for emergency service access.
	Public health hazards caused by flooding	Potential damage to properties if stormwater is not managed properly.
	Critical facilities	Adequate ingress and egress during emergency scenarios.
	Transportation	At-grade crossings, culvert crossings, and intersection flooding.
	Flood insurance claims	If stormwater is not properly managed, flood insurance claims could increase.
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	Newly developed areas should consider the natural floodplain functions and weave these into their designs.
Block Wall/Property Fences	Life, safety, health, evacuation	Diverted flows will increase concentrated flows at other locations creating potential risks to properties and lives.
	Public health hazards caused by flooding	Risks at locations of diverted flows where flows have increased could cause issues to those attempting to cross where water typically crossing the roadway was less.
	Critical facilities	Reduced ingress/egress if storm water is diverted to previously defined access route.
	Transportation	Increased flows for at-grade crossings and other storm drainage infrastructure. Roadway flooding is a concern.
	Flood insurance claims	Increased claims from higher concentrations of flows.
	Economic	Increased damage to infrastructure and properties which holds up money being spent on other projects elsewhere.
	Natural floodplain functions	Obstruction of historic flow paths which creates a change to flow paths.

	Issue	Impact
Fissures	**Life, safety, health, evacuation**	Fissures were confirmed by the AZGS near Wintersburg at the nuclear generating plant.
	Public health hazards caused by flooding	Fissures could negatively impact the plant.
	Critical facilities	Nuclear generating plant could be impacted.
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	Financial, electrical power, and employment impacts if the nuclear plant is out of service.
	Natural floodplain functions	N/A
Wildfires	**Life, safety, health, evacuation**	The 2015 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan shows a low hazard rating for the I-10 corridor in south Phoenix and medium hazard for most of the remainder. Wash corridors and alluvial fan areas with dense vegetation are shown to have high hazard potential. Transfer of sediment downstream and increased flash flood potential after a wildfire.
	Public health hazards caused by flooding	Post-fire debris flow increases risk to public health.
	Critical facilities	Downstream risk to ingress/egress problems increases for several years after a wildfire.
	Transportation	Ingress/egress problems increases for several years after a wildfire.
	Flood insurance claims	Could increase in areas downstream of a burn area.
	Economic	Higher post-flood maintenance costs for several years after a wildfire.
	Natural floodplain functions	Wildfires may be a natural process, but man-made debris transported during storms can be detrimental to natural floodplain.
Drought	**Life, safety, health, evacuation**	Increased risk of flooding from prolonged flooding which could have adverse impacts to the soil in the area. The soil could dry out and take in less water during the first storm event.
	Public health hazards caused by flooding	N/A
	Critical facilities	Increased visitations due to the high temperatures that often come with drought conditions.
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	Increased groundwater pumping, which could have adverse impacts, such as land subsidence and increased cost of water. Land subsidence could cause damage to drainage infrastructure.
	Natural floodplain functions	Desert vegetation is resilient to drought; however, extended drought could cause an adverse impact to natural floodplains.

3.4 Gila River/Queen Creek Watershed Flooding Problems

Table 17: Identified Flooding Problems of the Gila River/Queen Creek Watershed

	Issue	Impact
Dams	**Life, safety, health, evacuation**	Spook Hill, Signal Butte, Apache Junction, Powerline, Vineyard Road, and Rittenhouse protect several unincorporated county islands as well as several East Valley cities. Guadalupe FRS protects a small county island and portions of Phoenix, Tempe, and Guadalupe. The structures reduce exposure to flooding; however, in the unlikely event of a dam failure, large metropolitan areas would require evacuation.
	Public health hazards caused by flooding	Large discharges could lead to hazardous materials spills and animal waste.
	Critical facilities	Dams protect numerous hospitals, rescue centers, police/fire stations, Phoenix-Mesa Gateway Airport and extensive transportation and utility infrastructures.
	Transportation	Lower impact to county islands, but ingress/egress and utilities may be interrupted.
	Flood insurance claims	May decrease due to increased flood protection.
	Economic	Support economy by providing flood protection. High negative impact to businesses/employment centers during a dam emergency spillway discharge or dam failure, but the likelihood of occurrence is very low.
	Natural floodplain functions	The dams cut off water to downstream reaches of washes but provide habitat in the upstream reservoir pool.
Embankment overtopping	**Life, safety, health, evacuation**	The CAP, Western, Highline, Consolidated, Eastern, Tempe, and South canals traverse the watershed and downstream areas would be impacted by a breach. Smaller irrigation canals are present in the agricultural areas of Queen Creek and have a comparatively reduced impact but higher probability of occurrence.
	Public health hazards caused by flooding	Canal breaches cause flooding downstream.
	Critical facilities	Could interrupt irrigation operations.
	Transportation	One dry lane needed.
	Flood insurance claims	Risk for structures upstream & downstream of canals.
	Economic	Could damage Zone X structures. If irrigation supply is significantly interrupted, agricultural operations would be damaged.
	Natural floodplain functions	Recreation in impoundment areas. Canals modify natural floodplains, both beneficially and detrimentally.
Levee	**Life, safety, health, evacuation**	Development downstream of the Pass Mountain Diversion Channel Levee would be impacted. Same as embankment overtopping issues.
	Public health hazards caused by flooding	Flooding of the downstream neighborhood could promote mold growth.
	Critical facilities	Ingress/egress issues would impact emergency response to the downstream community.
	Transportation	Local streets downstream would have ingress/egress issues.
	Flood insurance claims	May increase downstream of the levee.
	Economic	Property damage to residences.
	Natural floodplain functions	N/A

	Issue	Impact
Single-lot development	**Life, safety, health, evacuation**	The Mountain/Erie development is frequently flooded due to interruption of the shallow drainage paths by improved roadways. Single lot development on the downstream side of the Pass Mountain Diversion Channel Levee would be significantly impacted by a breach because the meandering drainage paths would be overwhelmed.
	Public health hazards caused by flooding	Flooded streets. Animal waste conveyed downstream in rural/large-lot properties.
	Critical facilities	No significant impact.
	Transportation	Road closures, access issues, high maintenance for road clearing.
	Flood insurance claims	Uncoordinated drainage system could increase number of claims.
	Economic	Flooded residences.
	Natural floodplain functions	Uncoordinated drainage systems tend to negatively interrupt natural flow patterns and behavior.
Un-delineated floodplains	**Life, safety, health, evacuation**	Approximate A Zone delineations should be restudied with the understanding that adjacent land will be developed.
	Public health hazards caused by flooding	Unidentified level of risk diminishes flood awareness and preparedness, resulting in flooded roadways, residences, and businesses.
	Critical facilities	Unidentified level of risk diminishes flood awareness and preparedness.
	Transportation	Unidentified level of risk diminishes flood awareness and preparedness.
	Flood insurance claims	Many residents are unaware of risk and may not carry flood insurance.
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	Would be adversely affected by unregulated development in the floodplain.
Recreation hazards along floodplains	**Life, safety, health, evacuation**	Human activity such as trails, ATV use, low water crossings, bridges. Remote hiking areas such as Usery Mountain Park are risky during flash flooding.
	Public health hazards caused by flooding	In-channel activity can result in injury or death during a flash flood.
	Critical facilities	N/A
	Transportation	At-grade road crossings prevent ingress/egress and increase risk to personal safety.
	Flood insurance claims	N/A
	Economic	Increased O&M on at-grade road crossings.
	Natural floodplain functions	Important wildlife habitats and migration corridors may be negatively impacted.

	Issue	Impact
Repetitive losses	**Life, safety, health, evacuation**	Repetitive loss areas located at 194th Street and San Tan Boulevard in Queen Creek; 43rd Avenue and Carver Road/51st Avenue and Olney Avenue in Laveen; and 27th Avenue and Dobbins Road in Phoenix.
	Public health hazards caused by flooding	Increases potential exposure to post-flood hazards such as mold growth.
	Critical facilities	Rescue centers needed more often.
	Transportation	Ingress/egress repeatedly flooded.
	Flood insurance claims	Comparatively more claims made.
	Economic	Comparatively more frequent property damages.
	Natural floodplain functions	No significant impact.
Flash flooding	**Life, safety, health, evacuation**	The Laveen community was flooded in 2014 storms, as well as the Emerald Park neighborhood in Mesa and many other locations. Need to improve communications listing areas impacted. Show evacuation routes and safe distances from areas impacted. Sun City/Sun City Grand may need special mobilization plans for evacuation. Communication messages should be consistent during floods.
	Public health hazards caused by flooding	Improve communications listing areas impacted. Animal waste conveyed downstream in rural/large-lot properties.
	Critical facilities	Show evacuation routes and safe distances from areas impacted.
	Transportation	Major transportation corridors were impassible during the 2014 monsoon storms. Depressed roadways or at-grade road crossings are also flooded.
	Flood insurance claims	Increases likelihood of claims.
	Economic	Losses to major employment centers if ingress/egress is compromised.
	Natural floodplain functions	Recreational activity is at risk. Consider user check in/out system at trailheads where flash flood potential is high.
High runoff potential of soils	**Life, safety, health, evacuation**	Increases flash flood risk. 75% of the watershed has moderately low runoff potential, particularly in the agricultural areas.
	Public health hazards caused by flooding	Increases flash flood risk.
	Critical facilities	Exacerbates access problems.
	Transportation	Short basin response times in & around mountains increase risk at road crossings.
	Flood insurance claims	May increase.
	Economic	Comparatively more frequent property damages.
	Natural floodplain functions	N/A

	Issue	Impact
Split flows	**Life, safety, health, evacuation**	Level of risk to life and property is uncertain. Queen Creek and Sonoqui Wash are braided in the unimproved reaches. Runoff from Pinal County to the west into Maricopa County has these characteristics. The unimproved reaches of Queen Creek and Sonoqui Wash are braided.
	Public health hazards caused by flooding	Risk to property is uncertain, so residents may be unaware of the dangers of changes to the watercourses.
	Critical facilities	N/A
	Transportation	Roads interrupt the drainage patterns and concentrate flows.
	Flood insurance claims	Would increase due to greater uncertainty of risk.
	Economic	Population growth has channelized sheet flow and increased flood risk.
	Natural floodplain functions	Very sensitive to development & road crossings. Flow becomes concentrated and downstream system may not accommodate it.
Sheet flow channelized by development	**Life, safety, health, evacuation**	Risk to downstream developments and properties.
	Public health hazards caused by flooding	Unidentified level of risk diminishes flood awareness and preparedness, resulting in flooded roadways, residences, and businesses downstream of channelization.
	Critical facilities	Unidentified level of risk diminishes flood awareness and preparedness.
	Transportation	Unidentified level of risk diminishes flood awareness and preparedness.
	Flood insurance claims	Residents downstream may be unaware of the risk and not have purchased flood insurance.
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	Channelization removes the natural floodplain functions.
Alluvial fans	**Life, safety, health, evacuation**	Alluvial fans present coming off the San Tan Mountains and Goldmine Mountains within Pinal County. Perceived risk may be lower than actual, so preparedness is diminished.
	Public health hazards caused by flooding	Unidentified level of risk diminishes flood awareness and preparedness, resulting in flooded roadways, residences, and businesses.
	Critical facilities	Unidentified level of risk diminishes flood awareness and preparedness.
	Transportation	Unidentified level of risk diminishes flood awareness and preparedness, resulting in flooded roadways.
	Flood insurance claims	Many residents are unaware of flooding risk and do not have flood insurance.
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	Fans provide important wildlife habitat.

	Issue	Impact
Lateral migration and erosion of natural streams	Life, safety, health, evacuation	Significant lateral migration and erosion in the unimproved reaches of watercourses.
	Public health hazards caused by flooding	Unidentified level of risk diminishes flood awareness and preparedness, resulting in flooded roadways, residences, and businesses.
	Critical facilities	Unidentified level of risk diminishes flood awareness and preparedness.
	Transportation	Bridge abutments may be undermined.
	Flood insurance claims	Claims may increase as changes in the location of the watercourse affect additional properties.
	Economic	Increased costs to repair roads, bridges. Additional property damage may occur adjacent to the watercourse.
	Natural floodplain functions	Lateral erosion is important to natural floodplain function.
Sediment-laden floodwaters	Life, safety, health, evacuation	Sediment-laden floodwater often means fast moving floodwaters which pose a risk to people trying to cross.
	Public health hazards caused by flooding	Sediment-laden floodwater could contain bacteria or hazardous materials that were picked up during the storm, leading to public health risks following the storms when the sediment is still present.
	Critical facilities	N/A
	Transportation	Culvert clogged by sediment and debris could overtop the roadway creating a hazard to vehicular traffic.
	Flood insurance claims	N/A
	Economic	Increased damage from sediment-laden floodwaters
	Natural floodplain functions	Sediment transport is important to natural floodplain function.
Loss of habitat	Life, safety, health, evacuation	N/A
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	N/A
	Natural floodplain functions	Natural habitats are vital to natural floodplain functions. As development expands and habitats are lost, the benefits of natural floodplains are also lost.
At-grade crossings	Life, safety, health, evacuation	Problematic as the risks are not fully known at all at-grade crossings. Depth gages could provide additional information to drivers before they try to cross a flooded crossing. Stranded vehicles could require emergency rescue services.
	Public health hazards caused by flooding	Potential for vehicles to be carried away by swiftly moving water if the person crosses a flooded at-grade crossing.
	Critical facilities	Potential delays in emergency services to properties that are only accessed by at-grade crossings.
	Transportation	Delays in access in and out of developed areas.
	Flood insurance claims	N/A
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	N/A

	Issue	Impact
Flooding of transportation corridors	Life, safety, health, evacuation	Stranded vehicles could require emergency rescue services.
	Public health hazards caused by flooding	Potential for vehicles to be carried away by swiftly moving water.
	Critical facilities	Potential delays for access of emergency services.
	Transportation	Delays in access.
	Flood insurance claims	N/A
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	N/A
Agricultural interruptions to natural drainage patters	Life, safety, health, evacuation	N/A
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	Diversion of floodwater due to agricultural plots could impact roadways causing delays.
	Flood insurance claims	Diversion of floodwater due to agricultural plots could impact homes and create flood insurance claims, if the property has flood insurance.
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	Removal of natural floodplains for agriculture.
Localized flooding	Life, safety, health, evacuation	Lack of storm drain infrastructure within developed areas on unincorporated Maricopa County (unincorporated Maricopa County islands throughout Gilbert, Mesa, Chandler and Phoenix).
	Public health hazards caused by flooding	Localized flooding can damage properties and if homes are impacted, mold could become an issue.
	Critical facilities	Flooding could cause delays to emergency services.
	Transportation	Flooding intersections and roadways could impact vehicular traffic in and out of areas.
	Flood insurance claims	Localized flooding could impact structures and, if insured, cause increases in flood insurance claims.
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	N/A
Managing Proposed Development	Life, safety, health, evacuation	Newly developed master planned areas need to plan for emergency service access.
	Public health hazards caused by flooding	Potential damage to properties if stormwater is not managed properly.
	Critical facilities	Adequate ingress and egress during emergency scenarios.
	Transportation	At-grade crossings, culvert crossings, and intersection flooding.
	Flood insurance claims	If stormwater is not properly managed, flood insurance claims could increase if the areas are within floodplains or the properties have flood insurance.
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	Newly developed areas should consider the natural floodplain functions and weave these into their designs.

	Issue	Impact
Urban-Suburban Interface	**Life, safety, health, evacuation**	Different land use and density along with potentially different storm drain infrastructure features to tie together.
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	Increased runoff due to urban sprawl and increase impervious areas.
	Flood insurance claims	N/A
	Economic	N/A
	Natural floodplain functions	Urban development typically no longer adheres to protecting the natural floodplain functions.
Block Wall/Property Fences	**Life, safety, health, evacuation**	Diverted flows will increase concentrated flows at other locations creating potential risks to properties and lives.
	Public health hazards caused by flooding	Risks at locations of diverted flows where flows have increased could cause issues to those attempting to cross where water typically crossing the roadway was less.
	Critical facilities	Reduced ingress/egress if storm water is diverted to previously defined access route.
	Transportation	Increased flows for at-grade crossings and other storm drainage infrastructure. Roadway flooding is a concern.
	Flood insurance claims	Increased claims from higher concentrations of flows.
	Economic	Increased damage to infrastructure and properties which holds up money being spent on other projects elsewhere.
	Natural floodplain functions	Obstruction of historic flow paths which creates a change to flow paths.
Lack of Storm Drainage Infrastructure	**Life, safety, health, evacuation**	Restricts movements of people within areas that get overwhelmed by runoff and no ways to remove water from the surface.
	Public health hazards caused by flooding	Flooding can damage properties and if homes are impacted, mold could become an issue.
	Critical facilities	Flooded roadways will reduce emergency response times.
	Transportation	Flooded roadways and intersections causing re-routes of vehicles and emergency personnel.
	Flood insurance claims	N/A
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	N/A
Fissures	**Life, safety, health, evacuation**	Significant fissure activity along the Hunt Highway corridor, US 60/ Meridian Rd and in Pinal County between US 60 and Guadalupe Rd. Serious safety issues if fissures open up and/or widen.
	Public health hazards caused by flooding	Trucks transporting hazardous material on the Hunt Highway or US 60 are at risk if a fissure causes road damage during a storm.
	Critical facilities	US 60, Hunt Highway.
	Transportation	Could result in lengthy ingress/egress issues if damage occurs to US 60, Hunt Highway, or surrounding roads.
	Flood insurance claims	Could increase if new areas are exposed to flooding.
	Economic	Longer-term ingress/egress interruptions if SR 303 is damaged.
	Natural floodplain functions	Could dramatically alter the location and behavior of drainage and reduce flora and fauna habitats.

	Issue	Impact
Wildfires	**Life, safety, health, evacuation**	Transfer of sediment downstream after a wildfire.
	Public health hazards caused by flooding	Post-fire debris flow increases risk to public health.
	Critical facilities	Downstream risk to ingress/egress problems increases for several years after a wildfire.
	Transportation	Ingress/egress problems increases for several years after a wildfire.
	Flood insurance claims	Could increase in areas downstream of a burn area.
	Economic	Higher post-flood maintenance costs for several years after a wildfire.
	Natural floodplain functions	Wildfires may be a natural process, but man-made debris transported during storms can be detrimental to natural floodplain.
Drought	**Life, safety, health, evacuation**	Increased risk of flooding from prolonged flooding which could have adverse impacts to the soil in the area. The soil could dry out and take in less water during the first storm event.
	Public health hazards caused by flooding	N/A
	Critical facilities	Increased visitations due to the high temperatures that often come with drought conditions.
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	Increased groundwater pumping, which could have adverse impacts, such as land subsidence and increased cost of water. Land subsidence could cause damage to drainage infrastructure.
	Natural floodplain functions	Desert vegetation is resilient to drought; however, extended drought could cause an adverse impact to natural floodplains.

3.5 Hassayampa River Watershed Flooding Problems

Table 18: Identified Flooding Problems of the Hassayampa River Watershed

	Issue	Impact
Dams	**Life, safety, health, evacuation**	The Buckeye Structures (Buckeye FRS Nos. 1, 2, and 3 and floodways) are located at the south end of the watershed north of I-10. The structures provide valuable flood protection to I-10, agricultural operations, and parts of Buckeye. The Wickenburg Structures (Sunset and Sunnycove FRSs and Casandro Wash Dam) provide protection for the town and surrounding areas.
	Public health hazards caused by flooding	Although very unlikely, significant residential developments downstream of the dams may be inundated in a dam failure.
	Critical facilities	I-10, Roosevelt and Buckeye irrigation canals, and the railroad are in the downstream inundation areas of the Buckeye Structures. US 60 and police/fire/municipal complex are downstream of the Wickenburg Structures.
	Transportation	The structures provide valuable flood protection for I-10 and US 60 and the railroad, but they would be inundated in the unlikely event of a dam failure.
	Flood insurance claims	May decrease downstream due to increased flood protection.
	Economic	I-10, US 60, and the railroad are important commerce routes for the region and would be highly affected if it damaged due to a dam failure. US 60/SR 93 is a heavily-traveled route to Las Vegas.
	Natural floodplain functions	Dams cut off water to downstream reaches of washes but provide habitat in the upstream reservoir pool.
Embankment overtopping	**Life, safety, health, evacuation**	The CAP, Roosevelt, and Buckeye canals and I-10 traverse the watershed, as well as numerous smaller local irrigation canals. A breach may cause safety issues downstream.
	Public health hazards caused by flooding	None identified.
	Critical facilities	I-10, the CAP Canal, and utility infrastructures.
	Transportation	SR 303 may be affected by a breach of the CAP Canal.
	Flood insurance claims	May increase if downstream flooding occurs.
	Economic	Damage to Zone X structures, higher post-flood maintenance costs.
	Natural floodplain functions	Canals modify natural floodplains, both beneficially and detrimentally.
Single-lot development	**Life, safety, health, evacuation**	Minimal single-lot development. Flooding is usually unpredictable.
	Public health hazards caused by flooding	Flooded local streets in unincorporated county.
	Critical facilities	No significant impact.
	Transportation	Ingress/egress problems on local streets.
	Flood insurance claims	Uncoordinated drainage system could increase number of claims.
	Economic	Flooded residences and post-flood road maintenance costs.
	Natural floodplain functions	Uncoordinated drainage systems tend to negatively interrupt natural flow patterns and behavior.

	Issue	Impact
Un-delineated floodplains	**Life, safety, health, evacuation**	Large areas of undeveloped land in the northern portion lack delineated floodplains.
	Public health hazards caused by flooding	Unidentified level of risk diminishes flood awareness and preparedness, resulting in flooded roadways, residences, and businesses.
	Critical facilities	Unidentified level of risk diminishes flood awareness and preparedness.
	Transportation	Unidentified level of risk diminishes flood awareness and preparedness. Ingress/egress is restricted and post- flood maintenance is needed.
	Flood insurance claims	Residents are unaware of flooding risk and may not carry a policy.
	Economic	Unexpected flooding causes property damage and interrupts farming operations. Increased post-flood maintenance costs.
	Natural floodplain functions	Would be adversely affected by unregulated development along the floodplain. Effect is more critical to minor and medium-sized washes.
Recreation hazards along floodplains	**Life, safety, health, evacuation**	Human activity such as hiking in the White Tank Mountains and long the Hassayampa River. Hikers could be stranded during floods. ATV use is also prevalent in the river corridor.
	Public health hazards caused by flooding	In-channel activity can result in injury or death during a flash flood.
	Critical facilities	I-10 and the railroad cross the Hassayampa River.
	Transportation	At-grade road crossings prevent ingress/egress and increase risk to personal safety.
	Flood insurance claims	N/A
	Economic	N/A
	Natural floodplain functions	Important wildlife habitats and migration corridors may be negatively impacted.
Flash flooding	**Life, safety, health, evacuation**	Entire watershed is susceptible to flooding. Need effective, consistent communication during floods. Evacuation routes may be interrupted, dictating shelter-in-place.
	Public health hazards caused by flooding	Sanitary sewers may be affected. Animal waste conveyed.
	Critical facilities	Public transportation and power infrastructures are in unincorporated county. Need to show evacuation routes and safe distances from areas impacted.
	Transportation	Directly affected – most deaths during flooding are transportation-related.
	Flood insurance claims	Increases likelihood of claims.
	Economic	Agricultural losses may increase.
	Natural floodplain functions	The Hassayampa River Corridor is an important bird habitat.

	Issue	Impact
High runoff potential of soils	**Life, safety, health, evacuation**	About 32% of the watershed has high runoff potential. Runoff typically includes greater transport of sediment.
	Public health hazards caused by flooding	Increases flash flood risk.
	Critical facilities	Exacerbates access problems.
	Transportation	Increases flash flood risk.
	Flood insurance claims	May increase.
	Economic	Comparatively more frequent property damages.
	Natural floodplain functions	N/A
Split flows	**Life, safety, health, evacuation**	Significant sheet flow conditions and braided washes, but development in unincorporated county is low. Level of risk to life and property is uncertain.
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	Roads interrupt the drainage patterns and concentrate flows.
	Flood insurance claims	Would increase due to greater uncertainty of risk.
	Economic	Population growth has channelized sheet flow and increased flood risk.
	Natural floodplain functions	Very sensitive to development & road crossings. Flow becomes concentrated and downstream system may not accommodate it.
Sheet flow channelized by development	**Life, safety, health, evacuation**	Risk to downstream developments and properties.
	Public health hazards caused by flooding	Unidentified level of risk diminishes flood awareness and preparedness, resulting in flooded roadways, residences, and businesses downstream of channelization.
	Critical facilities	Unidentified level of risk diminishes flood awareness and preparedness.
	Transportation	Unidentified level of risk diminishes flood awareness and preparedness.
	Flood insurance claims	Residents downstream may be unaware of the risk and not have purchased flood insurance.
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	Channelization removes the natural floodplain functions.
Alluvial fans	**Life, safety, health, evacuation**	Fan activity on the west side of the White Tank Mountains. Perceived risk may be lower than actual, so preparedness is diminished.
	Public health hazards caused by flooding	Festival Ranch is a master-planned subdivision on the northwest side of the White Tank Mountains.
	Critical facilities	Unidentified level of risk diminishes flood awareness and preparedness.
	Transportation	Unidentified level of risk diminishes flood awareness and preparedness, resulting in flooded roadways.
	Flood insurance claims	Many residents are unaware of flooding risk and do not have flood insurance.
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	Fans provide important wildlife habitat.

	Issue	Impact
Lateral migration and erosion of natural streams	**Life, safety, health, evacuation**	Significant lateral migration and erosion in the Hassayampa River and tributary washes can increase risk to adjacent properties.
	Public health hazards caused by flooding	Unidentified level of risk diminishes flood awareness and preparedness, resulting in flooded roadways, residences, and businesses.
	Critical facilities	Unidentified level of risk diminishes flood awareness and preparedness.
	Transportation	Bridge abutments may be undermined.
	Flood insurance claims	Claims may increase as changes in the location of the watercourse affect additional properties.
	Economic	High costs to repair roads, bridges. Additional property damage may occur adjacent to the watercourse.
	Natural floodplain functions	Lateral erosion is important to natural floodplain function.
Sediment-laden floodwaters	**Life, safety, health, evacuation**	Sediment-laden floodwater often means fast moving floodwaters which pose a risk to people trying to cross.
	Public health hazards caused by flooding	Sediment-laden floodwater could contain bacteria or hazardous materials that were picked up during the storm, leading to public health risks following the storms when the sediment is still present.
	Critical facilities	N/A
	Transportation	Culvert clogged by sediment and debris could overtop the roadway creating a hazard to vehicular traffic.
	Flood insurance claims	N/A
	Economic	Increased damage from sediment-laden floodwaters
	Natural floodplain functions	Sediment transport is important to natural floodplain function.
Loss of habitat	**Life, safety, health, evacuation**	N/A
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	N/A
	Natural floodplain functions	Natural habitats are vital to natural floodplain functions. As development expands and habitats are lost, the benefits of natural floodplains are also lost.
At-grade crossings	**Life, safety, health, evacuation**	Problematic as the risks are not fully known at all at-grade crossings. Depth gages could provide additional information to drivers before they try to cross a flooded crossing. Stranded vehicles could require emergency rescue services.
	Public health hazards caused by flooding	Potential for vehicles to be carried away by swiftly moving water if the person crosses a flooded at-grade crossing.
	Critical facilities	Potential delays in emergency services to properties that are only accessed by at-grade crossings.
	Transportation	Delays in access in and out of developed areas.
	Flood insurance claims	N/A
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	N/A

	Issue	Impact
Flooding of transportation corridors	Life, safety, health, evacuation	Stranded vehicles could require emergency rescue services.
	Public health hazards caused by flooding	Potential for vehicles to be carried away by swiftly moving water.
	Critical facilities	Potential delays for access of emergency services.
	Transportation	Delays in access.
	Flood insurance claims	N/A
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	N/A
Localized flooding	Life, safety, health, evacuation	Lack of storm drain infrastructure within developed areas on unincorporated Maricopa County.
	Public health hazards caused by flooding	Localized flooding can damage properties and if homes are impacted, mold could become an issue.
	Critical facilities	Flooding could cause delays to emergency services.
	Transportation	Flooding intersections and roadways could impact vehicular traffic in and out of areas.
	Flood insurance claims	Localized flooding could impact structures and, if insured, cause increases in flood insurance claims.
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	N/A
Managing Proposed Development	Life, safety, health, evacuation	Newly developed master planned areas need to plan for emergency service access.
	Public health hazards caused by flooding	Potential damage to properties if stormwater is not managed properly.
	Critical facilities	Adequate ingress and egress during emergency scenarios.
	Transportation	At-grade crossings, culvert crossings, and intersection flooding.
	Flood insurance claims	If stormwater is not properly managed, flood insurance claims could increase if the areas are within floodplains or the properties have flood insurance.
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	Newly developed areas should consider the natural floodplain functions and weave these into their designs.
Block Wall/Property Fences	Life, safety, health, evacuation	Diverted flows will increase concentrated flows at other locations creating potential risks to properties and lives.
	Public health hazards caused by flooding	Risks at locations of diverted flows where flows have increased could cause issues to those attempting to cross where water typically crossing the roadway was less.
	Critical facilities	Reduced ingress/egress if storm water is diverted to previously defined access route.
	Transportation	Increased flows for at-grade crossings and other storm drainage infrastructure. Roadway flooding is a concern.
	Flood insurance claims	Increased claims from higher concentrations of flows.
	Economic	Increased damage to infrastructure and properties which holds up money being spent on other projects elsewhere.
	Natural floodplain functions	Obstruction of historic flow paths which creates a change to flow paths.

	Issue	Impact
Lack of Storm Drainage Infrastructure	**Life, safety, health, evacuation**	Restricts movements of people within areas that get overwhelmed by runoff and no ways to remove water from the surface.
	Public health hazards caused by flooding	Flooding can damage properties and if homes are impacted, mold could become an issue.
	Critical facilities	Flooded roadways will reduce emergency response times.
	Transportation	Flooded roadways and intersections causing re-routes of vehicles and emergency personnel.
	Flood insurance claims	N/A
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	N/A
Invasive vegetation species	**Life, safety, health, evacuation**	N/A
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	N/A
	Natural floodplain functions	Destruction of natural vegetation within waterways, leading to loss of habitats for some animals and potential increased obstruction of flow within the waterway.
Wildfires	**Life, safety, health, evacuation**	The hazard rating is medium to high in the mapped portion of the watershed.
	Public health hazards caused by flooding	Transfer of sediment downstream and increased flash flood potential after a wildfire. Post-fire debris flow increases risk to public health.
	Critical facilities	Downstream risk to ingress/egress problems increases for several years after a wildfire.
	Transportation	Ingress/egress problems increases for several years after a wildfire.
	Flood insurance claims	Could increase in areas downstream of a burn area.
	Economic	Higher post-flood maintenance costs for several years after a wildfire.
	Natural floodplain functions	Wildfires may be a natural process, but man-made debris transported during storms can be detrimental to natural floodplain.
Drought	**Life, safety, health, evacuation**	Increased risk of flooding from prolonged flooding which could have adverse impacts to the soil in the area. The soil could dry out and take in less water during the first storm event.
	Public health hazards caused by flooding	N/A
	Critical facilities	Increased visitations due to the high temperatures that often come with drought conditions.
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	Increased groundwater pumping, which could have adverse impacts, such as land subsidence and increased cost of water.
	Natural floodplain functions	Desert vegetation is resilient to drought; however, extended drought could cause an adverse impact to natural floodplains.

3.6 Lower Gila River Watershed Flooding Problems

Table 19: Identified Flooding Problems of the Lower Gila River Watershed

	Issue	Impact
Dams	**Life, safety, health, evacuation**	The U.S. Army Corps of Engineers' Painted Rock Dam is in the northeast portion of the watershed.
	Public health hazards caused by flooding	Minimal human activity downstream.
	Critical facilities	N/A
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	Agricultural operations would be impacted.
	Natural floodplain functions	Tamarisk deters growth of native plant species. Dams cut off water to downstream reaches of washes.
Embankment overtopping	**Life, safety, health, evacuation**	N/A
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	N/A
	Natural floodplain functions	Irrigation canals modify natural floodplains, both beneficially and detrimentally.
Single-lot development	**Life, safety, health, evacuation**	Evacuation routes are less reliable.
	Public health hazards caused by flooding	Very few, isolated structures that support farming operations.
	Critical facilities	N/A
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	N/A
	Natural floodplain functions	N/A
Un-delineated floodplains	**Life, safety, health, evacuation**	A number of washes are delineated as Zone A (approximate). Natural washes on much of the remaining developed/ developable land have been significantly altered or eliminated by farm fields.
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	N/A
	Natural floodplain functions	N/A

	Issue	Impact
Flash flooding	**Life, safety, health, evacuation**	Entire watershed is susceptible to flooding, but lack of human activity poses low risk.
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	Agricultural operations may sustain losses to crops.
	Natural floodplain functions	Not impacted.
High runoff potential of soils	**Life, safety, health, evacuation**	About half of the watershed has high runoff potential. High water table near the Gila River results in increased runoff potential.
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	May exacerbate agricultural losses.
	Natural floodplain functions	N/A
Split flows	**Life, safety, health, evacuation**	Flatter land slopes and farming operations result in ill-defined flow patterns that mask flood risk. Significant sheet flow conditions and braided washes outside the agricultural areas.
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	N/A
	Natural floodplain functions	N/A
Alluvial fans	**Life, safety, health, evacuation**	Fan activity in the Sauceda Mountains, Crater Range, and Gila Bend Mountains. However, there is little human activity in the area.
	Public health hazards caused by flooding	No significant impact.
	Critical facilities	Unidentified level of risk diminishes flood awareness and preparedness.
	Transportation	Unidentified level of risk diminishes flood awareness and preparedness, resulting in flooded roadways.
	Flood insurance claims	Many residents are unaware of flooding risk and do not have flood insurance.
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	Fans provide important wildlife habitat.

	Issue	Impact
Lateral migration and erosion of natural streams	Life, safety, health, evacuation	N/A
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	N/A
	Natural floodplain functions	Lateral migration is important to natural floodplain function.
Sediment-laden floodwaters	Life, safety, health, evacuation	Sediment-laden floodwater often means fast moving floodwaters which pose a risk to people trying to cross.
	Public health hazards caused by flooding	Sediment-laden floodwater could contain bacteria or hazardous materials that were picked up during the storm, leading to public health risks following the storms when the sediment is still present.
	Critical facilities	N/A
	Transportation	Culvert clogged by sediment and debris could overtop the roadway creating a hazard to vehicular traffic.
	Flood insurance claims	N/A
	Economic	Increased damage from sediment-laden floodwaters
	Natural floodplain functions	Sediment transport is important to natural floodplain function.
Loss of habitat	Life, safety, health, evacuation	N/A
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	N/A
	Natural floodplain functions	Natural habitats are vital to natural floodplain functions. As development expands and habitats are lost, the benefits of natural floodplains are also lost.
At-grade crossings	Life, safety, health, evacuation	Problematic as the risks are not fully known at all at-grade crossings. Depth gages could provide additional information to drivers before they try to cross a flooded crossing. Stranded vehicles could require emergency rescue services.
	Public health hazards caused by flooding	Potential for vehicles to be carried away by swiftly moving water if the person crosses a flooded at-grade crossing.
	Critical facilities	Potential delays in emergency services to properties that are only accessed by at-grade crossings.
	Transportation	Delays in access in and out of developed areas.
	Flood insurance claims	N/A
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	N/A

	Issue	Impact
Flooding of transportation corridors	**Life, safety, health, evacuation**	Stranded vehicles could require emergency rescue services.
	Public health hazards caused by flooding	Potential for vehicles to be carried away by swiftly moving water.
	Critical facilities	Potential delays for access of emergency services.
	Transportation	Delays in access.
	Flood insurance claims	N/A
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	N/A
Agricultural interruptions to natural drainage patterns	**Life, safety, health, evacuation**	N/A
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	Diversion of floodwater due to agricultural plots could impact roadways causing delays.
	Flood insurance claims	Diversion of floodwater due to agricultural plots could impact homes and create flood insurance claims, if the property has flood insurance.
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	Removal of natural floodplains for agriculture.
Block Wall/Property Fences	**Life, safety, health, evacuation**	Diverted flows will increase concentrated flows at other locations creating potential risks to properties and lives.
	Public health hazards caused by flooding	Risks at locations of diverted flows where flows have increased could cause issues to those attempting to cross where water typically crossing the roadway was less.
	Critical facilities	Reduced ingress/egress if storm water is diverted to previously defined access route.
	Transportation	Increased flows for at-grade crossings and other storm drainage infrastructure. Roadway flooding is a concern.
	Flood insurance claims	Increased claims from higher concentrations of flows.
	Economic	Increased damage to infrastructure and properties which holds up money being spent on other projects elsewhere.
	Natural floodplain functions	Obstruction of historic flow paths which creates a change to flow paths.
Invasive vegetation species	**Life, safety, health, evacuation**	N/A
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	N/A
	Natural floodplain functions	Destruction of natural vegetation within waterways, leading to loss of habitats for some animals and potential increased obstruction of flow within the waterway. Tamarisk is the key issue in most Maricopa County waterways.

	Issue	Impact
Wildfires	**Life, safety, health, evacuation**	High hazard in the Gila River corridor.
	Public health hazards caused by flooding	Post-fire debris flow increases risk to public health.
	Critical facilities	N/A
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	May cause loss of crops and livestock.
	Natural floodplain functions	Wildfires may be a natural process, but tamarisk and man-made debris transported during storms can be detrimental to natural floodplain.
Drought	**Life, safety, health, evacuation**	Increased risk of flooding from prolonged flooding which could have adverse impacts to the soil in the area. The soil could dry out and take in less water during the first storm event.
	Public health hazards caused by flooding	N/A
	Critical facilities	Increased visitations due to the high temperatures that often come with drought conditions.
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	Increased groundwater pumping, which could have adverse impacts, such as land subsidence and increased cost of water. Land subsidence could cause damage to drainage infrastructure.
	Natural floodplain functions	Desert vegetation is resilient to drought; however, extended drought could cause an adverse impact to natural floodplains.

3.7 Verde River Watershed Flooding Problems

Table 20: Identified Flooding Problems of the Verde River Watershed

	Issue	Impact
Dams	**Life, safety, health, evacuation**	Bartlett and Horseshoe dams are on the Verde River. Salt River dams include Roosevelt at the eastern tip of the county, Horse Mesa, Mormon Flat, and Stewart Mountain dams.
	Public health hazards caused by flooding	Although very unlikely, significant damage could occur downstream of a dam failure. Outreach and education is needed regarding water quality on the Salt and Verde systems since they are a vital source for potable water in Maricopa County.
	Critical facilities	SR 87, 188, and 288 are downstream of Bartlett Dam.
	Transportation	SR 87, 188, and 288 provide access to Payson and the lakes on the Salt River. The highways may be inundated in the unlikely event of a dam failure.
	Flood Insurance Claims	N/A
	Economic	A dam failure would have a major impact on the metropolitan Phoenix area. If the highways were damaged by a failure at Bartlett Dam, access to Payson would be cut off, and alternative routes are much longer. Recreational enterprises would be financially impacted if access to the Salt River river/lake system.
	Natural floodplain functions	Dams cut off water to downstream reaches of washes but provide habitat in the upstream reservoir pool.
Single-lot development	**Life, safety, health, evacuation**	The community of Rio Verde is predominantly single-lot development and is susceptible to shallow sheet flow and shifting drainage patterns.
	Public health hazards caused by flooding	Flooded local streets limit ingress/egress.
	Critical facilities	No significant impact.
	Transportation	Rio Verde is adjacent to The Tonto National Forest and McDowell Mountain Regional Park, which limits ingress/egress. Within the community, local streets may be flooded also.
	Flood insurance claims	Uncoordinated drainage system could increase number of claims.
	Economic	Flooded residences. Many of the streets are unimproved and are susceptible to flood damage.
	Natural floodplain functions	Uncoordinated drainage systems tend to negatively interrupt natural flow patterns and behavior.

	Issue	Impact
SFHA – watercourses/ponding	**Life, safety, health, evacuation**	Identified levels of risk for Zone AE delineations with Base Flood Elevations.
	Public health hazards caused by flooding	Structures could be at risk whether within the floodplain or on the fringes, leading to concerns of mold within impacted structures.
	Critical facilities	Identified risks provide emergency services a chance to be prepared in emergency situations but could still cause delays in responses.
	Transportation	Identified crossings could be at risk if they are at-grade crossings. The identified risks could provide emergency services a chance to close the crossing, potentially saving lives and property but causing a delay in travel.
	Flood insurance claims	Residents within floodplains with federally backed mortgages require flood insurance and many other homes opt to buy flood insurance to protect their property.
	Economic	Flooding interrupts commerce and results in property damage.
	Natural floodplain functions	Would be adversely affected by unregulated development.
Un-delineated floodplains	**Life, safety, health, evacuation**	A number of washes are delineated in the Rio Verde Area. The natural flow exhibits shallow, distributary characteristics and the level of risk is difficult to determine.
	Public health hazards caused by flooding	Unidentified level of risk diminishes flood awareness and preparedness, resulting in flooded roadways, residences, and businesses.
	Critical facilities	Unidentified level of risk diminishes flood awareness and preparedness.
	Transportation	Unidentified level of risk diminishes flood awareness and preparedness. Ingress/egress is restricted and post- flood maintenance is needed.
	Flood insurance claims	Residents are unaware of flooding risk and may not carry a policy.
	Economic	Unexpected flooding causes property damage and interrupts farming operations. Increased post-flood maintenance costs.
	Natural floodplain functions	Would be adversely affected by unregulated development. More critical to minor and medium-sized washes.
Recreation hazards along floodplains	**Life, safety, health, evacuation**	High recreation use in the lakes created by the dams on both rivers.
	Public health hazards caused by flooding	In-channel activity can result in injury or death during a flash flood.
	Critical facilities	N/A
	Transportation	At-grade road crossings prevent ingress/egress and increase risk to personal safety.
	Flood insurance claims	N/A
	Economic	N/A
	Natural floodplain functions	Important wildlife habitats and migration corridors may be negatively impacted.

	Issue	Impact
Flash flooding	**Life, safety, health, evacuation**	Entire watershed is susceptible to flooding. Need to provide outreach to Rio Verde residents on flood risk. Evacuation routes may be interrupted, dictating shelter-in-place.
	Public health hazards caused by flooding	Sanitary sewers may be affected, and animal waste may be conveyed.
	Critical facilities	Unidentified level of risk diminishes flood awareness and preparedness.
	Transportation	Directly affected – most deaths during flooding are transportation-related.
	Flood insurance claims	Increases likelihood of claims.
	Economic	Increased structural damage and road maintenance costs.
	Natural floodplain functions	Important bird area; nesting habitat for bald eagles.
High runoff potential of soils	**Life, safety, health, evacuation**	The watershed has a mix of moderately low, moderately high, and high runoff potential.
	Public health hazards caused by flooding	Increases flash flood risk.
	Critical facilities	Exacerbates access problems.
	Transportation	Increases flash flood risk.
	Flood insurance claims	May increase.
	Economic	Comparatively more frequent property damages.
	Natural floodplain functions	N/A
Split flows	**Life, safety, health, evacuation**	Significant sheet flow conditions and braided washes. Level of risk to life and property is uncertain.
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	Roads interrupt the drainage patterns and concentrate flows.
	Flood insurance claims	Would increase due to greater uncertainty of risk.
	Economic	Population growth has channelized sheet flow and increased flood risk.
	Natural floodplain functions	Very sensitive to development & road crossings. Flow becomes concentrated and downstream system may not accommodate it.
Sheet flow channelized by development	**Life, safety, health, evacuation**	Risk to downstream developments and properties.
	Public health hazards caused by flooding	Unidentified level of risk diminishes flood awareness and preparedness, resulting in flooded roadways, residences, and businesses downstream of channelization.
	Critical facilities	Unidentified level of risk diminishes flood awareness and preparedness.
	Transportation	Unidentified level of risk diminishes flood awareness and preparedness.
	Flood insurance claims	Residents downstream may be unaware of the risk and not have purchased flood insurance.
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	Channelization removes the natural floodplain functions.

	Issue	Impact
Alluvial fans	**Life, safety, health, evacuation**	Fan activity in the McDowell Mountains. Perceived risk may be lower than actual, so preparedness is diminished.
	Public health hazards caused by flooding	Unidentified level of risk diminishes flood awareness and preparedness, resulting in flooded roadways, residences, and businesses.
	Critical facilities	Unidentified level of risk diminishes flood awareness and preparedness.
	Transportation	Unidentified level of risk diminishes flood awareness and preparedness, resulting in flooded roadways.
	Flood insurance claims	Many residents are unaware of flooding risk and do not have flood insurance.
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	Fans provide important wildlife habitat.
Lateral migration and erosion of natural streams	**Life, safety, health, evacuation**	Significant lateral migration and erosion in the rivers and washes.
	Public health hazards caused by flooding	Unidentified level of risk diminishes flood awareness and preparedness, resulting in flooded roadways, residences, and businesses.
	Critical facilities	Unidentified level of risk diminishes flood awareness and preparedness.
	Transportation	Bridge abutments may be undermined.
	Flood insurance claims	Claims may increase as changes in the location of the watercourse affect additional properties.
	Economic	High costs to repair roads, bridges. Additional property damage may occur adjacent to the watercourses.
	Natural floodplain functions	Lateral erosion is important to natural floodplain function.
Sediment-laden floodwaters	**Life, safety, health, evacuation**	Sediment-laden floodwater often means fast moving floodwaters which pose a risk to people trying to cross.
	Public health hazards caused by flooding	Bacteria or hazardous materials could be picked up during the storm, leading to public health risks following the storms when the sediment is still present.
	Critical facilities	N/A
	Transportation	Culvert clogged by sediment and debris could overtop the roadway creating a hazard to vehicular traffic.
	Flood insurance claims	N/A
	Economic	Increased damage from sediment-laden floodwaters
	Natural floodplain functions	Sediment transport is important to natural floodplain function.
Loss of habitat	**Life, safety, health, evacuation**	N/A
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	N/A
	Natural floodplain functions	Natural habitats are vital to natural floodplain functions. As development expands and habitats are lost, the benefits of natural floodplains are also lost.

	Issue	Impact
At-grade crossings	**Life, safety, health, evacuation**	Problematic as the risks are not fully known at all at-grade crossings. Depth gages could provide additional information to drivers before they try to cross a flooded crossing. Stranded vehicles could require emergency rescue services.
	Public health hazards caused by flooding	Potential for vehicles to be carried away by swiftly moving water if the person crosses a flooded at-grade crossing.
	Critical facilities	Potential delays in emergency services to properties that are only accessed by at-grade crossings.
	Transportation	Delays in access in and out of developed areas.
	Flood insurance claims	N/A
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	N/A
Flooding of transportation corridors	**Life, safety, health, evacuation**	Stranded vehicles could require emergency rescue services.
	Public health hazards caused by flooding	Potential for vehicles to be carried away by swiftly moving water.
	Critical facilities	Potential delays for access of emergency services.
	Transportation	Delays in access.
	Flood insurance claims	N/A
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	N/A
Managing Proposed Development	**Life, safety, health, evacuation**	Newly developed master planned areas need to plan for emergency service access.
	Public health hazards caused by flooding	Potential damage to properties if stormwater is not managed properly.
	Critical facilities	Adequate ingress and egress during emergency scenarios.
	Transportation	At-grade crossings, culvert crossings, and intersection flooding.
	Flood insurance claims	If stormwater is not properly managed, flood insurance claims could increase if the areas are within floodplains or the properties have flood insurance.
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	Newly developed areas should consider the natural floodplain functions and weave these into their designs.
Urban-Suburban Interface	**Life, safety, health, evacuation**	Different land use and density along with potentially different storm drain infrastructure features to tie together.
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	Increased runoff due to urban sprawl and increase impervious areas.
	Flood insurance claims	N/A
	Economic	N/A
	Natural floodplain functions	Urban development typically no longer adheres to protecting the natural floodplain functions. Channelization occurs through urban areas to open up more land for development.

	Issue	Impact
Block Wall/Property Fences	**Life, safety, health, evacuation**	Diverted flows will increase concentrated flows at other locations creating potential risks to properties and lives.
	Public health hazards caused by flooding	Risks at locations of diverted flows where flows have increased could cause issues to those attempting to cross where water typically crossing the roadway was less.
	Critical facilities	Reduced ingress/egress if storm water is diverted to previously defined access route.
	Transportation	Increased flows for at-grade crossings and other storm drainage infrastructure. Roadway flooding is a concern.
	Flood insurance claims	Increased claims from higher concentrations of flows.
	Economic	Increased damage to infrastructure and properties which holds up money being spent on other projects elsewhere.
	Natural floodplain functions	Obstruction of historic flow paths which creates a change to flow paths.
Lack of Storm Drainage Infrastructure	**Life, safety, health, evacuation**	Restricts movements of people within areas that get overwhelmed by runoff and no ways to remove water from the surface.
	Public health hazards caused by flooding	Flooding can damage properties and if homes are impacted, mold could become an issue.
	Critical facilities	Flooded roadways will reduce emergency response times.
	Transportation	Flooded roadways and intersections causing re-routes of vehicles and emergency personnel.
	Flood insurance claims	N/A
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	N/A
Wildfires	**Life, safety, health, evacuation**	The hazard rating is high in the northern and eastern portions of the watershed and moderate for most of the remaining portion. A considerable portion of the watershed is in the Tonto National Forest.
	Public health hazards caused by flooding	Transfer of sediment downstream and increased flash flood potential after a wildfire. Post-fire debris flow increases risk to public health. Wildfires can lead to water quality issues in the reservoir systems.
	Critical facilities	Downstream risk to ingress/egress problems increases for several years after a wildfire.
	Transportation	Ingress/egress problems increases for several years after a wildfire.
	Flood insurance claims	Could increase in areas downstream of a burn area.
	Economic	Higher post-flood maintenance costs for several years after a wildfire.
	Natural floodplain functions	Wildfires may be a natural process, but man-made debris transported during storms can be detrimental to natural floodplain.

	Issue	Impact
Drought	**Life, safety, health, evacuation**	Increased risk of flooding from prolonged flooding which could have adverse impacts to the soil in the area. The soil could dry out and take in less water during the first storm event.
	Public health hazards caused by flooding	N/A
	Critical facilities	Increased visitations due to the high temperatures that often come with drought conditions.
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	Increased groundwater pumping, which could have adverse impacts, such as land subsidence and increased cost of water. Land subsidence could cause damage to drainage infrastructure.
	Natural floodplain functions	Desert vegetation is resilient to drought; however, extended drought could cause an adverse impact to natural floodplains.

3.8 Waterman Wash Watershed Flooding Problems

Table 21: Identified Flooding Problems of the Waterman Wash Watershed

	Issue	Impact
Embankment overtopping	**Life, safety, health, evacuation**	Numerous irrigation berms are located in the agricultural areas near Gila Bend.
	Public health hazards caused by flooding	Minimal human activity downstream of the irrigation berms.
	Critical facilities	N/A
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	N/A
	Natural floodplain functions	Irrigation canals modify natural floodplains, both beneficially and detrimentally.
Single-lot development	**Life, safety, health, evacuation**	Evacuation routes are less reliable.
	Public health hazards caused by flooding	Single-lot development is predominant in Mobile and on the south side of the Gila River near Goodyear.
	Critical facilities	N/A
	Transportation	N/A
	Flood insurance claims	Likely to increase.
	Economic	Structural damage can occur to residences.

	Issue	Impact
	Natural floodplain functions	Adversely affected by changes in flow patterns.
SFHA – watercourses/ponding	**Life, safety, health, evacuation**	Identified levels of risk for Zone AE delineations with Base Flood Elevations.
	Public health hazards caused by flooding	Structures could be at risk whether within the floodplain or on the fringes, leading to concerns of mold within impacted structures.
	Critical facilities	Identified risks provide emergency services a chance to be prepared in emergency situations but could still cause delays in responses.
	Transportation	Identified crossings could be at risk if they are at-grade crossings. The identified risks could provide emergency services a chance to close the crossing, potentially saving lives and property but causing a delay in travel.
	Flood insurance claims	Residents within floodplains with federally backed mortgages require flood insurance and many other homes opt to buy flood insurance to protect their property.
	Economic	Flooding interrupts commerce and results in property damage.
	Natural floodplain functions	Would be adversely affected by unregulated development.
Un-delineated floodplains	**Life, safety, health, evacuation**	A number of washes are delineated as Zone A (approximate). Natural washes on much of the remaining developed/ developable land have been significantly altered or eliminated by farm fields.
	Public health hazards caused by flooding	Unidentified level of risk diminishes flood awareness and preparedness, resulting in flooded roadways, residences, and businesses.
	Critical facilities	Unidentified level of risk diminishes flood awareness and preparedness.
	Transportation	Unidentified level of risk diminishes flood awareness and preparedness. Ingress/egress is restricted and post-flood maintenance is needed.
	Flood insurance claims	Residents are unaware of flooding risk.
	Economic	Unexpected flooding causes property damage and interrupts farming operations. Increased post-flood maintenance costs.
	Natural floodplain functions	Would be adversely affected by unregulated development. More critical to minor and medium-sized washes.
Repetitive losses	**Life, safety, health, evacuation**	Repetitive loss area located at Watson Road and MC 85 in Buckeye.
	Public health hazards caused by flooding	Causes damage to properties and increases potential exposure to post-flood hazards such as mold growth.
	Critical facilities	N/A
	Transportation	Ingress/egress repeatedly flooded.
	Flood insurance claims	Comparatively more claims made.
	Economic	Comparatively more frequent property damage.
	Natural floodplain functions	No significant impact.

	Issue	Impact
Recreation hazards along floodplains	**Life, safety, health, evacuation**	Human activity such as hiking in Estrella Mountain Regional Park and along the Gila River. Hikers could be stranded during floods. ATV use is also prevalent in the wash and river corridor.
	Public health hazards caused by flooding	In-channel activity can result in injury or death during a flash flood.
	Critical facilities	State Route 85, I-10, I-8, and State Route 238 cross different floodplains for emergency access.
	Transportation	At-grade crossings prevent ingress/egress and increase risk to personal safety.
	Flood insurance claims	N/A
	Economic	N/A
	Natural floodplain functions	Important wildlife habitats and migration corridors may be negatively impacted.
Flash flooding	**Life, safety, health, evacuation**	Entire watershed is susceptible to flooding, but lack of human activity poses low risk.
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	Directly affected – most deaths during flooding are transportation-related. Ray Rd. north of Narrimore was flooding in January 2010.
	Flood insurance claims	Increases likelihood of claims.
	Economic	Agricultural operations may sustain losses to crops.
	Natural floodplain functions	Not impacted.
High runoff potential of soils	**Life, safety, health, evacuation**	About half of the watershed has high runoff potential. High water table near the Gila River results in increased runoff potential.
	Public health hazards caused by flooding	Increases flash flood risk.
	Critical facilities	Exacerbates access problems.
	Transportation	Short basin response times in & around mountains increase risk at road crossings.
	Flood insurance claims	May increase.
	Economic	May exacerbate agricultural losses.
	Natural floodplain functions	N/A

	Issue	Impact
Split flows	**Life, safety, health, evacuation**	Flatter land slopes and farming operations result in ill-defined flow patterns that mask flood risk. Significant sheet flow conditions and braided washes outside the agricultural areas. Waterman Wash is highly erosive.
	Public health hazards caused by flooding	Increased due to uncertain flow paths.
	Critical facilities	N/A
	Transportation	N/A
	Flood insurance claims	Increased due to uncertain flow paths.
	Economic	Increased due to uncertain flow paths.
	Natural floodplain functions	N/A
Alluvial fans	**Life, safety, health, evacuation**	Fan activity in the Estrella Mountains, Maricopa Mountains, and Gila Bend Mountains. Perceived risk may be lower than actual, so preparedness is diminished.
	Public health hazards caused by flooding	Unidentified level of risk diminishes flood awareness and preparedness, resulting in flooded roadways, residences, and businesses.
	Critical facilities	Unidentified level of risk diminishes flood awareness and preparedness.
	Transportation	Unidentified level of risk diminishes flood awareness and preparedness, resulting in flooded roadways.
	Flood insurance claims	Many residents are unaware of flooding risk and do not have flood insurance.
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	Fans provide important wildlife habitat.
Lateral migration and erosion of natural streams	**Life, safety, health, evacuation**	Significant lateral migration and erosion in the rivers and washes.
	Public health hazards caused by flooding	Unidentified level of risk diminishes flood awareness and preparedness, resulting in flooded roadways, residences, and businesses.
	Critical facilities	Unidentified level of risk diminishes flood awareness and preparedness.
	Transportation	Bridge abutments may be undermined.
	Flood insurance claims	Claims may increase as changes in the location of the watercourse affect additional properties.
	Economic	High costs to repair roads, bridges. Additional property damage may occur adjacent to the watercourse.
	Natural floodplain functions	Lateral erosion is important to natural floodplain function.

	Issue	Impact
Sediment-laden floodwaters	**Life, safety, health, evacuation**	Sediment-laden floodwater often means fast moving floodwaters which pose a risk to people trying to cross.
	Public health hazards caused by flooding	Sediment-laden floodwater could contain bacteria or hazardous materials that were picked up during the storm, leading to public health risks following the storms when the sediment is still present.
	Critical facilities	N/A
	Transportation	Culvert clogged by sediment and debris could overtop the roadway creating a hazard to vehicular traffic.
	Flood insurance claims	N/A
	Economic	Increased damage from sediment-laden floodwaters
	Natural floodplain functions	Sediment transport is important to natural floodplain function.
Loss of habitat	**Life, safety, health, evacuation**	N/A
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	N/A
	Natural floodplain functions	Natural habitats are vital to natural floodplain functions. As development expands and habitats are lost, the benefits of natural floodplains are also lost.
At-grade crossings	**Life, safety, health, evacuation**	Problematic as the risks are not fully known at all at-grade crossings. Depth gages could provide additional information to drivers before they try to cross a flooded crossing. Stranded vehicles could require emergency rescue services.
	Public health hazards caused by flooding	Potential for vehicles to be carried away by swiftly moving water if the person crosses a flooded at-grade crossing.
	Critical facilities	Potential delays in emergency services to properties that are only accessed by at-grade crossings.
	Transportation	Delays in access in and out of developed areas.
	Flood insurance claims	N/A
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	N/A
Flooding of transportation corridors	**Life, safety, health, evacuation**	Stranded vehicles could require emergency rescue services.
	Public health hazards caused by flooding	Potential for vehicles to be carried away by swiftly moving water.
	Critical facilities	Potential delays for access of emergency services.
	Transportation	Delays in access.
	Flood insurance claims	N/A
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	N/A

	Issue	Impact
Agricultural interruptions to natural drainage patterns	**Life, safety, health, evacuation**	N/A
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	Diversion of floodwater due to agricultural plots could impact roadways causing delays.
	Flood insurance claims	Diversion of floodwater due to agricultural plots could impact homes and create flood insurance claims, if the property has flood insurance.
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	Removal of natural floodplains for agriculture.
Managing Proposed Development	**Life, safety, health, evacuation**	Newly developed master planned areas need to plan for emergency service access.
	Public health hazards caused by flooding	Potential damage to properties if stormwater is not managed properly.
	Critical facilities	Adequate ingress and egress during emergency scenarios.
	Transportation	At-grade crossings, culvert crossings, and intersection flooding.
	Flood insurance claims	If stormwater is not properly managed, flood insurance claims could increase if the areas are within floodplains or the properties have flood insurance.
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	Newly developed areas should consider the natural floodplain functions and weave these into their designs.
Urban-Suburban Interface	**Life, safety, health, evacuation**	Different land use and density along with potentially different storm drain infrastructure features to tie together.
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	Increased runoff due to urban sprawl and increase impervious areas.
	Flood insurance claims	N/A
	Economic	N/A
	Natural floodplain functions	Urban development typically no longer adheres to protecting the natural floodplain functions. Channelization occurs through urban areas to open up more land for development.

	Issue	Impact
Block Wall/Property Fences	**Life, safety, health, evacuation**	Diverted flows will increase concentrated flows at other locations creating potential risks to properties and lives.
	Public health hazards caused by flooding	Risks at locations of diverted flows where flows have increased could cause issues to those attempting to cross where water typically crossing the roadway was less.
	Critical facilities	Reduced ingress/egress if storm water is diverted to previously defined access route.
	Transportation	Increased flows for at-grade crossings and other storm drainage infrastructure. Roadway flooding is a concern.
	Flood insurance claims	Increased claims from higher concentrations of flows.
	Economic	Increased damage to infrastructure and properties which holds up money being spent on other projects elsewhere.
	Natural floodplain functions	Obstruction of historic flow paths which creates a change to flow paths.
Lack of Storm Drainage Infrastructure	**Life, safety, health, evacuation**	Restricts movements of people within areas that get overwhelmed by runoff and no ways to remove water from the surface.
	Public health hazards caused by flooding	Flooding can damage properties and if homes are impacted, mold could become an issue.
	Critical facilities	Flooded roadways will reduce emergency response times.
	Transportation	Flooded roadways and intersections causing re-routes of vehicles and emergency personnel.
	Flood insurance claims	N/A
	Economic	Unexpected flooding interrupts commerce and results in property damage.
	Natural floodplain functions	N/A
Invasive vegetation species	**Life, safety, health, evacuation**	N/A
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	N/A
	Natural floodplain functions	Destruction of natural vegetation within waterways, leading to loss of habitats for some animals and potential increased obstruction of flow within the waterway. Tamarisk is the key issue in most Maricopa County waterways.
Fissures	**Life, safety, health, evacuation**	Unconfirmed fissure near 78th Ave. north of SR 238.
	Public health hazards caused by flooding	N/A
	Critical facilities	N/A
	Transportation	SR 238 could be impacted.
	Flood insurance claims	Could increase if new areas are exposed to flooding.
	Economic	Longer-term ingress/egress interruptions if SR 303 is damaged.
	Natural floodplain functions	Could dramatically alter the location and behavior of drainage and reduce flora and fauna habitats.

	Issue	Impact
Wildfires	**Life, safety, health, evacuation**	High hazard in the Gila River corridor.
	Public health hazards caused by flooding	Post-fire debris flow increases risk to public health.
	Critical facilities	Downstream risk to ingress/egress problems increases for several years after a wildfire.
	Transportation	Ingress/egress problems increases for several years after a wildfire.
	Flood insurance claims	Could increase in areas downstream of a burn area.
	Economic	Higher post-flood maintenance costs for several years after a wildfire.
	Natural floodplain functions	Wildfires may be a natural process, but man-made debris transported during storms can be detrimental to natural floodplain.
Drought	**Life, safety, health, evacuation**	Increased risk of flooding from prolonged flooding which could have adverse impacts to the soil in the area. The soil could dry out and take in less water during the first storm event.
	Public health hazards caused by flooding	N/A
	Critical facilities	Increased visitations due to the high temperatures that often come with drought conditions.
	Transportation	N/A
	Flood insurance claims	N/A
	Economic	Increased groundwater pumping, which could have adverse impacts, such as land subsidence and increased cost of water. Land subsidence could cause damage to drainage infrastructure.
	Natural floodplain functions	Desert vegetation is resilient to drought; however, extended drought could cause an adverse impact to natural floodplains.

3.9 Flood Damage to Structures: 2015 – 2019

The District uses several methods to keep track of flood damages and to include it in assessments of flooding problems in Maricopa County.

3.9.1 Presidential Disaster Declarations

No presidential disaster declarations have occurred for flooding or severe storms in Maricopa County since 2014 (https://www.fema.gov/disasters/state-tribal-government).

3.9.2 Report-a-Flood

The District's Report a Flood tool (https://gis.maricopa.gov/reportaflood/default.html) is a web-based application that allows people to report flooding incidents by location, describe the incident, and attach photos or videos. This information can be used by the District, incorporated communities and other agencies when conducting flood assessments. The public can also access the results to see where flooding problems have occurred, see a description of the problem, and view photos or videos that were provided.

Since January 2015 there have been 42 entries for areas of unincorporated Maricopa County. Twelve of these entries referred to events and problems that occurred in 2014 or earlier and aren't included in this summary. After removing multiple entries for the same person for the same event there are total of 24 entries included in the summary. Eighteen entries mentioned road flooding, 11 identified problems with maintenance, 7 reported flooding in yards, and 3 mentioned that buildings experienced or nearly experienced flooding. Many of the entries mention more than one problem.

In reviewing the 24 entries for events since 2015 it should be noted that all but one event occurred between July and October. The entries for events were evenly distributed across the months of July, August, and September with 7 each. October had two entries and March had one.

The year 2019 had the most entries with 8, followed by 2017 with 7, 2018 had 6 entries, and 2015 had 3 entries. There were no entries for 2016.

3.9.3 FMS Database

The Floodplain Permitting Division maintains a database of inquiries and information requests that they receive. This database can be searched for inquiries related to storm events. Since January 2015 there were 20 entries identified as being for unincorporated Maricopa County. One of the entries wasn't related to a flood event. Of the remaining 19 entries 10 of them reported issues with road flooding, 6 mentioned maintenance or potential violation issues, 10 reported flooding in their yards, 3 reported a building being flooded or concern that a building was close to being flooded, and 2 were for other reasons. Several entries mention more than one flood related problem.

The month of September had a total of 8 calls, followed by October with 5 calls, July had 3, December had 2, and there was 1 for April. Fourteen of the calls occurred in 2019, there were 3 in 2017, and 2015 and 2018 each had 1.

Approximately 70% of these inquiries where for properties that were located outside the SFHA.

3.9.4 NOAA Storm Events Database

The National Oceanic and Atmospheric Administration (NOAA) maintains a Storm Event

Database (https://www.ncdc.noaa.gov/stormevents) that contains the records used to create the official NOAA Storm Data publications. This database can be searched by State, County, Event Type, and Date.

Between January 2015 and December 2019 NOAA estimates the total damage due to flash flooding and flooding for all of Maricopa to be $1,358,000. This includes events that occurred in incorporated communities as well as unincorporated Maricopa County. For many events it is difficult to attribute the damages to each individual community. So only the totals for all of Maricopa County were used in this analysis.

During these years almost 75% of the property damage occurred between the months of July and October. Just two months, August and October account for nearly 50% damages reported by NOAA. The years 2018 and 2019 account for 60% of the property damages between 2015 and 2019.

The NOAA database has zero deaths (direct and indirect) and zero injuries (direct and indirect). The NOAA database also reports zero for damages to crops.

3.10 Flood Insurance Data: 2015 – 2019

At the end of September 2019, the total cumulative number of NFIP claims since 1978 was 381, 291 were closed with a payment and 90 were closed without any payment. Between December 31, 2014 and September 30, 2019, the reported number of paid claims increased by 13, and amount paid was $598,500.

At the end of September 2019 there were 2,731 NFIP flood insurance policies in effect for unincorporated Maricopa County, an increase of 74 polices since December 31, 2014. Based upon NFIP data 1,704 of these policies were located in one the SFHA zones, the vast majority where either in Zone AO (993) or Zone AE (580). The remaining 1,027 polices were located in a non-SFHA zone and 656 of these were preferred risk policies.

Of the 2,731 flood insurance polices 2,604 were for residential structures and 2,287 of these were for single family structures. The NFIP data identifies 370 polices as being for Pre-FIRM structures and 2,361 for Post-FIRM structures. Pre-FIRM structures are those built before the initial FIRM was issued on July 2, 1979.

Additional flood insurance data is provided within **Appendix D**.

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4. Floodplain Management Goals

The FMP Committee reviewed the goals established in the 2015 FMP and considered new ones based on discussions of flood hazards and problems described in the previous sections. Goals for the next five years are described herein.

4.1 Transportation and Low Water Crossing Mitigation

The District will work with transportation agencies and the communities to address public concerns on transportation routes that result in interruptions to normal operating conditions, delays of emergency services, negatively impact the economy, or pose safety risks due to flooding.

4.2 Funding Evaluation of Process and Dedicated Resources

The District shall work in partnership with stakeholders to evaluate its various programs, fiscal opportunities, and funding processes to assure funds continue to be invested back into the communities.

4.3 Education and Technical Resources

The District shall work with stakeholders and local organizations on consistent county-wide technical and educational materials for flood preparedness with materials available in physical locations as well as electronically.

4.4 Managed Open Space

The District shall continue pursuing nature-based solutions for flood mitigation, wherever practical, working with stakeholders to maximize a full range of community co-benefits of flood control projects, which may include open space, wildlife corridors and recreational opportunities.

4.5 Regional Leadership

The District shall continue to perform duties as the regional leader in floodplain management. The District shall provide and communicate information, guidelines, and regulations to agencies and communities throughout Maricopa County and to adjacent Counties.

5. Five-Year Action Plan

The FMP Committee selected a number of activities in the 2015 FMP to continue tracking, others to be updated, and generated additional items to be considered in developing the 2020 Plan. As categorized in the *CRS Coordinator's Manual*, activities may include preventative, property protection, natural resource protection, emergency services, structural projects, and public information. Activities considered under these categories and their merits are described in **Appendix E**.

The activities selected as viable were then brought forward to create the five-year action plan as shown in **Table 22.** These activities were placed in the six categories prescribed by the CRS Program.

The FMP Committee considered the value to the community of each action item in setting priorities. The top action items determined by the FMP Committee are identified with a High priority in Table 22. The District helped determined the responsibility party, timeframe and funding sources.

Top Priorities

- Public concerns about flooding impacts on transportation
- Floodplain delineations and re-delineations

The FMP Committee then considered the action plan items as a whole and identified two areas that should be given the highest priority. The first is to evaluate, prioritize, and mitigate impacts to transportation caused by flooding (Action Items #1 and #2). Many transportation corridors throughout unincorporated Maricopa County contain at-grade crossings which pose a risk to the public and emergency personnel alike during storm events. The second category is delineations and re-delineations of floodplains throughout Maricopa County (Action Item #27). These activities provide valuable information for current and future property owners. Re-delineation of floodplains provides the opportunity to update the flood risk information for an area and potentially remove properties from the floodplain. Re-delineations may also identify properties where the flood risk is under reported. Additionally, they provide critical information for infrastructure projects and help communities to become more resilient.

Funding for implementation of the action plan will be provided annually as resources permit under the District's operating and CIP budgets. Some exceptions are noted in the activity descriptions where soliciting outside funding is being considered.

Table 22: 2020 Floodplain Management Action Plan

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Action Item	1 Transportation and Low Water Crossings	2 Funding Evaluation community investments	3 Education and Technical Resources	4 Managed Open Space	5 Regional Leadership	Preventative	Property Protection	Natural Resource Protection	Emergency Services	Structural Projects	Public Information	Responsible Party [a]	Deadline (Timeframe)	Priority	Funding Source [b]
	2020 FMP Goals					CRS' Action Item Categories									
1. Identify and categorize transportation and low water crossing locations that have flood risks and concerns	x	x	x	x	x	x	x	x	x	x	x	ENG, MCDOT	June 2022	High	FCDMC Operating Budget
2. Develop a matrix to prioritize transportation and low water crossing flood risks	x	x		x	x	x	x	x	x	x	x	ENG, MCDOT	August 2021	High	Staff time mostly
3. Develop design approaches and funding options to reduce transportation and low water crossing flood risks	x	x		x		x	x	x	x	x	x	ENG, MCDOT	June 2023	Medium	FCDMC Operating and CIP Budgets, Grants
4. Establish triggers or warning methods to let public know how to avoid flooded transportation areas	x	x			x	x			x		x	ENG, MCDOT	June 2023	Medium	FCDMC Operating Budget, Partners

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Action Item	1 Transportation and Low Water Crossings	2 Funding Evaluation community investments	3 Education and Technical Resources	4 Managed Open Space	5 Regional Leadership	Preventative	Property Protection	Natural Resource Protection	Emergency Services	Structural Projects	Public Information	Responsible Party [a]	Deadline (Timeframe)	Priority	Funding Source [b]
	2020 FMP Goals					CRS' Action Item Categories									
5. Identify and pursue additional cost sharing partnerships to lower transportation related flood risks	x	x		x	x	x	x	x	x	x	x	ENG, MCDOT	Annually	Medium	FCDMC Operating Budget, Staff time, Grants
6. Develop partnership with emergency services on flood and transportation issues	x				x	x			x		x	ENG	June 2022	Medium	Staff time mostly
7. Coordinate with transportation agencies along with other agencies and communities on ways to notify public of ongoing flood risks at crossings	x			x	x	x			x		x	ENG, PCA	June 2022	Medium	Staff time mostly
8. Develop regular review cycle of funding status and evaluation of FCDMC CIP, SPAP, FPAP programs, and provide to communities and other agencies	x	x			x	x					x	PPM	Annually	Medium	Staff time mostly
9. Communicate availability of Federal funding to communities and other agencies, and maybe help prepare applications	x	x		x	x	x		x	x	x	x	EXE	Annually	Medium	Staff time mostly

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Action Item	1 Transportation and Low Water Crossings	2 Funding Evaluation community investments	3 Education and Technical Resources	4 Managed Open Space	5 Regional Leadership	Preventative	Property Protection	Natural Resource Protection	Emergency Services	Structural Projects	Public Information	Responsible Party [a]	Deadline (Timeframe)	Priority	Funding Source [b]
	2020 FMP Goals					CRS' Action Item Categories									
10. Conduct funding-based communication to the communities on FCDMC CIP, SPAP, and FPAP programs	x	x			x	x					x	PPM	Annually	Medium	Staff time mostly
11. Develop definition of process and evaluation on FCDMC CIP, SPAP, FPAP programs and help agencies succeed, especially smaller communities	x	x			x	x					x	PPM	Annually	Medium	Staff time mostly
12. Support developing/increasing IGAs with fiscal partners	x	x		x	x	x		x	x	x	x	PPM	Annually	Medium	Staff time mostly
13. Identifying additional physical locations where FCDMC documents can be available			x		x	x			x		x	EXE	August 2021	Low	FCDMC Operating Budget
14. Combine technical resource materials with emergency service information	x	x	x		x	x			x		x	ENG, PCA	Annually	Medium	FCDMC Operating Budget
15. Develop information on utilities points of contact for emergency response (city and service area specific)	m		x		x	x			x		x	ENG, PCA	Annually	Medium	Staff time mostly

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Action Item	1 Transportation and Low Water Crossings	2 Funding Evaluation community investments	3 Education and Technical Resources	4 Managed Open Space	5 Regional Leadership	Preventative	Property Protection	Natural Resource Protection	Emergency Services	Structural Projects	Public Information	Responsible Party [a]	Deadline (Timeframe)	Priority	Funding Source [b]
	2020 FMP Goals					CRS' Action Item Categories									
16. Outreach to HOA's for flood preparedness and wash management		x	x		x	x	x				x	PIO, FP	Annually	Medium	FCDMC Operating Budget
17. Characterization of acceptable vegetation within wash corridors to share with HOA's		x	x	x	x	x	x				x	PIO, FP	August 2021	Medium	FCDMC Operating Budget
18. Develop How to Manual for HOA's on maintaining drainage infrastructure after it is built	x	x	x	x	x	x	x	x	x	x	x	PIO, FP	August 2022	High	FCDMC Operating Budget
19. Develop illustrative literature and "how to" maintenance videos for HOA's	x		x		x	x	x	x	x	x	x	PIO, FP	August 2022	High	FCDMC Operating Budget
20. Home and Garden show booth to present and educate public and others on risks of floods	x		x		x	x	x	x	m		x	PIO	Annually	Medium	FCDMC Operating Budget
21. Develop ways to support and encourage check dams and water retention for recharge	x	x	x	x	x	x	x	x	x	x	x	PPM	August 2022	Low	Staff time
22. Distribute Green Infrastructure and Low Impact Development literature			x	x	x	x				x	x	PPM, P&D	Annually	Low	FCDMC Operating Budget

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Action Item	1 Transportation and Low Water Crossings	2 Funding Evaluation community investments	3 Education and Technical Resources	4 Managed Open Space	5 Regional Leadership	Preventative	Property Protection	Natural Resource Protection	Emergency Services	Structural Projects	Public Information	Responsible Party [a]	Deadline (Timeframe)	Priority	Funding Source [b]
	2020 FMP Goals					CRS' Action Item Categories									
23. Communicate / educate property owners, HOA's and others on adverse impacts of walls	x	x	x	x	x	x	x	x	x	x	m	FP, P&D	Annually	Medium	FCDMC Operating Budget
24. Educate and inform public of various citizen rain gage program		x	x		x	x					x	PIO	June 2021	Low	FCDMC Operating Budget
25. Coordinate and cooperate with Communities and Stakeholders on their need for drainage infrastructure	x	x		x	x	x	x		x		x	PPM	Annually	Medium	FCDMC Operating Budget
26. Prioritization of (drainage infrastructure) for areas poised for development with flood risk	x	x		x	x	x	x	x	x	x	x	PPM, P&D	Ongoing, with each new ADMS/ADMP study	Medium	FCDMC Operating Budget
27. Prioritize locations where floodplain delineations and re-delineations are needed	x	x	x	x	x	x	x	x	x	x	x	FP, P&D	Annually	High	Staff time mostly
28. Identify additional areas with flood risks that don't need to be delineated floodplains	x	x		x	x	x	x	x	x	x	x	PPM, P&D	Ongoing, with each new ADMS/ADMP study	Medium	FCDMC Operating Budget

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Action Item	1 Transportation and Low Water Crossings	2 Funding Evaluation community investments	3 Education and Technical Resources	4 Managed Open Space	5 Regional Leadership	Preventative	Property Protection	Natural Resource Protection	Emergency Services	Structural Projects	Public Information	Responsible Party [a]	Deadline (Timeframe)	Priority	Funding Source [b]
	2020 FMP Goals					CRS' Action Item Categories									
29. Develop best practices for identifying locations where recharge locations are best suited	x	x	x	x	x	x	x	x	x	m	x	PPM	Ongoing, with each new ADMS/ADMP study	Low	FCDMC Operating Budget
30. Identify locations and means for connectivity of open space on District Projects that could be wildlife corridors and habitat	x	x	x	x	x	m		x	x	x	x	PPM	Ongoing, with each new ADMS/ADMP study	Low	FCDMC Operating Budget
31. Conduct an annual meeting and include communication of changes in regulations and policies	x	x	x	x	x	x	x	x	x	x	x	EXE, P&D	Annually	High	FCDMC Operating Budget
32. Review current flood related information and guidelines available from FCDMC and others					x						x	FP, P&D	Annually	Low	Staff time mostly
33. Define a review cycle for FCDMC literature			x		x						x	EXE	June 2021	Low	Staff time mostly
34. Identify regulatory authority and need for legislative changes, or higher standards			x		x						x	EXE	June 2021	Low	Staff time mostly
35. Incorporate FCDMC and other agency best practices and communicate these to communities and others	x	x	x	x	x	x	x	x	x	x	x	EXE	June 2021	High	FCDMC Operating Budget

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Action Item	1 Transportation and Low Water Crossings	2 Funding Evaluation community investments	3 Education and Technical Resources	4 Managed Open Space	5 Regional Leadership	Preventative	Property Protection	Natural Resource Protection	Emergency Services	Structural Projects	Public Information	Responsible Party [a]	Deadline (Timeframe)	Priority	Funding Source [b]
	2020 FMP Goals					CRS' Action Item Categories									
36. Inform developers and communities on permitting enforcement and regulation issues	x	x	x	x	x	x	x	x	x	x	x	FP, P&D	Annually	High	FCDMC Operating Budget
37. Communicate changes to USACE Section 404 permits and 408 permissions, and protection of open space to communities and other agencies	x		x	x	x	x	x	x	x	x	x	PPM	Annually	Medium	Staff time
38. Coordinate with sand & gravel industry representatives to identify mutually beneficial activities in river corridors, and how specific activities might be implemented.				X	X			X		X		Executive	Annually	Medium	Staff Time

Legend: "X" denotes a majority vote by FMP Committee Members. "m" denotes a vote offered by an individual member of FMP Committee Member

(a) Engineering Division = ENG; Maricopa County Department of Transportation = MCDOT; Partner Cities and Agencies = PCA; Executive Division = EXE; Planning & Project Management Division = PPM; Public Involvement Office = PIO; Floodplain Permitting Division = FP; Planning & Development = P&D

(b) Funding Source: Staff time requires minimal funding; Partner = Partner with other Agencies; Grants = Potential for Grants

The FMP Committee tasked FCDMC with identifying the responsible parties.

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6. Adoption and Implementation

6.1 Adoption of the 2020 Floodplain Management Plan

The draft FMP was made available for review and comments at one public open house held at the District and posted on the District's web site (https://www.maricopa.gov/5423/Floodplain-Management-Plan-2020-Update). The link to the plan was emailed to approximately 54 stakeholders outside of Maricopa County's government structure for review. These stakeholders included federal and state agencies, local associations, adjacent communities and counties, and Native American Communities. The stakeholders are listed in Section 1.7. The FMP fully complied with the public notification process, timelines for review, and all requirements set forth for adoption. Upon incorporating comments into the draft plan, the final FMP was adopted by the Board of Directors under Resolution FCD2020RCXXX on October XX, 2020. The resolution is provided on the following page.

6.2 Recommendations for Monitoring/Revising the 5-Year Plan

Implementation of the FMP is central to meeting the District's goals of protecting lives and property and realizing the full benefits of floodplains. The following steps are recommended:

1. The District's Director appoints a staff member to be the FMP manager. At least annually, the FMP manager will gather status reports from the divisions and others responsible for performing the tasks in the 2020 action plan, along with the action items carried forward from the 2015 FMP.

2. After the status reports are gathered, the FMP manager prepares a summary for review by the FMP Committee.

3. The FMP Committee reviews the progress and may recommend changes to the FMP, if deemed necessary.

4. The District's FMP manager prepares and submits a report to the District's Board of Directors on the status of implementation, as well as any recommended changes to the FMP. This report will be published on the District's web site and released to the media.

5. If changes are made to the FMP as a result of recommendations by the FMP Committee, an updated plan is submitted to the District's Board of Directors to be considered for adoption.

6. If adopted, the District posts the updated plan on its website and issues a news release to local media.

OFFICIAL RECORDS OF
MARICOPA COUNTY RECORDER
HELEN PURCELL
ELECTRONIC RECORDING
20150838151 11/24/2015 11:06
RESFCD2016R001-2-1-1--N

When Recorded Return to:
Contracts Branch
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, AZ 85009-6399

RESOLUTION FCD 20

FLOODPLAIN MANAGF

Agenda Ite

TO BE REPLACED WITH NEW ADOPTION RESOLUTION

WHEREAS, the Chief Engineer a ricopa County (District) is required un have prepared a report for a compr d control facilities and ident s within Maricopa County

WHEREAS, the ution FCD 2010R010 (C- nt Plan and Program" (P

WHEP s Community Rating System a ears; and,

WHEREAS, t an 2015 (Plan) was based on committee input o d,

WHEREAS, the Plan s sses flooding issues, public education, loss reduction measures, fl flood related hazards; and,

WHEREAS, the Plan has been public, other jurisdictions and agencies for their review and comment; and,

WHEREAS, the Board of Directors of istrict has held a public hearing as required under ARS §48-3616; and,

WHEREAS, the Flood Control Advisory Board of the District endorsed the Plan on September, 23 2015, recommending to the Board of Directors of the District that the Plan be adopted.

Resolution FCD 2016R001 Page 1 of 2

NOW, THEREFORE, BE IT RESOLVED that the F ctors of the District approve and adopt the "Floodplain Management Plan 2015"; and.

BE IT FURTHER RESOLVED that the CH nager of the District is authorized and directed to forward the adopt er interested agencies and entities.

Dated this 18th d

Chairman, F

ATTES

DEPUTY Clerk of the Board

TO BE REPLACED WITH NEW ADOPTION RESOLUTION

Enclosure

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7. List of Acronyms and Terms

Acronym	Description
ADEMA	Arizona Department of Emergency and Military Affairs
2015 FMP	Flood Control District of Maricopa County Comprehensive Floodplain Management Plan and Program Report 2015
2020 Report	Flood Control District of Maricopa County Comprehensive Report & Program 2020
ACDC	Arizona Canal Diversion Channel
ADEQ	Arizona Department of Environmental Quality
ADMP	Area Drainage Master Plan
ADMS	Area Drainage Master Study
ADOT	Arizona Department of Transportation
ADWR	Arizona Department of Water Resources
ASLD	Arizona State Land Department
ATV	All-terrain vehicle
AZGS	Arizona Geological Survey
BFE	Base Flood Elevation
BLM	Bureau of Land Management
BMP	Best Management Practices
CAP	Central Arizona Project
CBRL N/S	Camelback Ranch Levee North/South
CIP	Capital Improvement Program
CIPPP	Capital Improvement Program Prioritization Procedure
CRS	Community Rating System
CTP	Cooperating Technical Partner
District	Flood Control District of Maricopa County
EAP	Emergency Action Plan
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
FCAB	Flood Control Advisory Board
FCDMC	Flood Control District of Maricopa County
FDS	Floodplain Delineation Study
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FMP	Floodplain Management Plan
FMS	Floodplain Management & Services
FPAP	Floodprone Properties Assistance Program

Acronym	Description
FPS	Feet per second
FRP	Flood Response Plan
FRS	Flood Retarding Structure
IBC	International Building Code
MAG	Maricopa Association of Governments
MCDEM	Maricopa County Department of Emergency Management
MCDES	Maricopa County Department of Environmental Services
MCDOT	Maricopa County Department of Transportation
MCPDD	Maricopa County Planning & Development Department
MCPRD	Maricopa County Parks and Recreation Department
MS4	Municipal Separate Storm Sewer System
NCDC	National Climatic Data Center
NFIP	National Flood Insurance Program
NRCS	Natural Resources Conservation Service
NWS	National Weather Service
O&M	Operation and Maintenance
PIO	Public Information Officer
Plan	Comprehensive Report & Program 2020
PPM	Planning and Project Management
PVR FRSs	Powerline, Vineyard Road, and Rittenhouse Flood Retarding Structures
RWCD	Roosevelt Water Conservation District
SFHA	Special Flood Hazard Area
SPAP	Small Projects Assistance Program
SRP	Salt River Project
UPRR	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
USBR	U.S. Bureau of Reclamation
USFS	U.S. Forest Service
USFWS	U.S. Fish & Wildlife Service
Zone A	An area with an approximate delineation of a floodplain. Floodway boundaries and Base Flood Elevations have not been determined.
Zone AE	An area with a detailed delineation of a floodplain and in which Base Flood Elevations have been determined. Identification of a Floodway maybe part of the delineation.
Zone AH	An area with flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations have been determined.

Acronym	Description
Zone AO	An area with flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average flood depths have been determined. For areas of Alluvial Fan flooding, velocities may have also been determined.
Zone D	Areas in which flood hazards are undetermined, but possible.
Zone X	Areas determined to be outside the 1% annual chance floodplain but within the 0.2% annual chance floodplain.

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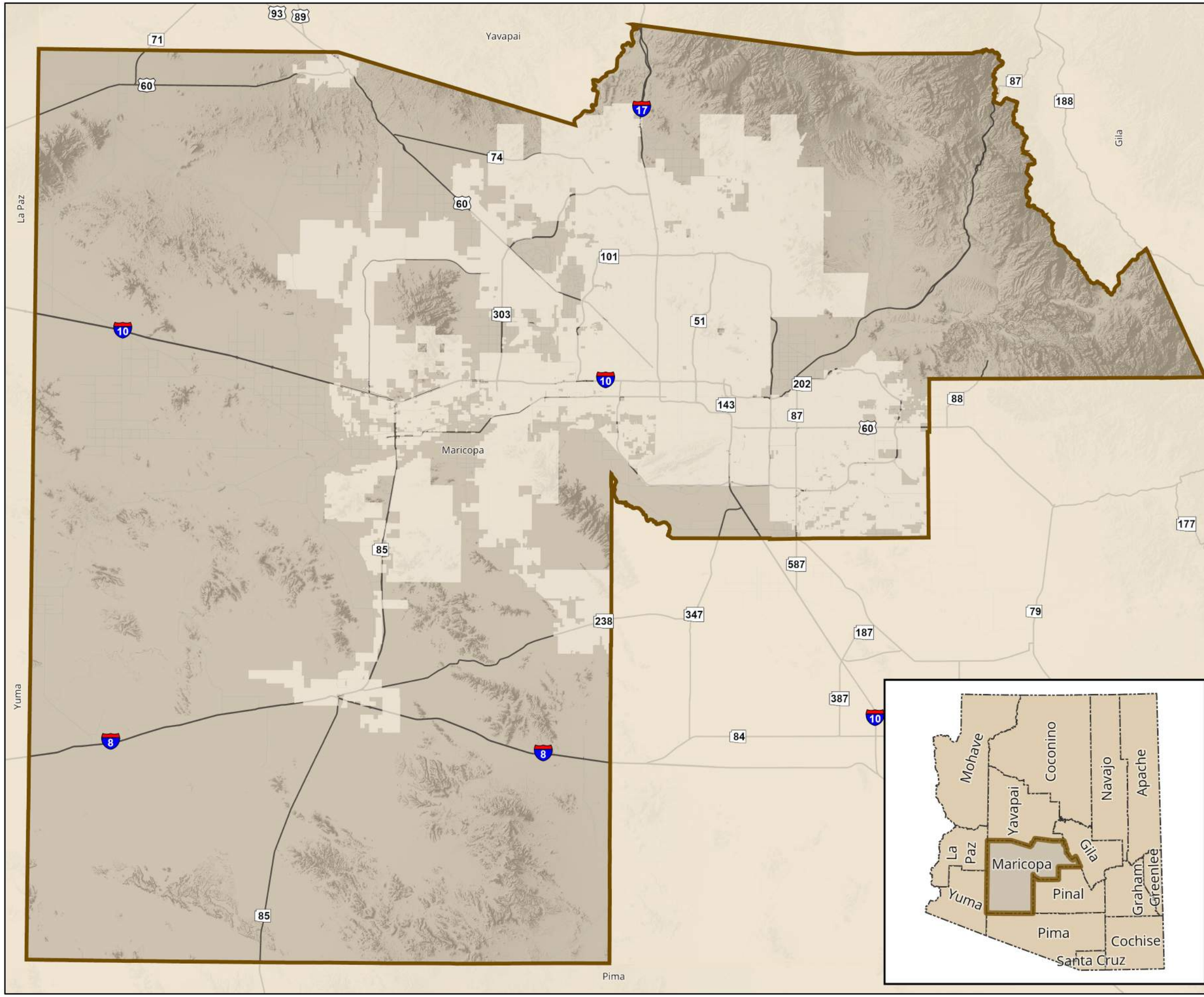
Appendix A

Maps



Location Map

Map 1

City/Incorporated Area/Other County

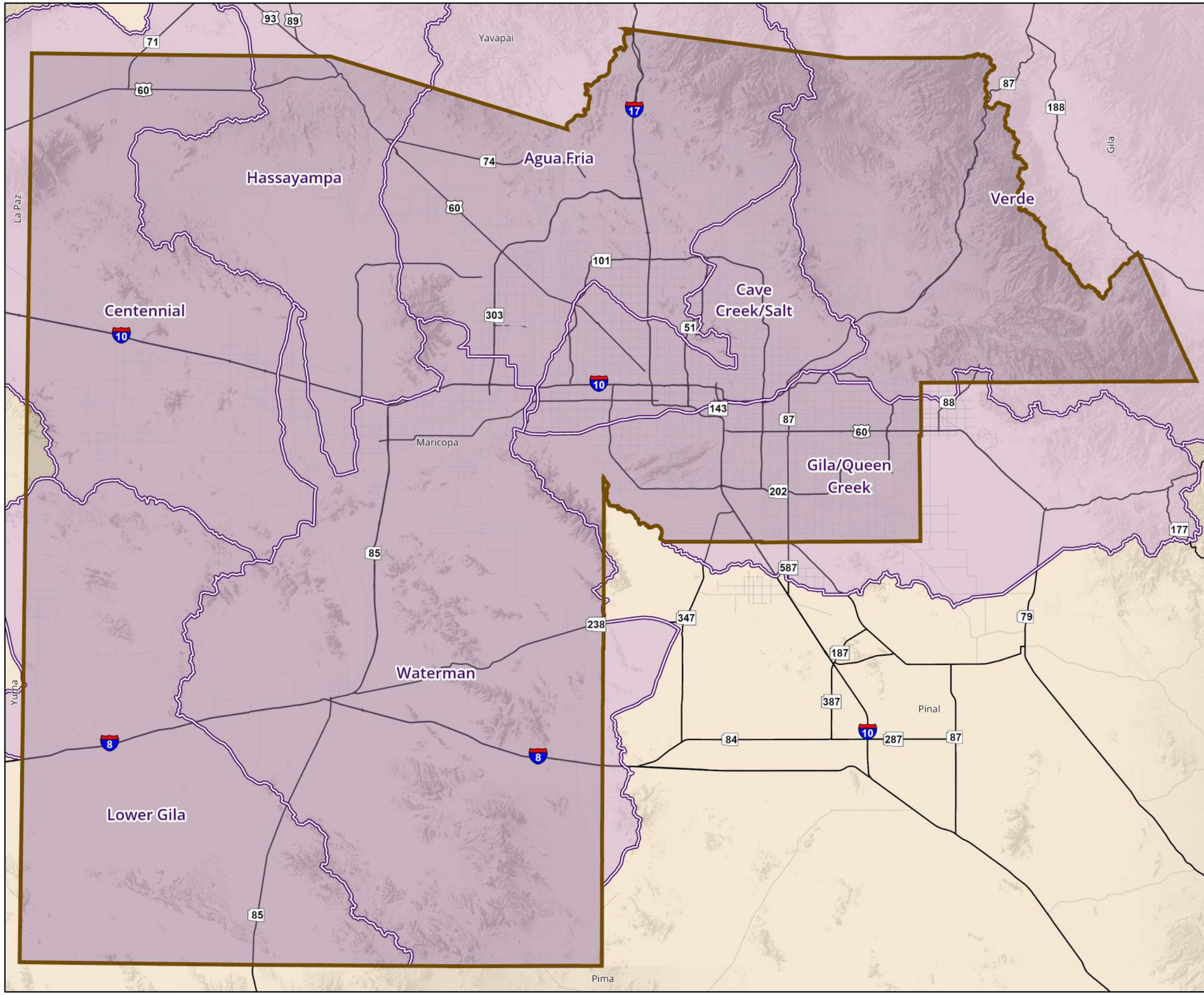
Maricopa County

0 2.5 5 10 Miles

N

Data Source: Flood Control District of Maricopa County, MAG

Created on: 02/2020



Watersheds

Map 1a

Watershed

Maricopa County

0 2.5 5 10 Miles

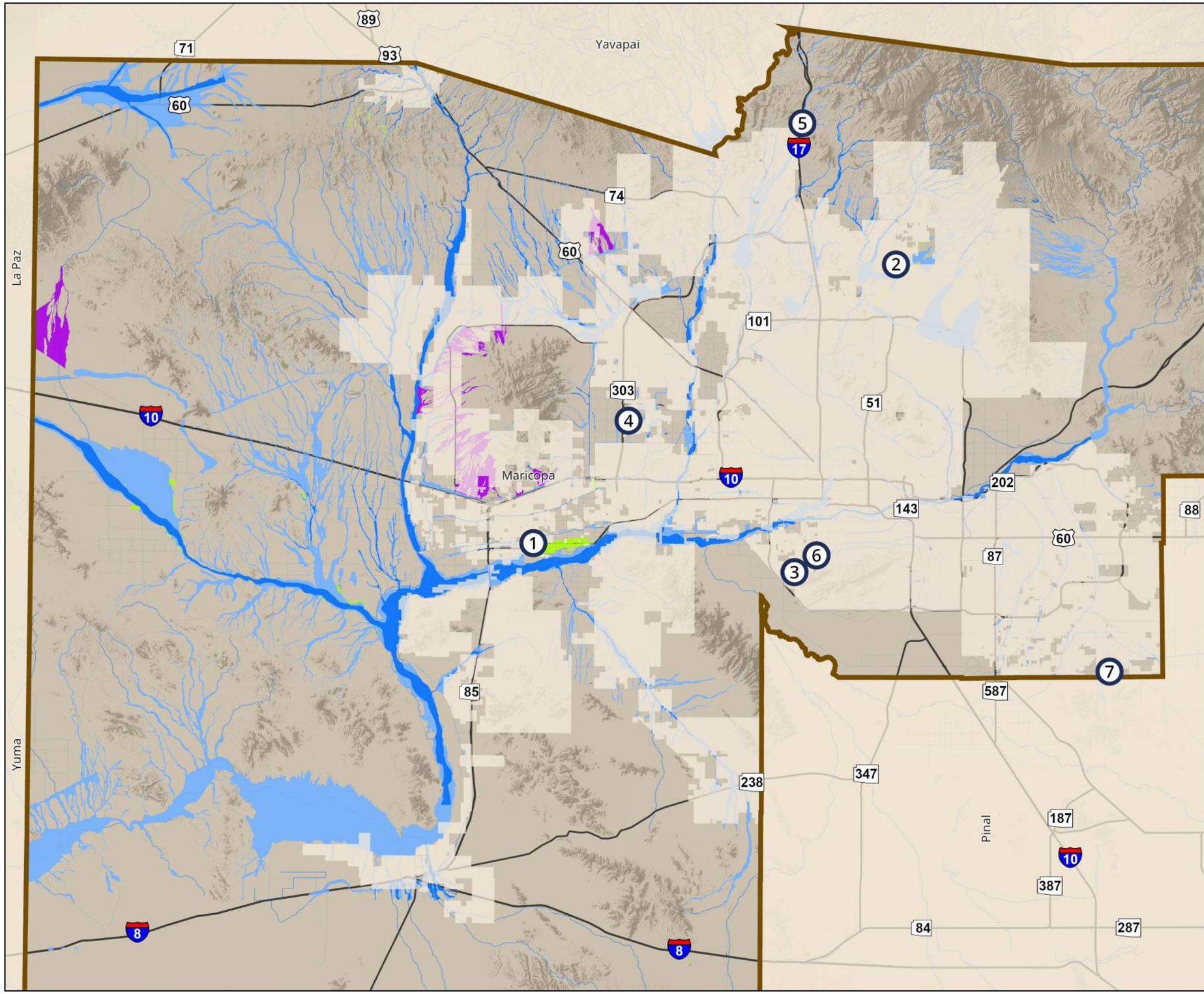
N

Data Source: Flood Control District of Maricopa County, MAG

Created on: 02/2020

Regulatory Floodplains, Alluvial Fans and Repetitive Loss Areas

Map 2a



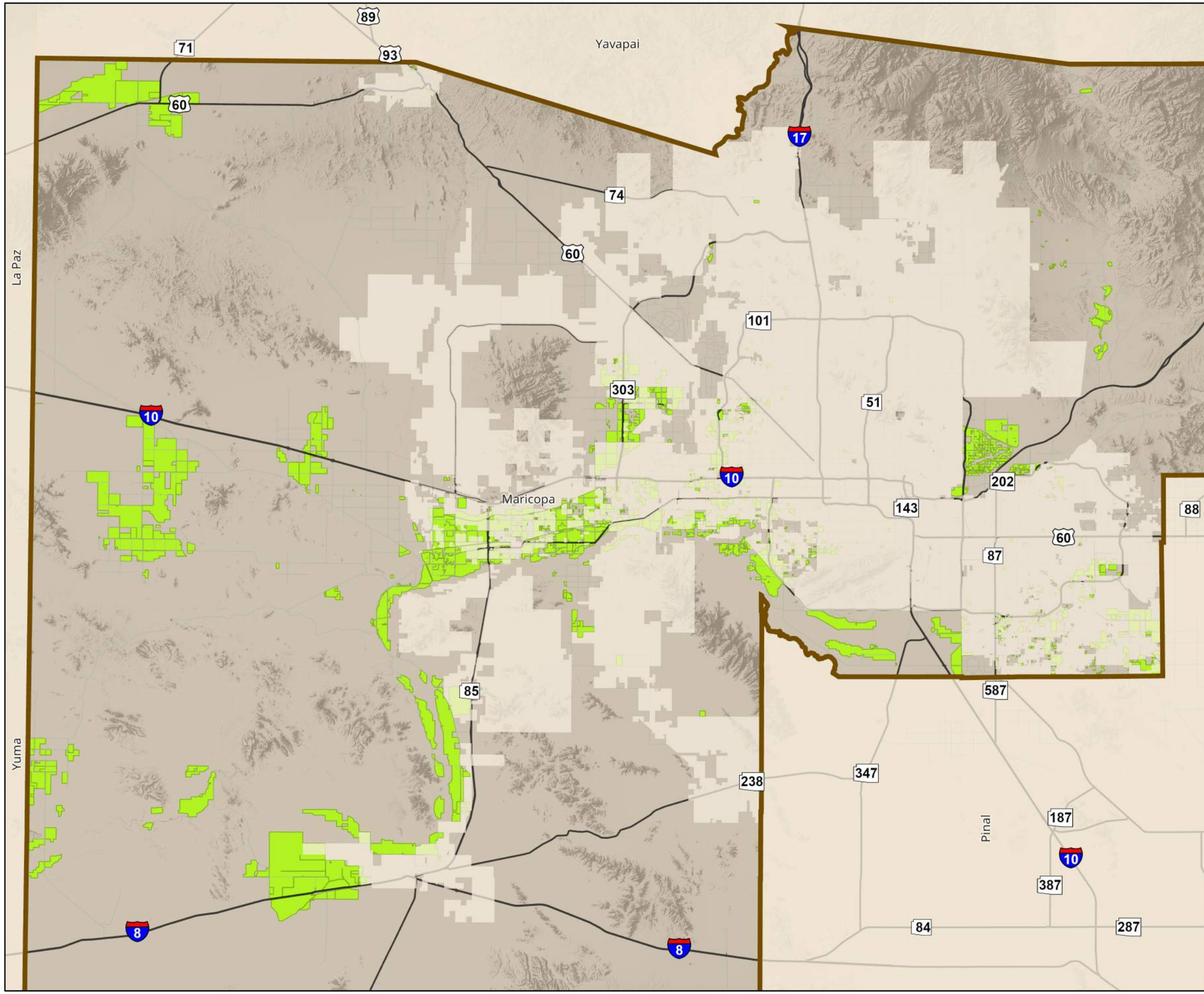
Repetative Loss Area
FEMA Floodway
FEMA Flooplain
Alluvial Fan
Pending Floodway
Pending Floodplain
City/Incorporated Area/Other County
Maricopa County

0 2.5 5 10 Miles

N

Data Source: Flood Control District of Maricopa County

Created on: 02/2020



Agricultural Land

Map 2b

Agriculture

City/Incorporated Area/Other County

Maricopa County

0 2.5 5 10 Miles

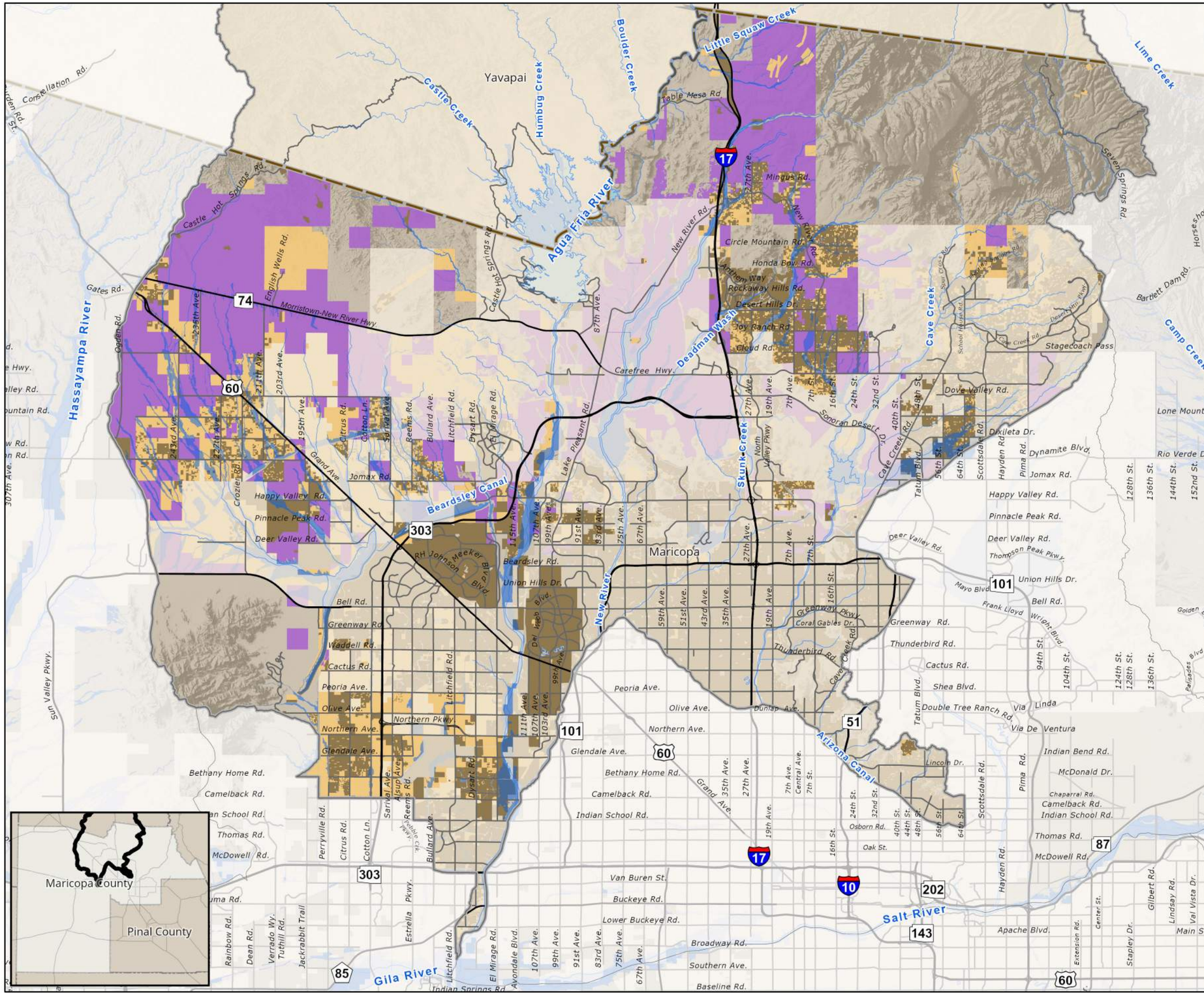
N

Data Source: Flood Control District of Maricopa County, MAG

Created on: 02/2020

Agua Fria Watershed

Map 3



Agua Fria Watershed

- 2329 sq. miles
- Existing Development (2016) 332 sq.mi.
- Developable Private Land (2016) 199 sq.mi.
- Developable State Trust Land (2016) 237 sq.mi.
- FEMA 100-Yr Floodplain
- City/Incorporated Area/Other County

0 1.25 2.5 5 Miles

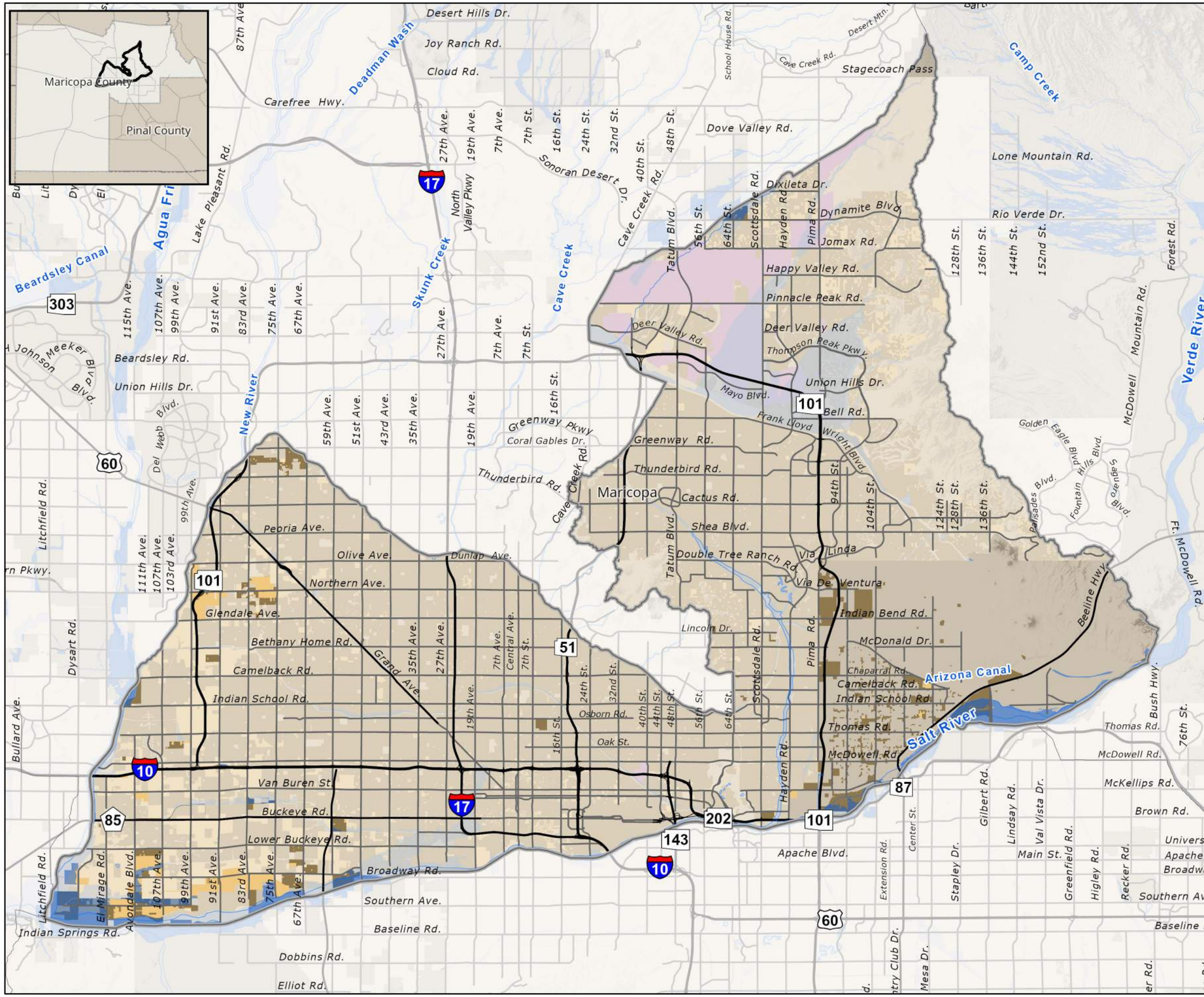
N

Data Source: Flood Control District of Maricopa County, MAG

Created on: 02/2020

Cave Creek/Salt Watershed

Map 4



Cave Creek/Salt Watershed

506 sq. miles	
Existing Development (2016)	318 sq.mi.
Developable Private Land (2016)	46 sq.mi.
Developable State Trust Land (2016)	21 sq.mi.
FEMA 100-Yr Floodplain	
City/Incorporated Area/Other County	

0 1 2 4 Miles

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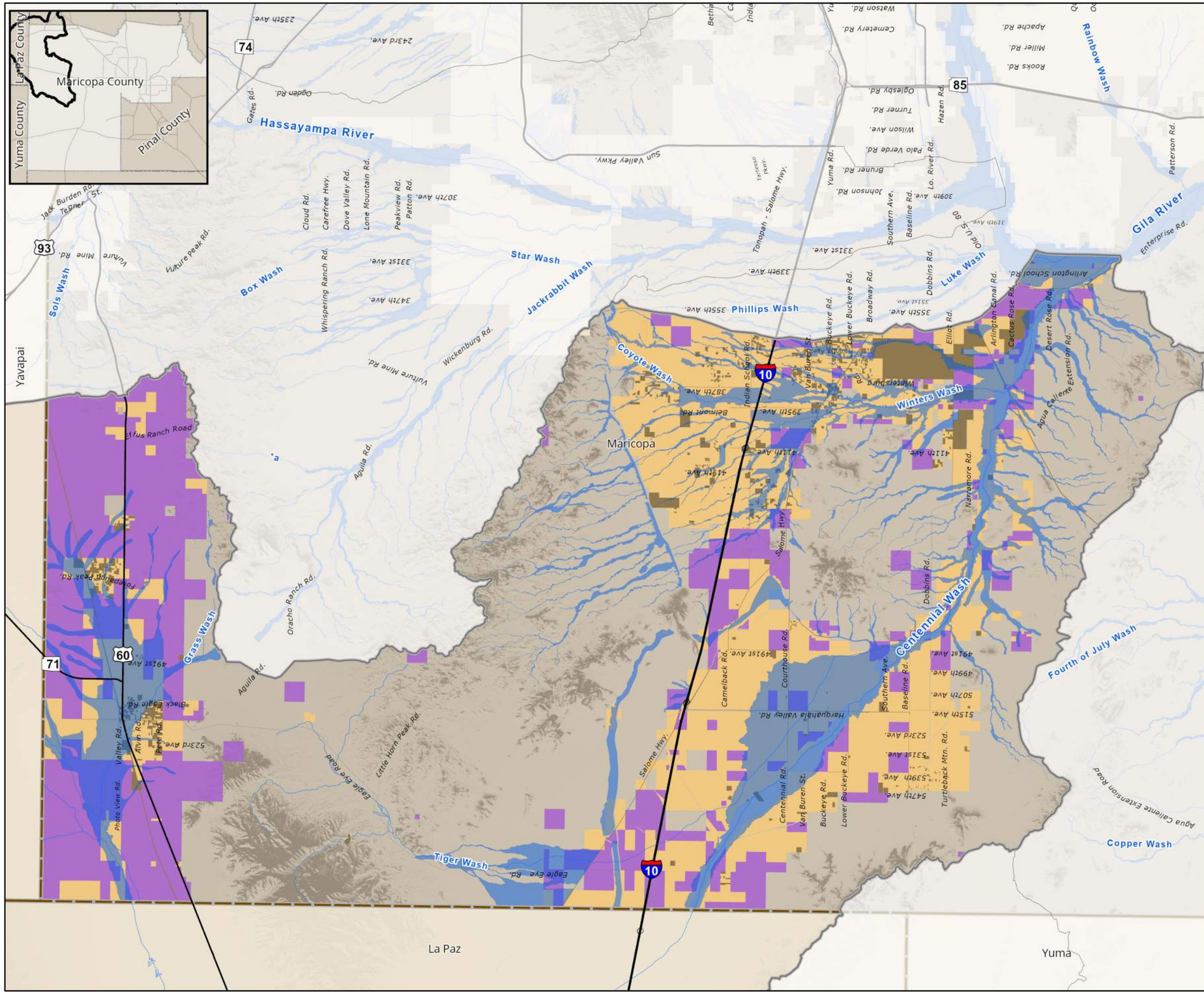
Data Source: Flood Control District of Maricopa County, MAG

Created on: 02/2020



Centennial Watershed

Map 5

Centennial Watershed

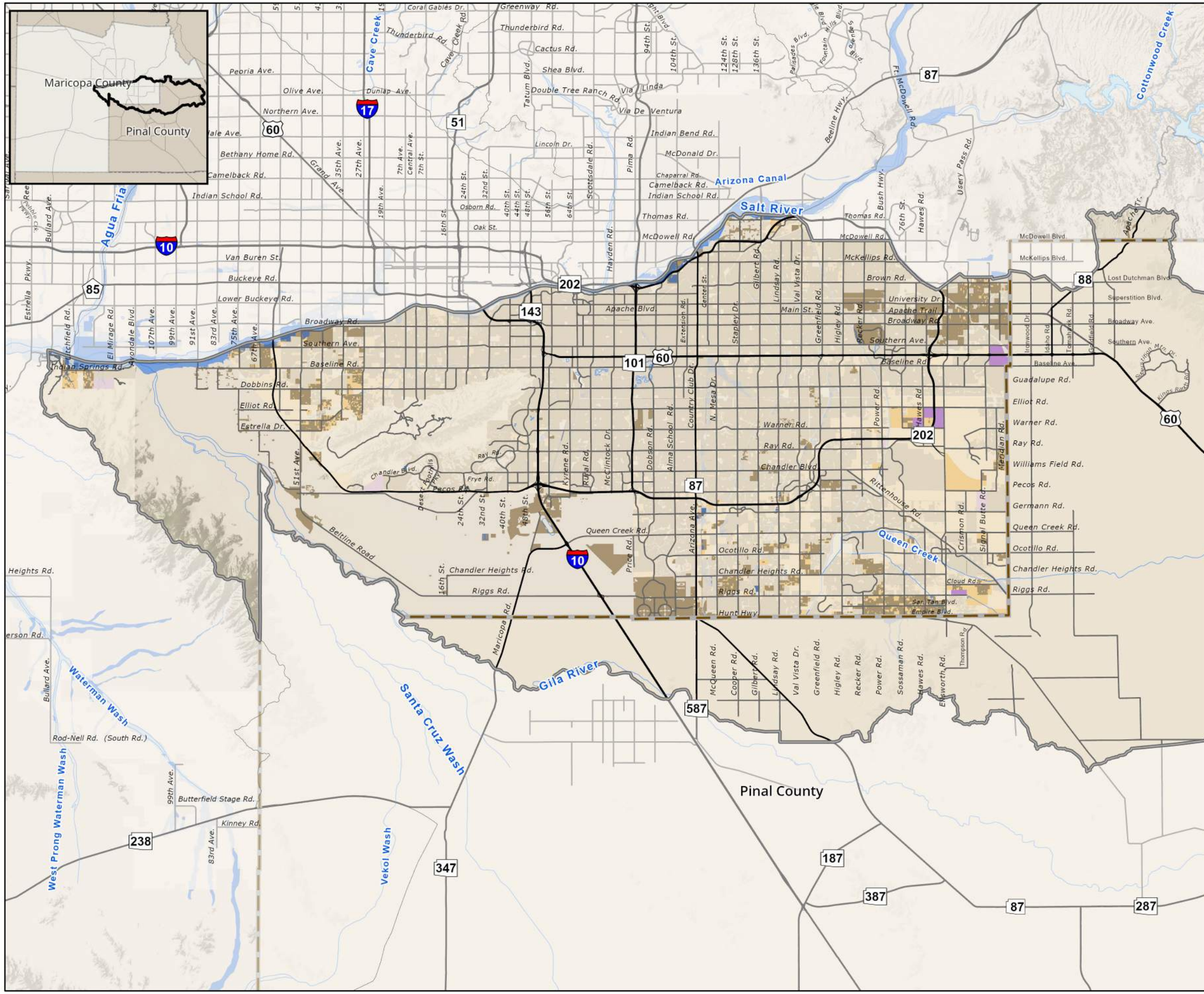
1924 sq. miles	
Existing Development (2016)	35.6 sq.mi.
Developable Private Land (2016)	293 sq.mi.
Developable State Trust Land (2016)	224 sq.mi.
FEMA 100-Yr Floodplain	
City/Incorporated Area/Other County	

0 1.5 3 6 Miles

N

Data Source: Flood Control District of Maricopa County, MAG

Created on: 02/2020



Gila/Queen Creek Watershed

Map 6

Gila/Queen Creek Watershed

1307 sq. miles	
Existing Development (2016)	342 sq.mi.
Developable Private Land (2016)	78 sq.mi.
Developable State Trust Land (2016)	3.5 sq.mi.
FEMA 100-Yr Floodplain	
City/Incorporated Area/Other County	

0 1.5 3 6 Miles

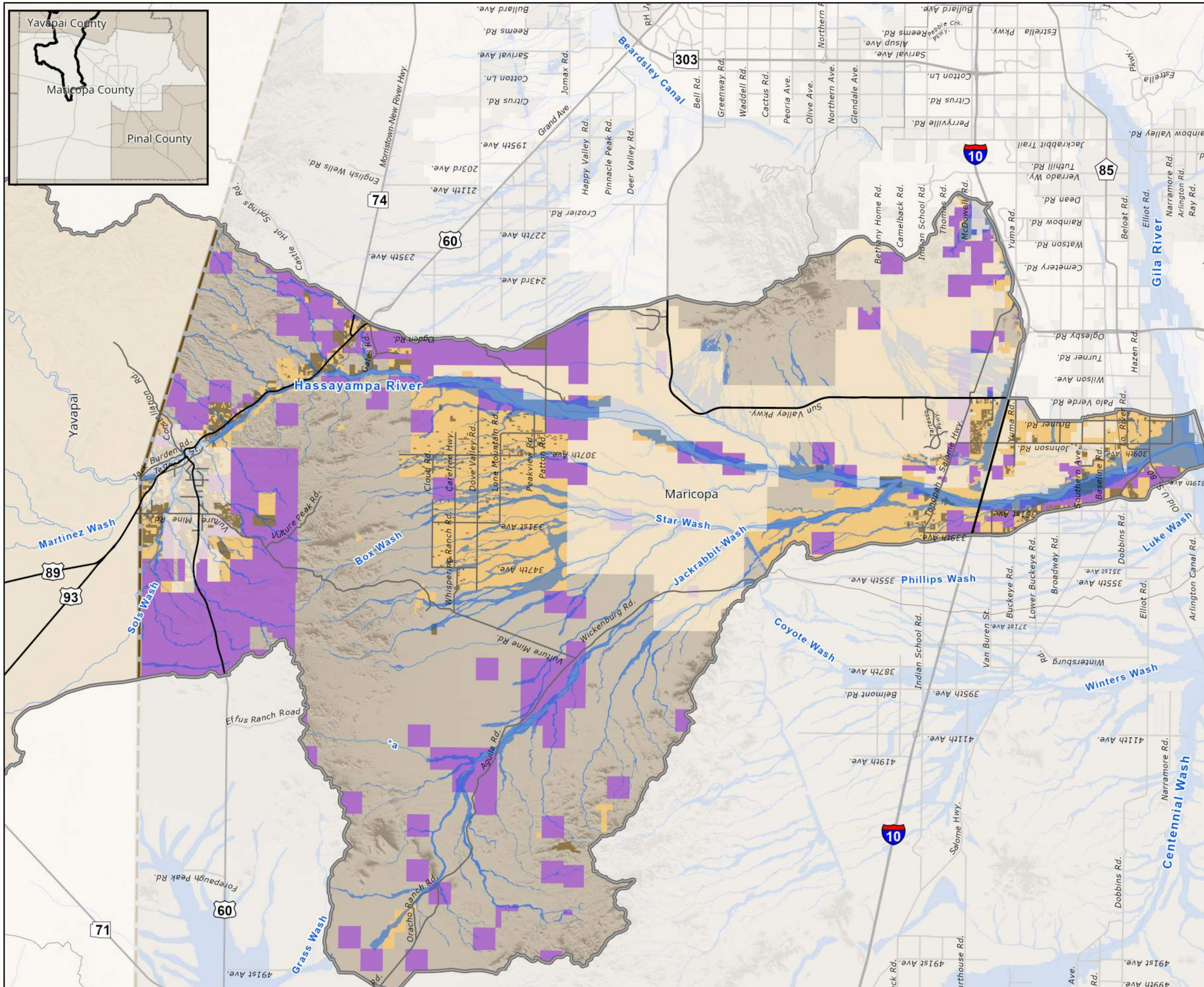
N

Data Source: Flood Control District of Maricopa County, MAG

Created on: 02/2020

Hassayampa Watershed

Map 7



Hassayampa Watershed

	1063 sq. miles	
	Existing Development (2016)	36 sq.mi.
	Developable Private Land (2016)	294 sq.mi.
	Developable State Trust Land (2016)	224 sq.mi.
	FEMA 100-Yr Floodplain	
	City/Incorporated Area/Other County	

0 1.5 3 6 Miles N

Data Source: Flood Control District of Maricopa County, MAG

Flood Control District of Maricopa County

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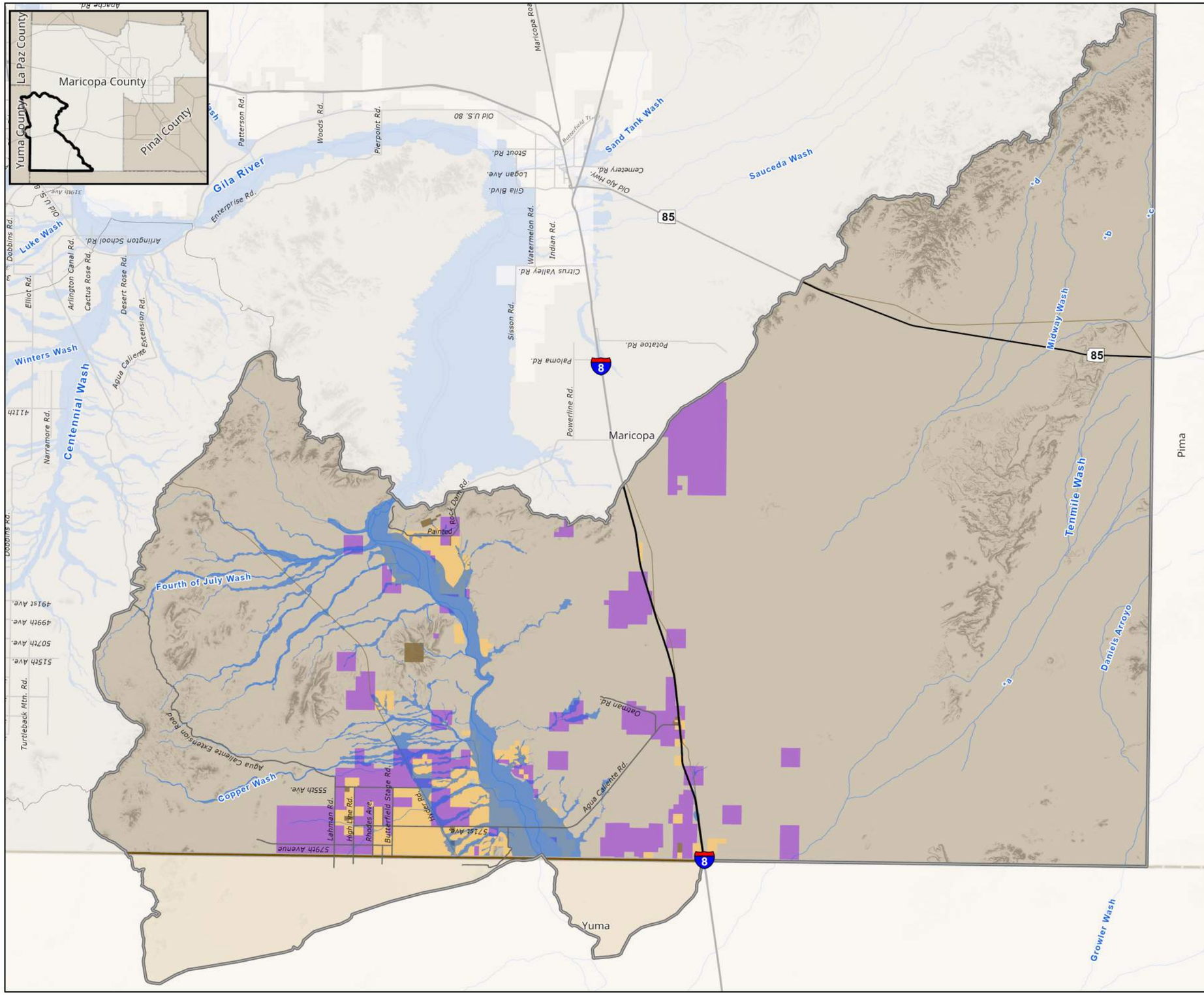


Lower Gila Watershed

Map 8

Lower Gila Watershed

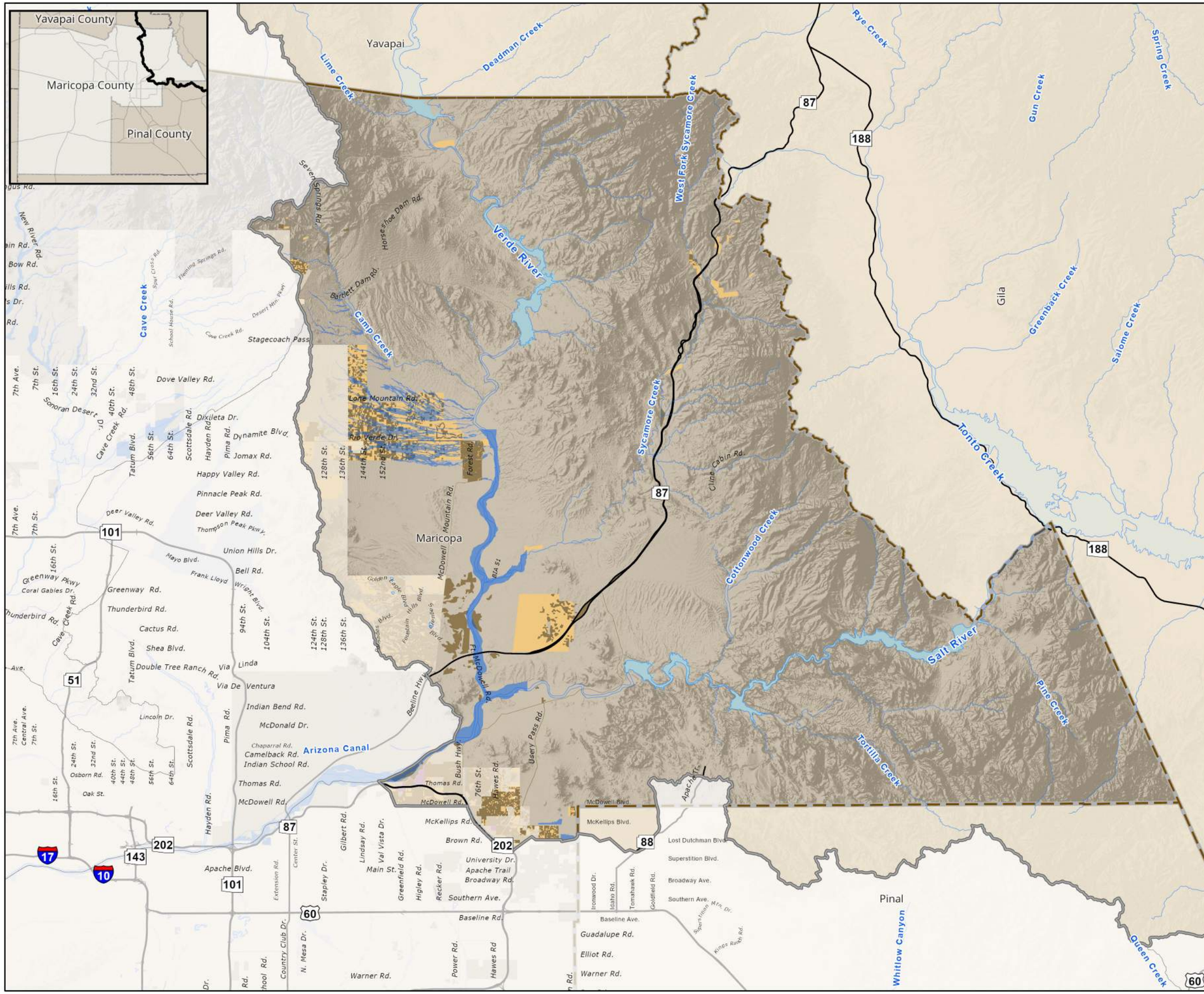
1522 sq. miles	
Existing Development (2016)	6.7 sq.mi.
Developable Private Land (2016)	43 sq.mi.
Developable State Trust Land (2016)	79 sq.mi.
FEMA 100-Yr Floodplain	
City/Incorporated Area/Other County	

0 1.5 3 6 Miles

N

Data Source: Flood Control District of Maricopa County, MAG

Created on: 02/2020



Verde Watershed

Map 9

Verde Watershed

3216 sq. miles	
Existing Development (2016)	43 sq.mi.
Developable Private Land (2016)	33 sq.mi.
Developable State Trust Land (2016)	0.5 sq.mi.
FEMA 100-Yr Floodplain	
City/Incorporated Area/Other County	

0 1.5 3 6 Miles

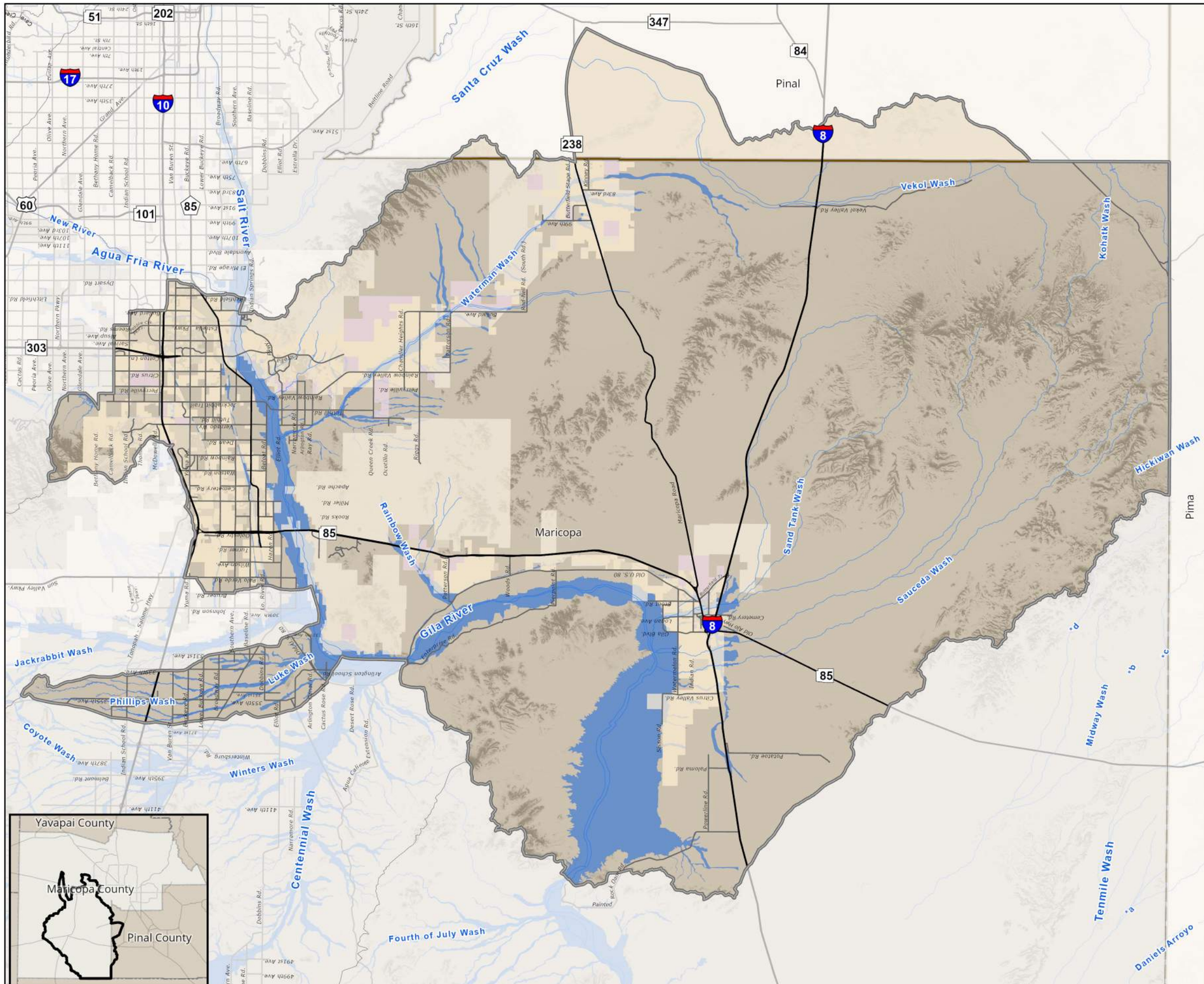
N

Data Source: Flood Control District of Maricopa County, MAG

Created on: 02/2020

Waterman Watershed

Map 10



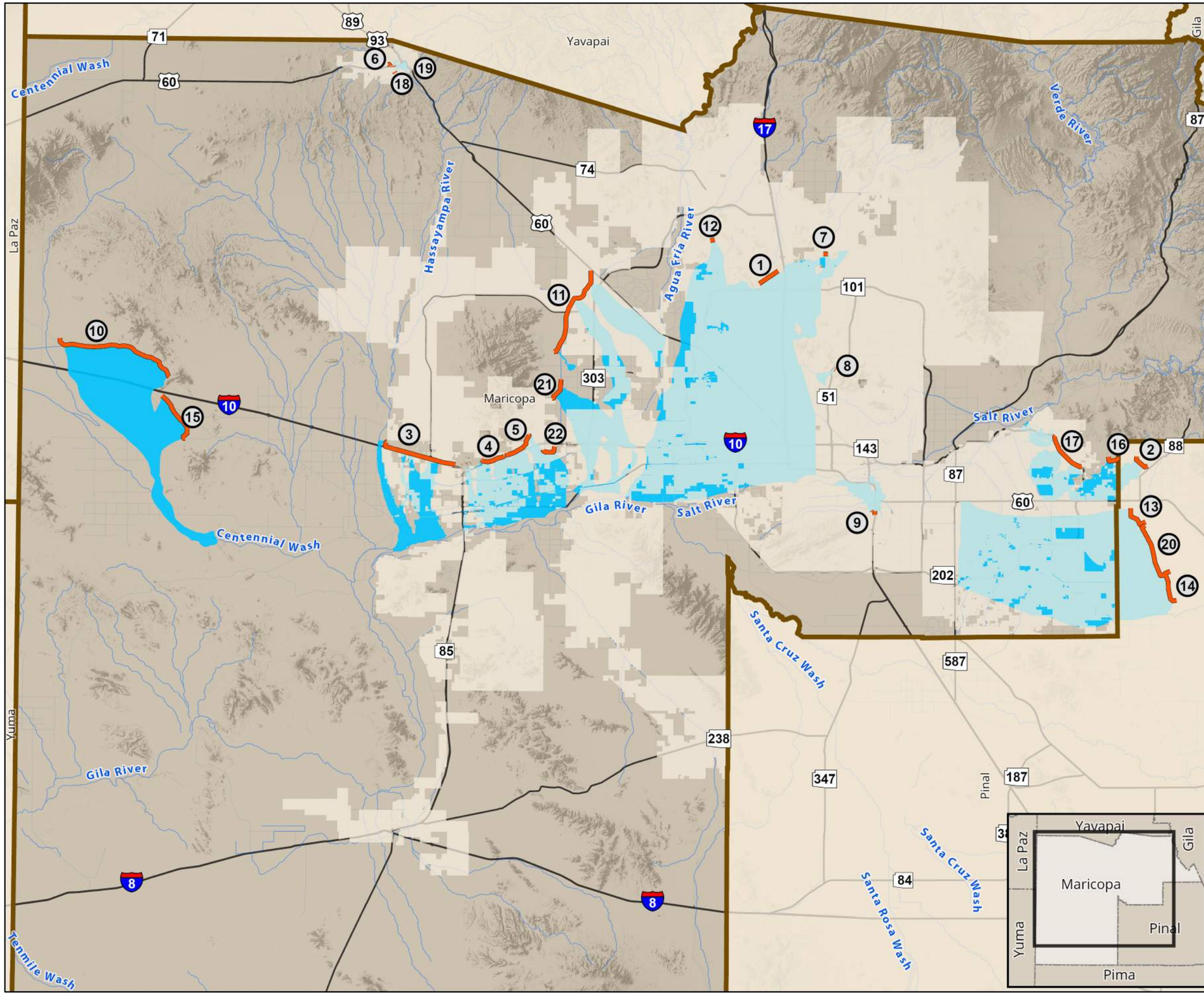
Waterman Watershed

2472 sq. miles	
Existing Development (2016)	91 sq.mi.
Developable Private Land (2016)	415 sq.mi.
Developable State Trust Land (2016)	134 sq.mi.
FEMA 100-Yr Floodplain	
City/Incorporated Area/Other County	

0 2 4 8 Miles

Data Source: Flood Control District of Maricopa County, MAG

Created on: 02/2020



Dams and Inundation Areas

Map 11

1. Adobe Dam
2. Apache Junction FRS
3. Buckeye FRS #1
4. Buckeye FRS #2
5. Buckeye FRS #3
6. Casandro Wash Dam
7. Cave Buttes Dam
8. Dreamy Draw Dam
9. Guadalupe FRS
10. Harquahala FRS
11. McMicken Dam
12. New River Dam
13. Powerline FRS
14. Rittenhouse FRS
15. Saddleback FRS
16. Signal Butte FRS
17. Spook Hill FRS
18. Sunnycove Dam
19. Sunset Dam
20. Vineyard Road FRS
21. White Tanks FRS #3
22. White Tanks FRS #4

Dam

Inundation Area

City/Incorporated Area/Other County

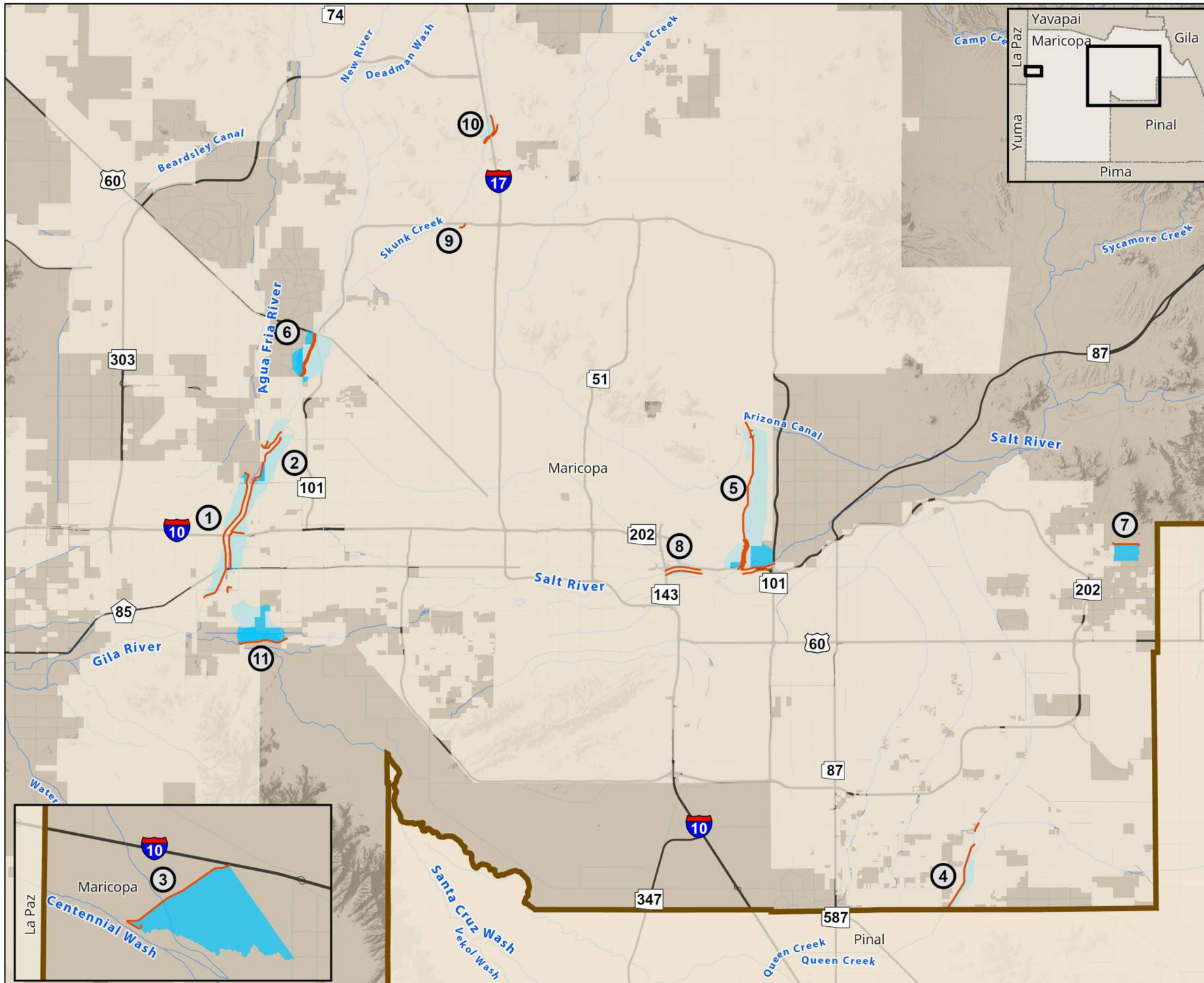
Maricopa County

0 2.5 5 10 Miles

N

Data Source: Flood Control District of Maricopa County

Created on: 02/2020



District Levees and Inundation Areas

Map 12

1. Agua Fria River Levees
2. Camelback Ranch Levees
3. Centennial Wash Levee
4. East Maricopa Floodway
5. Indian Bend Wash
6. New River Channelization
7. Pass Mountain Diversion
8. Salt River Channel Levees
9. Scatter Wash Channel
10. Skunk Creek Levees
11. Tres Rios North Levee

Levee

Inundation Area

City/Incorporated Area/Other County

Maricopa County

0 1.25 2.5 5 Miles

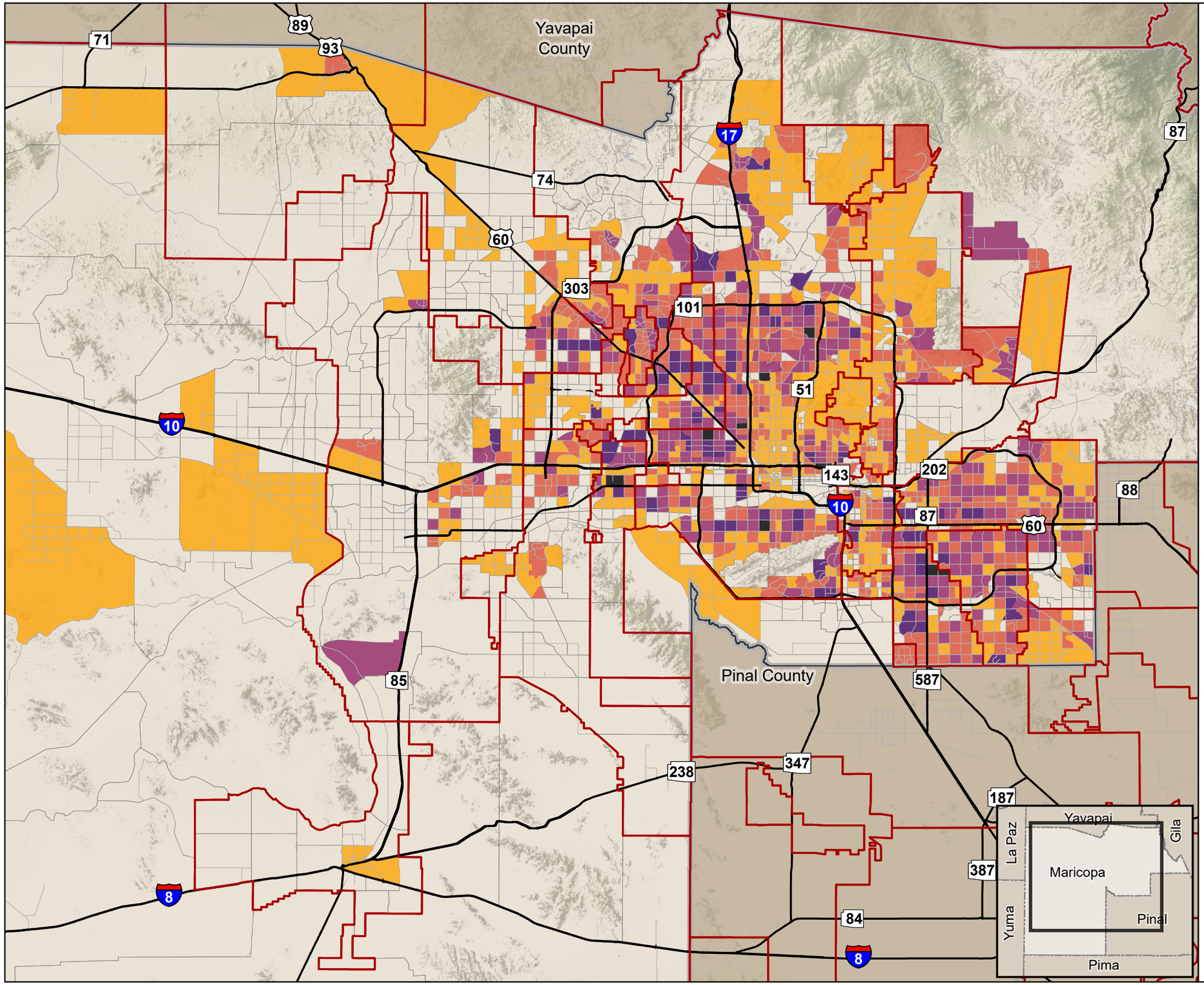
N

Data Source: Flood Control District of Maricopa County, U.S. Army Corps of Engineers

Created on: 02/2020

2020 Projected Population Concentrations of Maricopa County

Map 13A



Less than 250

250 to 2000

2000 to 4000

4000 to 6000

6000 to 8000

More than 8000

Municipal Planning Areas, 2019

Maricopa County

Other County

0 2.5 5 10 Miles

N

Data Source: MAG Projections of Population, Housing, and Employment for Maricopa and Pinal Counties, Arizona, by Traffic Analysis Zone, 2019 and Flood Control District of Maricopa County

Flood Control District of Maricopa County

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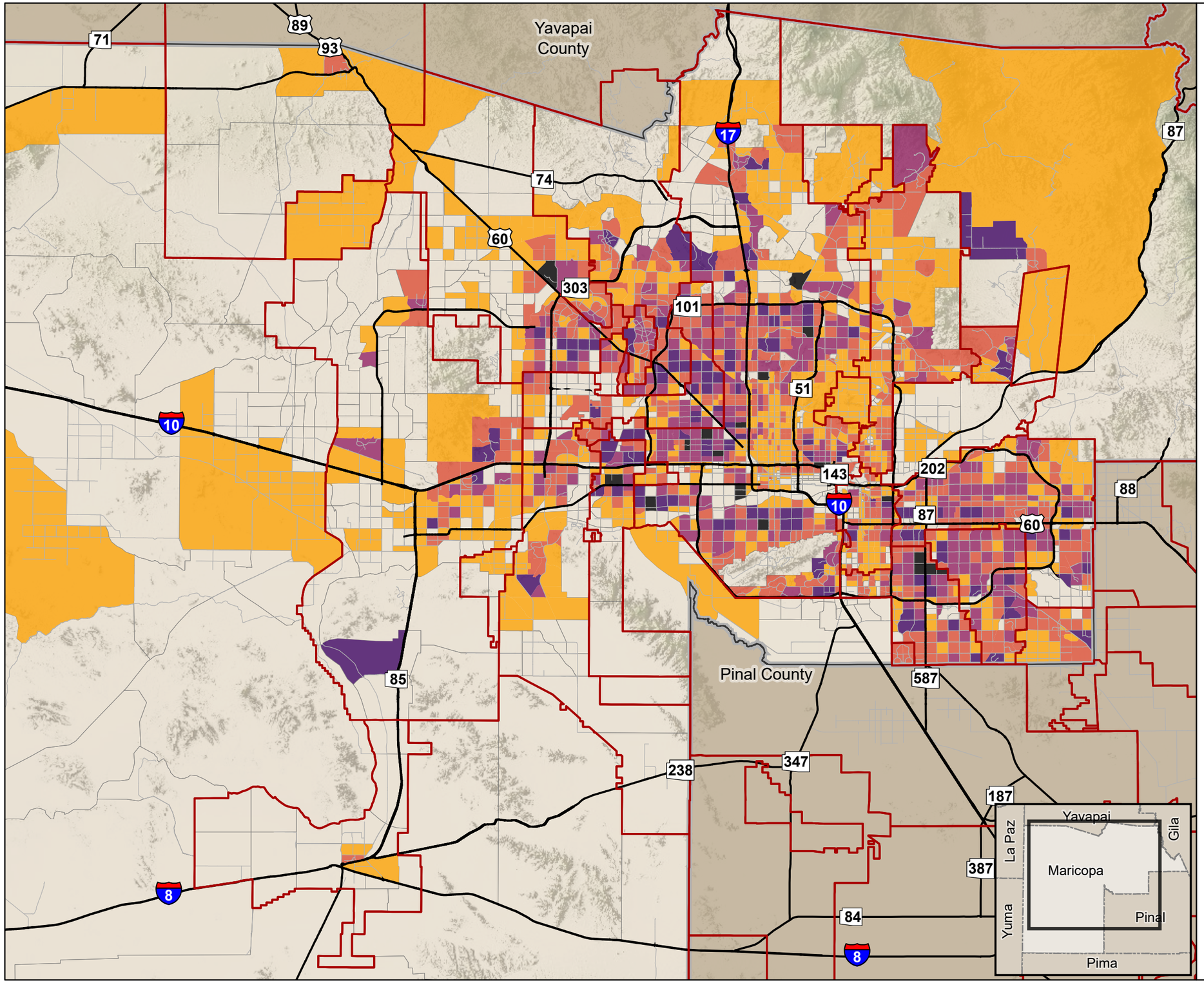

2030 Projected Population Concentrations of Maricopa County

Map 13B

- Less than 250
- 250 to 2000
- 2000 to 4000
- 4000 to 6000
- 6000 to 8000
- More than 8000
- Municipal Planning Areas, 2019
- Maricopa County
- Other County

0 2.5 5 10 Miles

N

Data Source: MAG Projections of Population, Housing, and Employment for Maricopa and Pinal Counties, Arizona, by Traffic Analysis Zone, 2019 and Flood Control District of Maricopa County

Flood Control District of Maricopa County

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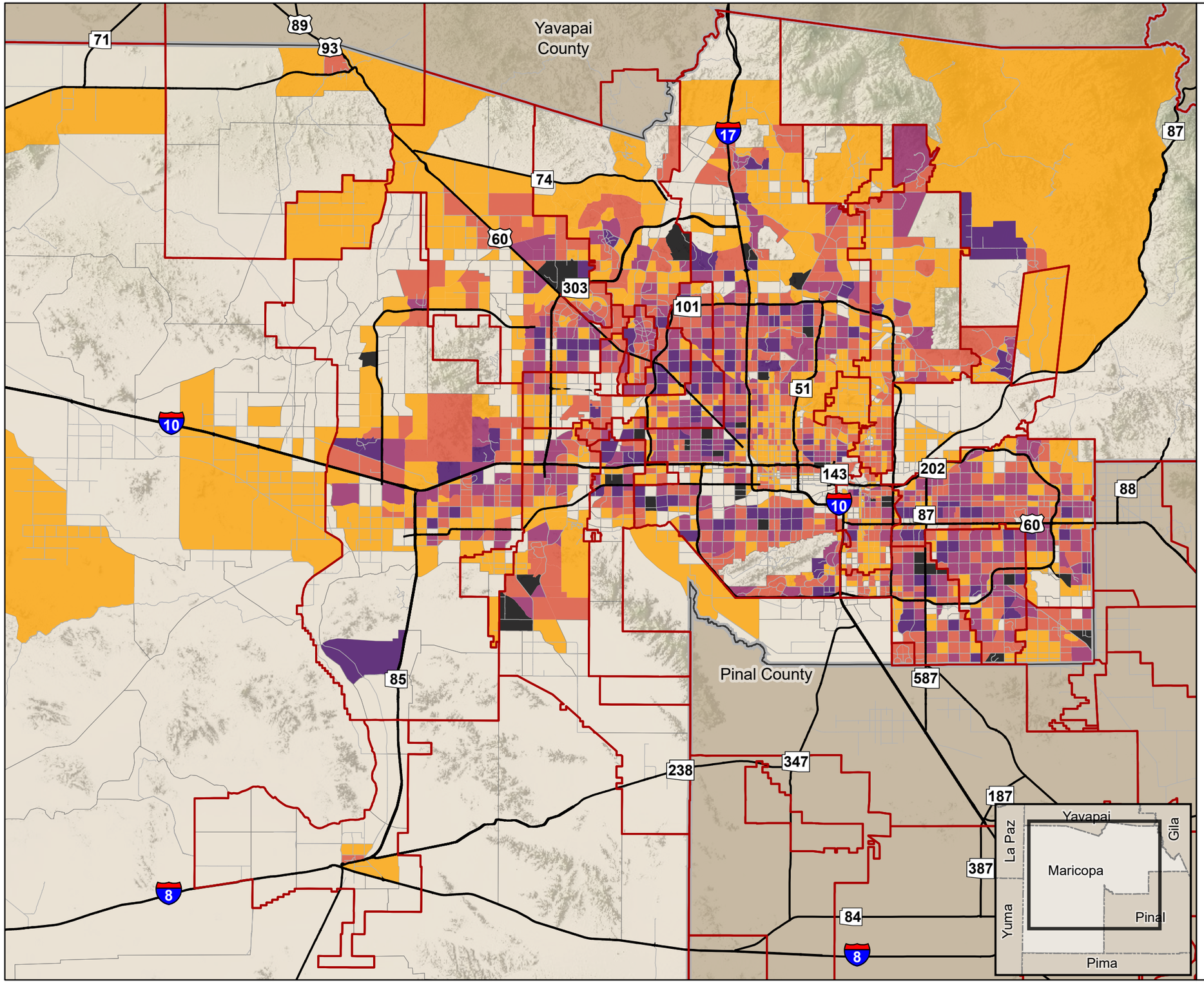

2040 Projected Population Concentrations of Maricopa County

Map 13C

- Less than 250
- 250 to 2000
- 2000 to 4000
- 4000 to 6000
- 6000 to 8000
- More than 8000
- Municipal Planning Areas, 2019
- Maricopa County
- Other County

0 2.5 5 10 Miles

N

Data Source: MAG Projections of Population, Housing, and Employment for Maricopa and Pinal Counties, Arizona, by Traffic Analysis Zone, 2019 and Flood Control District of Maricopa County

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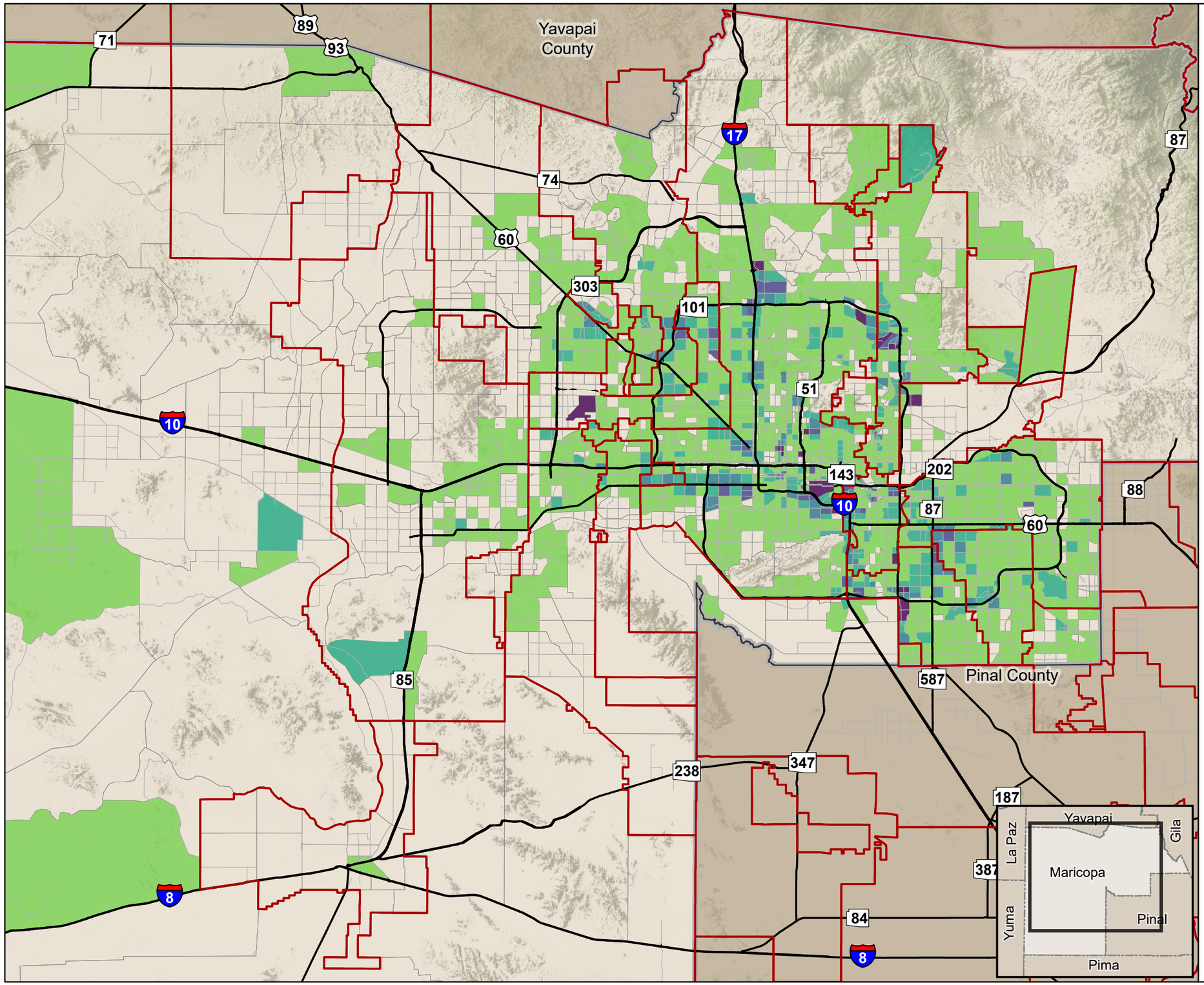

2030 Projected Employment Concentrations of Maricopa County

Map 14A

- Less than 250
- 250 to 2000
- 2000 to 4000
- 4000 to 6000
- 6000 to 8000
- More than 8000
- Municipal Planning Areas, 2019
- Maricopa County
- Other County

0 2.5 5 10 Miles

N

Data Source: MAG Projections of Population, Housing, and Employment for Maricopa and Pinal Counties, Arizona, by Traffic Analysis Zone, 2019 and Flood Control District of Maricopa County

Flood Control District of Maricopa County

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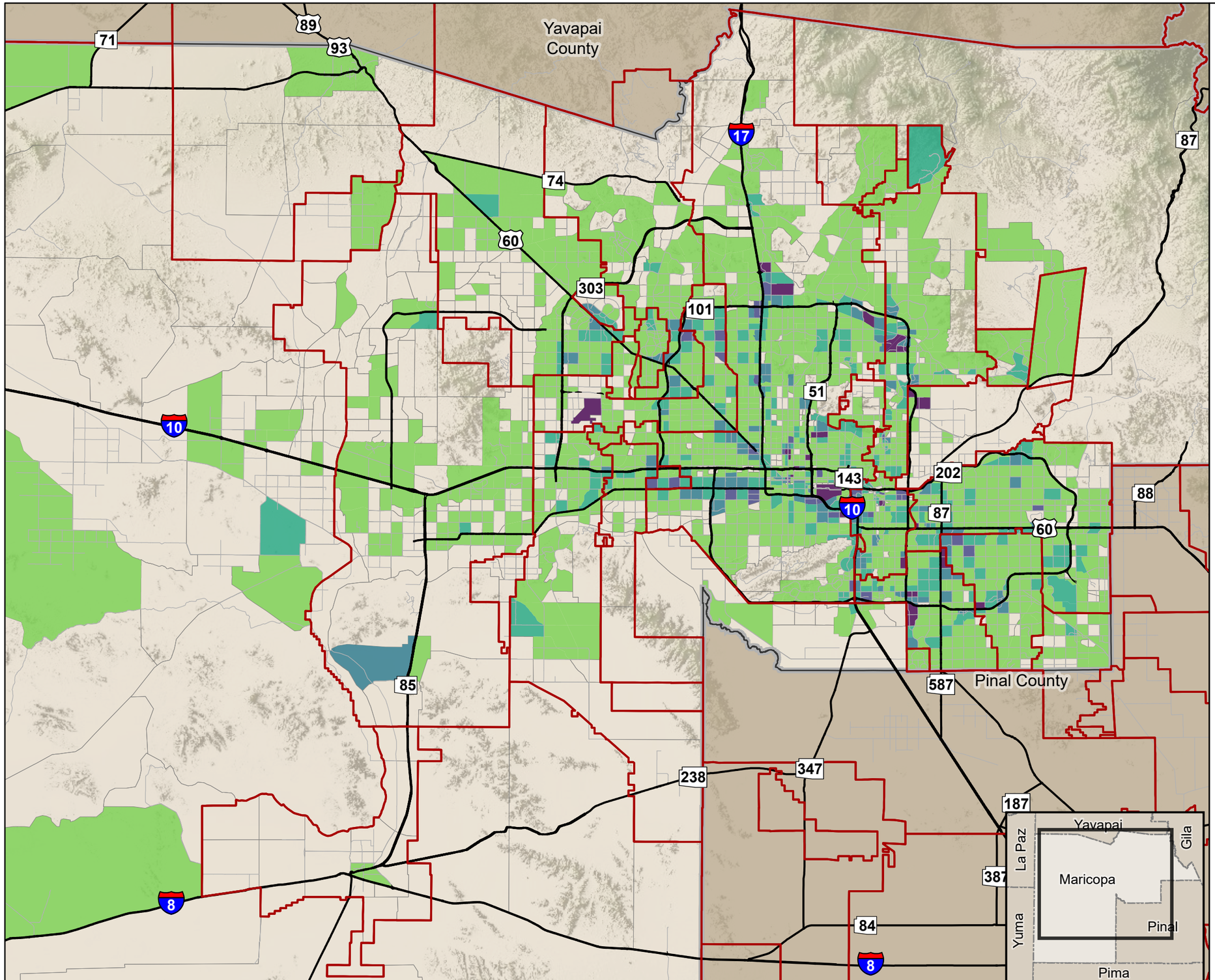

2040 Projected Employment Concentrations of Maricopa County

Map 14B

- Less than 250
- 250 to 2000
- 2000 to 4000
- 4000 to 6000
- 6000 to 8000
- More than 8000
- Municipal Planning Areas, 2019
- Maricopa County
- Other County

0 2.5 5 10 Miles

N

Data Source: MAG Projections of Population, Housing, and Employment for Maricopa and Pinal Counties, Arizona, by Traffic Analysis Zone, 2019 and Flood Control District of Maricopa County

Flood Control District of Maricopa County

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Appendix B

Floodplain Management Plan Committee Meetings

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PLANNING COMMITTEE MEETING MINUTES
Floodplain Management Plan 2020 Update
Wednesday, October 3, 2019 9:00 AM – 12:00 PM
Flood Control District Adobe Conference Room
Recorded by Black & Veatch Corporation

Welcome

Introduction

- Around-the-room Introductions
  - Kelli Sertich
    - Policy, Planning & Coordination Branch Manager
    - Flood Control District of Maricopa County (FCDMC)
  - Mark Fountain
    - Water Resources Regional Planning Leader
    - Black & Veatch
  - Dan Nissen
    - Deputy Engineering Director
    - City of Peoria
  - Sami Korpelainen
    - Supervisor – Civil/Mechanical Engineering
    - Central Arizona Project (CAP)
  - Ken Vonderscher
    - Planning and Development Manager
    - Maricopa County Parks and Recreation
  - Tice Supplee
    - Director of Bird Conservation
    - Audubon Society of Arizona
  - Lance Webb
    - Deputy Engineer
    - City of Mesa
  - Kelly Hargadin
    - Engineering Project Manager
    - City of Glendale
    - CRS Program, Grants, Drainage Projects
  - Brandon Espinoza
    - Development Services & Code-Compliance Officer
    - Town of Gila Bend
  - Mark Edelman
    - Planning and Engineering Manager
    - Arizona State Land Department
  - Tony Angueira
    - Yavapai County Flood Control District
  - Patti Trites
    - Citizen – South Mountain/Laveen area
    - President of Southern Hills Homeowners Association and member of South Mountain Village Planning Committee
    - Flooded twice in 2014
  - Ray Dovalina
    - Assistant Public Works Director

    - City of Phoenix
- Sam Patton
    - Project Manager Multimodal Planning Division Corridor Planning Group
    - Arizona Department of Transportation (ADOT)
- Gregory Arrington
    - Community Development Manager
    - Town of Youngtown
- Lynn Whitman
    - Flood Control District Director
    - Yavapai County Flood Control District
- Tom Ewers
    - Division Manager Plan Review – Chief Building Official
    - Maricopa County Planning and Development
- Nuning Lemka
    - Public Works Manager
    - City of Surprise
- Robert (Bob) Eroh
    - Project Engineer
    - City of Buckeye
- Jesus Haro
    - Emergency Services Planner
    - Maricopa County Emergency Management
- Liz Foster
    - Executive Director
    - Maricopa County Farm Bureau
- Brian Cosson
    - Arizona Department of Water Resources (ADWR) National Flood Insurance Program (NFIP) and Flood Warning Coordinator
    - ADWR
- Mike Shelton
    - Floodplain Risk Map Coordinator
    - ADWR
- Bassem Naba
    - Senior Drainage Engineer
    - Maricopa County Department of Transportation (MCDOT)
- Randy Goettsche
    - Citizen
    - Rio Verde area
- Ed Taylor
    - Citizen
    - President of New River Desert Hills Community Association
- Matt Hann
    - Water Resources Engineer
    - Black & Veatch
- Steve Waters
    - Hydrometeorologist and Flood Warning Program Manager
    - FCDMC
- Don Rerick
    - Planning and Project Management Division Manager
    - FCDMC
- Cathy Regester
    - Floodplain Permitting Division Manager

        - FCDMC
    - Scott Vogel
        - Chief Engineering and General Manager; Engineering Division Manager
        - FCDMC
    - Lisa Blyler
        - Information, Outreach and Support Division Manager
        - FCDMC
    - Charlie Klenner
        - Operations and Maintenance Division Manager
        - FCDMC
    - Hasan Mushtaq
        - Planning Branch Manager
        - FCDMC
- Safety Moment
    - Flu Season
        - 4 more upcoming meetings – want everyone to keep healthy through the remainder of the year.
    - Rally Point
        - Out in parking lot under shade structures
- Future Meeting Attendance
    - Alternates are requested if current participants cannot attend
- Welcome from Michael Fulton
    - Updating the plan is more than just an exercise – helps to identify flooding hazards in Maricopa County
    - Brought in a diverse group of individuals and stakeholders to gather information on the different interests with flooding to help with the development of the plan
- Overview of Agenda
    - Review of program and background
    - Overview of District Programs
    - Hazards Identified in 2015 Floodplain Management Plan (FMP)
    - Action Items from 2015 FMP
    - Where are we going with the 2020 FMP
    - Leadership in the County
    - Next steps for forthcoming meetings
- Overview of the National Flood Insurance Program (NFIP)
    - In the late 1960's, Congress created the NFIP – maps were necessary to identify hazards and a regulatory process was needed
        - Maricopa County joined in 1970
        - NFIP requires flood hazards/regulation
    - Community Rating System (CRS) developed by NFIP to provide incentives for floodplain management activities done by the communities
        - County programs assist in the involvement of the CRS
    - Flood Insurance
    - Community Rating System (CRS) – Class 4 Community
        - Up to 30% flood insurance discount for residents in unincorporated Maricopa County
    - FMP Committee Process started in 2015 and continuing forward with the development of the 2020 FMP Update
    - Overview of changes within the NFIP and CRS
        - 2012 major reform – rates and map changes
        - 2014 tweaks to NFIP

        - Reauthorizations over the years and recently Congress voted to continue NFIP to November 21, 2019 as they work through potential reform
        - CRS – Task force meets and updates manual frequently – they seek input from the different regions throughout the country
- Overview of the FMP
    - Guiding document to help Maricopa County with floodplain management for the next 5 years
    - Seeks to identify hazards and set action items for how Maricopa County will proceed forward to mitigate flood hazards throughout the county
    - Development process
        - A plan has been in place since 1985 – State statute requires all Flood Control Districts to have a comprehensive plan
        - 2015 was first standalone FMP outside of comprehensive plan – used committee process
        - Community input helps to improve the FMP development – committee helps provide additional input that will also be incorporated into the Comprehensive Plan
        - Talks about projects that will be done and how funding will come about
        - FCDMC Strategic Plan will be updated in the next year and the FMP will be used to help guide that document.
    - Your role as a participant
        - Feedback is very important in the development of the FMP
    - Review of FMP Committee Timeline
- Other concurring plans – Comprehensive Report & Program, Strategic Plan

Overview of Featured District Programs

- Hazard Identification Studies and Plans, Programs/Projects – Don Rerick
  Planning and Project Management Division
  Cradle to Grave
    - Hazard Identification through project design and construction
        - Helps with communication
        - Helps reduce change orders
    - Fiscal Year 2020 Funding
        - $81M capital funding
        - $37M operating fund
    - Cradle to grave
        - Hazard identification
        - Potential mitigation solutions
        - Prioritization
        - If recommended, Inter-Governmental Agreement (IGA) to Project Design
        - Project construction
        - Project turnover
    - Hazard ID phase
        - FLO-2D to identify hazards
        - Helps to identify hazards that solution is needed for
    - 12 studies currently underway
        - Example – Lower Indian Bend Wash Study Report
            - Hazard identification within study
        - Cities help provide input
    - Area Drainage Master Plans (ADMP's)
        - Partnerships to develop cost efficient measures
        - Example – South Mountain/Laveen

        - Updated about 1 years ago from the 1994 ADMP
        - 6 different mitigation areas
        - Some underway currently in one phase or another
- Capital Improvement Plan Prioritization Process (CIPPP)
    - Formal annual process that agencies can submit projects for formal evaluation
- Evaluation committee reviews and then gets approval from FCDMC Director
- Advisory Board for final approval
- Recommended for implementation – will not be pushed forward until IGA for cost sharing has been developed and agreed to
    - CIPPP Scoring
- Broken down into multiple elements for scoring prioritization
    - Develop/Transition
- Design Concept Report (DCR) or mini-ADMP may be needed
- Timeline and budgets
- If partner available, IGA pushed forward for design
    - Design
- Includes landscape architecture and water conservation
- Includes utility work – utilities could be the biggest issue for a project
- Right of way acquisition
    - McMicken Dam Example
- Currently under construction
    - Landscape Architecture and Water Conservation
- Encourages Green Infrastructure (GI) and Low Impact Development (LID) and alternative stormwater measures
- Structural aesthetics – do not want to have plain concrete within projects
    - Dam Safety Program
- 22 dams operated and maintained by FCDMC
- Multiple structures within Pinal County
- Rehabilitation is important due to age of structures – NRCS and USACE structures
    - McMicken Dam (built in the 1950's)
    - Buckeye FRS 1
    - Powerline FRS, Vineyard FRS, and Rittenhouse FRS
    - Cave Buttes Dam
        - All under design/construction
    - Construction
- Construction Management is done with FCDMC staff primarily – sometimes it is contracted out
- Encourage partnering with contractors to get good relationship from beginning
- Encourage value engineering
- Example – 115th Ave and Union Hills (Completed with Peoria and Surprise)
    - 6% change order due to changes in field – minimally due to design or specs issues
- Pass operation and maintenance on to partner agencies after construction is complete
- Questions
    - (Dan Nissen – City of Peoria) Are the Levee and Dam Safety Program the same?
        - No, levees are separate and headed by Frank Brown and dams by Tom Renckly

        - (Tice Supplee) Is there a process after turnover to partner agency for the success of the project and design and come back with reworks and modifications short of a disaster response?
            - In 2014 and 2015 not one structure malfunctioned or failed
            - Challenge is when the structures work the citizens do not know why they do not get flooded – but when they do not work, which is rare, they (citizens) do get flooded
            - Rarely have reasons to go back and do rework on projects
        - (Patti Trites) When you prioritize projects, how do they get elevated? Is it based on if the city has funding?
        - Yes, when the CIPPP process was started it was thought once the project got recommended it immediately went into design and construction. Have a backlog of projects recommended as far back as 2002 that have still not been implemented because the agency requesting has not found the need to implement it.
        - When the city comes to FCDMC, based on recommendations for a project to be implements and they are ready to sign an IGA to help fund the project then it moves forward.
        - If the above are met, the project can move forward.
        - Yes there are projects that have been designed but no IGA has been made to push project forward
        - (Brian Cosson) Does it matter where funding comes from (Cosson)
            - No, it does not matter where the secondary funds come from
- Operations and Maintenance – Charlie Klenner (Division Manager)
    - O&M Overall budget $1.9M
        - 22 Purchases this year
    - Taking care of a lot of aging infrastructure
    - Help manage facilities
        - HVAC in Durango facility
        - Facilities upgrades for break rooms, rest rooms
    - Major maintenance
        - New to the budget
            - Example – Fall protection needed for structural features
            - People and homes are within areas of safety concern - it is important they are included
            - Levees are a big concern – fall hazards from crests with no protection
            - Arizona Canal Diversion Channel (ACDC) – Fencing failing along canal and erosion concerns – getting contractor to take care of the fence replacement since doing it in-house took too long. $5.5M
        - New River Channel Maintenance
            - Modeling done to show there was too much growth in some areas
            - Took 1.5 years to clear up – needed Section 404 permitting to get completed
        - Reems Road Channel after Maintenance Cycle
            - Updated channel with vegetation to make it more aesthetically pleasing
    - Questions
        - (Kelli Sertich) How many structural items are maintained by District?
            - 22 dams and over 80 miles of levees
            - Michael Fulton directed committee to look at the exhibits to see the structures maintained by FCDMC

    - Managing aging infrastructure is a budget issue
    - Have a lot of infrastructure to manage daily to have it function when it is needed – flap gates, vegetation removed, etc.
    - Sun City Drains are needed to be upgraded and will be a $25M job to keep them operating as they should
- (Patti Trites) Budget – is it all out of taxes?
    - Yes
- (Patti Trites) Is Maricopa County seeing a growth in budget as Maricopa County has grown?
    - Yes and no – the funds come from a secondary property take and it varies based on values of properties. The rate was set by Board a couple years ago and brings in around $70M. Approximately $30M operating budget for salaries and other overhead items. Remaining is available for projects to be shared 50/50 with cities.
- It is not only about quantity it is also about valuation
- Get some revenue from partnerships from the Federal government if the manage projects
- Dam rehabilitations projects at $100M projects that need Federal partnerships to have pushed forward
- Cities have their items to manage and the District is one of the items in pile
- (Tice Supplee) Del Webb (Sun City) example – do new developments have to be responsible for developing floodplain management items? Is there any communication with FCDMC engineers to make sure they convey the flows and meet design standards?
    - County Planning and Development reviews plans
    - Goals for Sun City improvements is to keep Sun City infrastructure the same size and replace like-for-like
- (Dan Nissen) For the maintenance of New River and it is known when the District is in there – is there a better way to notify the public that maintenance is going on to reduce citizen phone calls to cities? Joint message was developed and sent out after and might have been better to send out early.
    - Yes, this will be addressed later in the presentation for opportunities between the communities and FCDMC
- (Lance Webb) Challenges the cities have is educating the public about drainage related maintenance. Have FCDMC ever put together a manual or guidelines for how maintenance should be done by the community residents?
    - Yes, there was a flyer showing who was responsible for what, but not sure if much has been done with it lately
- (Lance Webb) Mesa went through and documented ownership of maintenance. That was the first part of it, but what does Mesa do to maintain their infrastructure. General HOA boards do not know what needs to be done. Mesa has talked with the HOA boards to include the maintenance and cleaning of drainage infrastructure within their landscaping contracts. Often asking how often they should be doing maintenance. Has FCDMC taken a lead to develop something to help the general public with maintenance programs?
    - Flood control is everyone's responsibility and FCDMC has the role to communicate how citizens and cities can mitigate flood risks
    - GI and LID guidelines have been developed for communities, but a better outreach plan could be developed

        - The data is available in different documents and it would need to be combined for the public to use

- Permitting and Delineations – Cathy Regester
  - Floodplain permits
    - Provides floodplain management for 14 communities within Maricopa
    - Review Conditional Letter of Map Revision (CLOMR) and Letter of Map Revision (LOMR) for 14 communities and un-incorporated MC
    - Seen a 30% increase permits applications in the last year
    - Online permit program developed to submit applications online to facilitate submissions
      - Can check status and receive permit from online application
      - Been in place since July 2019 for testing and working on removal of bugs
      - Encourage online only submittals going forward
      - Team is tasked with responding to requests from the public about floodplains and general information
      - Get about 2,000 questions a year from the public – staff expected to respond within 24 hours of receipt. A full answer is not always provided within 24 hours, but a notice of receipt of question and that it is being worked on is sent back.
  - Code enforcement/Inspections
    - Coordinate prior to any action
    - Team does around 400 inspections per year – with about 75 open cases currently.
  - Floodplain delineations
    - Several studies currently under review at the Federal Emergency Management Agency (FEMA)
    - Several underway currently
      - Hassayampa River (underway)
        - USGS has looked at stream gage data in the area and updated the flow rates – decreased between 20 to 30%
        - New delineation done based on new flow rates
      - Gila Bend area (planning)
        - Zone A re-delineations
        - 2013 FEMA looked at all railroad embankments and placed Zone A's along embankments with potential for failure
        - Looking to see if Zone A delineations are warranted or if it base flood elevations need to be developed
        - Currently developing an approach for study
      - Sunland Avenue Tributary (planning)
        - 99th Avenue to 115th Avenue, north of the Salt River
        - Current delineation is likely no longer accurate due to development done within area
        - Developing approach for study
      - Revision of a Zone D within City of Mesa
        - Zone D flood insurance is not mandatory, but expensive if purchased
        - Goal of the delineation is to identify flood hazard to remove a majority of the Zone D area
        - Future study to look at area south of Elliot Road
  - Questions

        - (Tice Supplee) Why are new delineations done on the Hassayampa River with lower flows when we are in a 20-year drought?
            - River flow data is based on 60+ years of recorded data
            - Change in development within watershed could warrant a re-delineation.
            - When does FCDMC decide there has been enough change to warrant a re-delineation? This is a big issue and needs to be thought about when looking at re-delineations.
        - (Tice Supplee) Some of the new delineations are within areas of proposed green space. Could this be included into the re-delineation to both re-delineate and provide mechanism for green space preservation?
            - Delineations are blind to the current land use but may be helpful to where green space and open space projects may be applicable. This goes beyond the re-delineation of the floodplain.

- Engineering Division Program Highlights – Scott Vogel – Chief Engineer
    - Focus on Emergency Action Plans (EAP's) for Dams/Levees and Flood Warning Program
    - FLO-2D Web Access Tool
        - 11 studies added to the tool
        - Video tutorials are ready to be loaded to the site
        - Will continue to place future studies online are they are completed
        - Displays flow depths and direction of flow
        - Special log-in for technical personnel to get more data to use
    - Drainage Design Manuals – Updated Fall 2018
        - Hydrology, Hydraulics, Erosion control
    - Dam Fill-Time and Outflow Forecasting Tool
        - Developed recently to predict the time of dam fill/peak
        - During a storm, based on real time feedback and parameters developed for the watershed/contributing area
    - Levee Safety Program
        - 24 District Levees – 35 miles in length
        - Program developed to keep levees in operational shape and FEMA certified
        - Program now allows for assistance through the United States Army Corps of Engineers (USACE) Rehabilitation and Inspection Program
    - Right-of-Way Use Permitting
        - Resolution to work in FCDMC Right-of-Way recently updated
        - USACE Section 408 Permission
            - Any impact to structure to be reviewed by USACE
            - Have monthly conference calls with USACE to discuss permits going to USACE
        - Mapping and Survey
            - LiDAR data has saved FCDMC time and money on overall mapping services
            - Started Drone Mapping and Imagery
                - Good for certain applications, such as where it may be difficult or unsafe to get surveyors to
    - In-house Design and Review
        - Done for smaller CIP projects as well as Operation and Maintenance repair projects
            - Helps with turnaround of reviews
    - Emergency Action Plans

        - For dams and levees managed by FCDMC
        - Potential emergency conditions at structure and what actions should be taken in case of emergency condition
        - 22 FCDMC Dams that surround the valley
            - Around 23 other dams in Maricopa County operated by others
        - Why EAP's?
            - Minimize the loss of life and property during storm events
            - Laws require this for significant hazard potential dams
            - FEMA requires them to keep structures certified
            - NFIP CRS Dam and Levee credits
            - USACE required FCDMC to have EAP's in place for structures
            - Minimize loss of life and property damage
        - EAP Content
            - Identifies potential emergency conditions – impoundment, spillway flow, breach, etc.
            - Actions that are taken for emergency condition
                - Could be crews sent to field to observe structure
                - All the way up to evacuation recommendations
            - Flow Chart for FCDMC actions are included in each EAP to identify staff actions for emergency conditions
                - Lists who is responsible and who should be notified and when
    - Questions
        - (Mark Fountain) How many EAP's are being updated currently?
            - All are reviewed annually. Currently have one or two being updated – Two types of updates are administrative updates (contacts updates, new critical structure, etc.) and larger updates every 7 years or so with updates to hydrology or dam rehabilitations
        - (Dan Nissen) How often are table top exercises done for each EAP?
            - One to two table top exercises done every year with cities and other agencies
            - Full scale once a year
        - (Lance Webb) What constitutes the threshold for internal design?
            - Internal design staff to help out – Example would be plans for Operation and Maintenance staff for requested information
            - Smaller CIP tasks if staff is available
- ALERT and Flood Response Plans – Steve Waters
    - Should be used day-to-day, design, irrigation, anything you may have
    - Elements of Flood Warning program
        - Planning – where do gages go to best represent rainfall and stream flows in areas the system is set up
        - Detection – rainfall, streamflow, weather stations.
        - Communication – how do people receive the info?
        - Action – How do people respond when they receive info?
        - Maintenance of Equipment and Plans
        - Exercises – table top and full scale
    - Responsibilities
        - To the District's structures
            - Dams, Levees, Channels, and Basins
        - In late 1970's during major floods, there was no option for real time information, unless person sent to field with radio

        - In 1980's, District started the ALERT system to collect data and put into format people could read and use
    - MCDOT
        - TO help close at grade crossings
    - Other County Departments
        - MCDOT, Maricopa County Sherriff's Office (MCSO), Maricopa County Department of Emergency Management (MCDEM), Cities, ADOT
        - FCDMC not responsible for warning the public directly
- Partners
    - County Transportation & Emergency Management
    - USGS
    - National Weather Service
    - ADWR
    - Various land agencies (Bureau of Land Management, US Forest, State Land Department, Tribes)
- FCDMC ALERT System
    - Picked up at gage
    - Send to ALERT, MCDEM, and National Weather Service(NWS)/PHX/AFWS
    - Sent out for real time data information
- Installations
    - Requested by multiple agencies over the course of the past 30+ years – sometimes done with a cost share
- FCDMC ALERT System Inventory
    - Covers 12,044 square miles
    - Gages outside the county since water comes into the county from outside
    - 71 sensors on dams and basins
        - Not just FCDMC structures – includes others such as Phoenix, CAP, etc.
- Incremental ALERT Rain Gage Installations
    - Increase of gage installations after years of severe storms
- Flood Detection
    - Meteorology and hydrology go hand-in-hand
- Meteorological Services Program (MSP) Outlooks
    - Sent to more than 1,400 clients per day for general weather information for critical services
- Weather Outlook
    - Example provided to show outlook for the coming days, when rain may occur, and what maximum depth may be
    - The messages play into the flood response plans
- Flood response plans
    - Developed several over the years – areas in Maricopa County that have more flood hazards than other and this does not mean only structures but also at grade crossings
    - Relies heavily on support from FCDMC and NWS
    - Broken down into 4 parts
        - What gets it going – what gets people looking at plan and making actions
        - What are the actions required – what are people supposed to do when triggered

            - Potential trouble areas – where they may be structures or at grade crossings
            - Critical times – how much time do they have to perform actions based on how wash would respond
        - South Mountain/Laveen Flood Response Plan (FRP)
            - Maps and online interface to provide dispatchers and police the ability to look at in real-time
            - Provides Red Alert condition areas
                - Anecdotal information for flooding and transportation corridors that have flooded
    - Automated Flooded Roadway Warning Assemblies
        - Several locations throughout Maricopa County
        - Can be activated from FCDMC computers and also activated by a stream gage upstream of crossing
        - Locations for the Automated Flooded Roadway Warning Assemblies are at a distance away from MCDOT facilities – done to make it easier to notify people in case MCDOT cannot respond in time to close the road
        - Intrusion alarm in cabinet in case it is opened without authorization
    - Questions
        - (Dan Nissen) Who comes out for FCDMC to help train agencies on how to navigate through webpage to read the information provided?
            - Done on a as requested basis to have FCDMC come out
            - Prior to monsoon season a meeting/webcast is held to showcase new developments and take questions on how things operate

Hazards Identified in the 2015 Plan

- Thinking about influences inside and outside the County boundaries
- 21 total identified hazards previously identified – structural, regulatory, natural, and human-caused
    - Committee has the influence to identify new hazards
    - This list is not all encompassing
    - Structural
        - Dams and FRS
        - Overtopping of the CAP and other canals
            - Risks to downstream properties
            - Designed to convey certain return intervals through infrastructure
        - Levees
            - FCDMC's Levee Program was developed to keep levees operational and FEMA certified
            - Adjacent developments have created hazards to dams (illegal taps, vandalism, etc.)
        - At-grade crossings
            - Flashing signs and depth gages
            - Identify risks to public before they enter the crossing
        - Transportation Corridors
            - Example – September 2014 storm – the flooding of the I-10, US-60, and I-17
            - ADOT inspecting structures – debris and public waste get into pumps and cause issues
            - MCDOT operations and maintenance
    - Regulatory
        - Single-lot development – no coordinated drainage system

        - Lack of communication from rural standpoint from influx of new residents that do not understand the risks and change property to increase risks to themselves or others. May not understand why they may make things work.
        - Educating the public about guidelines available from FCDMC
    - Special Flood Hazard Areas
        - Transitioning from approximate/indeterminate risks to better identified risks
        - Velocity is a risk that is not included within the floodplain mapping
        - FCDMC maps to show depths and velocities to provide flood risk hazards to different levels
    - In-channel Activities (e.g. recreation)
        - Open space for recreation within channels/washes
            - People using washes for recreation (dirt bikes, UTV's, pedestrian)
    - Repetitive loss properties
        - CRS program issues
        - How are we communicating the risk to the areas of repetitive loss
    - Natural Hazards
        - Flash flooding
        - High runoff potential of some soils
        - Split Flows
        - Alluvial Fans
            - FCDMC studies to better understand behaviors of alluvial fans
            - Better understand for development within areas
        - Lateral migration and erosion of natural streams
        - Sediment-laden floodwaters
        - Drought
    - Human-Caused
        - Changed flow characteristics due to urbanization
        - Changed flow paths due to farming
        - Loss of habitat for both animals and vegetation
        - Subsidence and earth fissures
        - Wildfires (also a natural hazard)

Where We are Now – Status of 2015 Plan Goals & Action Plan

- Coordination and Accountability
    - FCDMC has the charge to effectively communicate information in a timely manner
    - STEM program to educate kids early
- Prevention Efforts
    - Preserving areas of open space to help mitigate flood prone areas
- Property Protection
- Natural Resource Protection
    - Preservation of open space, green spaces, wildlife corridors, in addition to floodplain purposes
- Groundwater Recharge
    - Used to be a fee to use FCDMC land for recharge – recent change to make it a partnership with the District to capture and recharge the water
    - Need to see the runoff as a resource
- Emergency Services
    - Effective and timely responses of emergency service resources

- Structural Projects
  - FCDMC CIP shows where the structures are being rehabbed and constructed
- Public Information Activities
  - FCDMC takes a proactive approach with agencies and developers – flood objectives and land use
    - Developers need to know the floodplains are there and a risk
  - Use FCDMC tools to provide risk information to the public – online maps
- Resource Development
  - FLO-2D Web Tool, Design Manuals, and Design Guidance
  - Trainings
  - STEM Program
  - How do we share information that has been developed?
- Quality of Life
  - FCDMC responsibility is to preserve and protect – each agency has a different idea of what their role is
- Lessons Learned 2015
  - Flood preparedness and awareness
  - Location of emergency service and response times
    - Stockpiles of materials – could people get mobilized the materials
- Change of Communications
  - Change of staff within FCDMC and agencies – communication and body of knowledge changes
    - How is this going to change the direction and ability to meet goals?

Where We Want to Be – 2020 Plan

- Leverage information developed within the 2015 FMP
- Strengthen the role of Regional Leadership
    - FCDMC to use this committee platform to collect information to determine what else needs to be done. New documents to educate
- Update and identify hazards in Maricopa County
    - FCDMC has a number of ADMS/P updates underway, but the updates may not be in an area of interest to certain committee members
        - May need to focus on another area
    - Developments could change the characterization of risks
        - To the public and the FCDMC structures
- Understand the problems associated with the hazards
    - Public not thinking about the risks associated with structures or flooding
        - Think the structures will never fail
    - EAP's to help communicate and direct individuals
- Establish new goals and actionable timelines
    - Priorities of different agencies and provide actionable goals – new goals to be documented and communicated into the FMP update
    - Annual review by FCDMC to ensure the goals are been tracked and achieved.
    - A table of actions will be developed to assist in the tracking of the FMP progress
- Evaluate potential actions and known challenges for new goals
    - Mechanism of tracking progress and get feedback on how to do so
- Prepare a five-year action plan with progress tracking metrics
    - Input from all on how this can be done
- Adopt and Implement the plan
    - Changes to the plan that are contributed by the whole committee
    - Make sure actions/goals are implementable
- Frequent monitoring of progress toward goals
    - Cannot create the FMP and let it go onto a shelf – additional coordination with the District and agencies are needed to ensure actions are moving forward

Next Steps

- 2020 Plan
    - Identify hazards
    - Understand problems caused by hazards
    - Set goals
    - Develop/evaluate potential actions
    - Prepare five-year plan
    - Monitor progress
- Collect and incorporate hazard and mitigation data for Maricopa County
    - Send questions and comments to Kelli Sertich so they can be documented and included into the FMP update
- Ongoing coordination with FMP Committee
    - Prefer full participation from group going forward – need quorum to make the FMP committee meetings happen
    - Provide input on FMP development with breakout sessions
    - Review of Draft FMP in Spring 2020
        - May influence further questions, comments, concerns to be included
- Conduct Public and Stakeholder Involvement – Specific Audiences
    - Areas that may need targeted meetings – if the committee members has areas that fit this let Kelli/Mark know so this can be documented and action developed

Open Discussion

- (Tice Supplee) Data or info available after levee or water barrier, like a road – downstream risk to subsidence?
    - ADWR has publicly available information to show where areas subject to subsidence and known earth fissures locations
- (Tice Supplee) A GIS Greenprint is available from the Desert Botanical Garden
- Budget and Public Outreach/Information presentations will occur at next meeting
- (Dan Nissen) Has FCDMC incorporated LID into Design Manuals?
    - Included some principles in the Manual updates a few years ago.
    - Still coming together with MCDOT and other agencies to develop details and other standards
    - Greater Phoenix Metro Green Infrastructure Guide

- **Adjourn**

<u>Next Meeting:</u>
Thursday, October 24, 2019
9:00 AM – 12:00 PM
FCD OPS Building

Flood Control District of Maricopa County
2801 W. Durango Street
Phoenix, AZ 85009

FLOODPLAIN MANAGEMENT PLAN 2020 UPDATE
SIGN-IN SHEET

Meeting #1:	Assess the Flooding Hazard	**Meeting Date:**	Thursday – October 3, 2019
Facilitator:	Mark Fountain, Black & Veatch Corporation	**Place/Room:**	Adobe/Harquahala/New River Conf. Rooms

Initial	Name	Title	Organization	Phone	Alternate Phone
BE	Brandon Espinosa	Development Services & Code-Compliance Officer	Town of Gila Bend	602-679-0355	
BC	Brian Cosson	ADWR NFIP and Flood Warning Coordinator	Arizona Department of Water Resources	602-771-8657	
DN	Dan Nissen	Sr. Civil Engineer	City of Peoria	623-773-7237	
	~~David Fritz~~ Boosem Nabe	Engineering Branch Manager	Maricopa County Department of Transportation	602-506-2826	
EA	Ed Taylor	President - New River/Desert Hills Community Association	Citizen	602-739-1235	
GA	Gregory Arrington	Community Development Manager	Town of Youngtown	623.933.8226	
JH	Jesus Haro	Emergency Services Planner	Maricopa County Emergency Management		
KH	Kelly Hargadin	Engineering Project Manager	City of Glendale	623-930-3641	
KV	Ken Vonderscher	Planning and Development Manager	Maricopa County Parks and Recreation	602-506-9503	
	Kristin Tytler	Assistant Director/City Engineer	City of Surprise	623-222-6153	
LW	Lance Webb	Deputy Engineer	City of Mesa	480-644-2399	
LF	Liz Foster	Executive Director	Maricopa County Farm Bureau	480-635-3631	
LW	Lynn Whitman	Flood Control District Director	Yavapai County	928-771-3196	
MF	Mark ~~Edleman~~ Edelman	Planning and Engineering Manager	Arizona State Land Department	602-542-6331	

Flood Control District of Maricopa County
2801 W. Durango Street
Phoenix, AZ 85009

Initial	Name	Title	Organization	Phone	Alternate Phone
	Mike Shelton	Floodplain Risk Map Coordinator	Arizona Department of Water Resources	602-771-8428	
	Noel Carter	Buckeye Water Conservation and Drainage District	Irrigation District & Electrical Districts Association	623-386-2196 (Main Office)	
	Nunning Lemka (backup)	Public Works Manager	City of Surprise	623-222-6148	
	Patti Trites	President of Southern Hills HOA, member of South Mountain Village Planning Committee	Citizen	402-213-7126	602-603-9033
	Pete Weaver	Emergency Management Coordinator	Town of Gilbert	480-503-6333	
	Randy Goettsche	Board Member Rio Verde Horsemen's Association	Citizen		
	Ray Dovalina	Assistant Public Works Director	City of Phoenix	602-534-5720	
	Robert Eroh	Project Engineer	City of Buckeye	623-349-6245	
	Rudy Perez	Emergency Services Planner	Maricopa County Emergency Management	602-273-1411	
	Sam Patton	Project Manager Multimodal Planning Division Corridor Planning Group	Arizona Department of Transportation	602-712-6168	
	Sami Korpelainen	Supervisor – Civil/Mechanical Engineering	Central Arizona Project	623-869-2631	
	Steve Trussell	Executive Director	Arizona Rock Products Association - ARPA	602-271-0346	
	Tice Supplee	Director of Bird Conservation	Audubon Society of Arizona	602-468-6470	
	Tom Condit	Development Engineer	Town of Gilbert	480-503-6815	
	Tom Ewers	Division Manager Plan Review	Maricopa County Planning & Development	602-506-7145	

Flood Control District of Maricopa County
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Initial	Name	Title	Organization	Phone	Alternate Phone
MF	Mark Fountain	WR Regional Planning	B&V	602-381-4430	602-309-9848
MH	Matt Hann	WR Engineer	B&V	602-381-4445	
	Liz Foster	Executive Dir	Maricopa		
BC	Brian Casson				
	Randy Goettsche	Self-Resident		623 451 3025	
LB	Lisa Blyler	Info. Support + Outreach Div Mgr	FCD	602 506 6782	
SW	Steve Waters		FCD	6-4694	
HM	Hasan Mushtaq	Planning Branch Manager	FCD	62929	
TA BA	Tony Angueira	Stormwater Engineer	YCFCD	442-5390	
SM	Sharon McGuire	Programs Coordinator	FCD	x68378	
MF	Mike Fulton	Director	FCD		

FMP PLANNING COMMITTEE MEETING NO. 2 MINUTES
Floodplain Management Plan 2020 Update
Wednesday, October 24, 2019 9:00 AM – 12:00 PM
Flood Control District Operations Building Conference Room

Introduction

- Welcome
  - Logistics and Intros
  - Rally point – Out the building and into the covered parking area
- Around-the-room introductions (Flooding concerns sought to be addressed)
  - Sam Patton – Arizona Department of Transportation [ADOT]
  - Tice Supplee – Audubon Arizona (Non-structural solutions)
  - Mark Edelman – Arizona State Land Department
  - Brandon Espinoza – Gila Bend (Floodplains in Town)
  - David Fritz – Maricopa County Department of Transportation [MCDOT]
  - Nuning Lemka – City of Surprise
  - Sami K – Central Arizona Project [CAP] (How CAP can help)
  - Bob Eroh – City of Buckeye
  - Melody Zyburt – City of Mesa
  - Ray Dovalina – City of Phoenix
  - Patti Trice – Citizen/South Mountain-Laveen area (Prevent local flooding)
  - Pete Weaver – Town of Gilbert
  - Greg Monger – Arizona Rock Products Association [ARPA] (Permitting and mineral reserve to planning)
  - Sydney Stauffer – ARPA
  - Ken Vonderscher – Maricopa County Parks and Recreation
  - Randy Goettsche – Citizen/Rio Verde area
  - Mike Shelton – Arizona Department of Water Resources [ADWR]
  - Jesus Haro – Maricopa County Department of Emergency Management [MCDEM]
  - Nicole Smart – Town of Youngtown
  - Dan Nissen – City of Peoria (How the FMP helps with the ADMP's in area)
  - Tony Angueira – Yavapai County
  - Lynn Whitman – Yavapai County
  - Kelly Hargadin – City of Glendale
  - Ed Taylor – Citizen/New River-Desert Hills area
  - Hasan Mushtaq – Flood Control District of Maricopa County [FCDMC]
- Agenda for this meeting
  - Goals for this meeting – flood hazards for the county
    - Historical flooding impacts to each community
    - Quantify and record to develop actionable items for the 2020 Floodplain Management Plan (FMP) update
  - Impacts of Hazards During Storms
    - Group breakout
  - Discussion
    - Close out discussions from groups

- Next Steps
    - Upcoming meeting and public meeting November 4th (3:00 to 6:00 PM)

- Safety Moment
  - Texting and driving
    - Avoid texting and driving – it can wait!
- Overview of October 3rd, 2019 Meeting – FMP Committee Meeting #1
  - Review of FCDMC Programs
    - FCDMC provided overview of featured District programs and opportunities
    - How they are set-up and actively assisting the communities
  - Hazards Identified in 2015 Plan
    - Structural, Non-Structural, Regulatory, and Human-caused
    - What the risks were identified
  - Status of 2015 Goals and Action Plan
  - Where We Want to be for 2020 FMP Update

- **Flood Control District Budget – Karen Scott**
  - District Funding
    - Tax revenue – largest portion of funding
      - Secondary tax – 0.1792%
    - Intergovernmental Agreements
      - Partner submits project to Capital Improvement Program (CIP) to create project. Cost share – usually 50/50
    - Interest
      - Currently FCDMC is separate entity from other Maricopa County agencies.
      - Allowed to carry money and can generate interest.
    - Permits
      - Use permits
      - Inspection fees
    - Miscellaneous
      - Data sells, rent on properties, land sales, etc.
      - Earlier this year sold a piece of land near Cave Buttes Dam for $26M
    - Tax revenue about 91% of revenue for fiscal year 2019
      - Tax rate has remained the same for years, but with the increase in home values the tax revenue will increase.
      - Miscellaneous second most and Intergovernmental Agreement third. Intergovernmental Agreement was smaller in fiscal year 2019 due to projects that were not progressing as they were anticipated. Permits is smallest portion – but increased over 20% from previous year.
  - FCDMC Expenditures
    - Fiscal year – July to June
    - Spent $52.8M – spent about 54% of what was budgeted
      - About 6 things FCDMC does – IT (5%), Admin (12%), Identification (10%), Regulation (3%), Education (4%), and Remediation (66%)
        - Education includes outreach, schools, STEM events
        - Water simulator model – used to educate children

        - 355 Weather stations
            - Stream, Impoundment, and Rain gages
        - Identification – looking at watersheds, where the water runs, and where is it a problem. Plans are developed that lead to projects. Floodplain delineations are a part of identification too.
        - Regulation – can justify based on the identification where people can and can't build.
        - Remediation – build structures, often with partners. Maintenance is also a portion of remediation.
- CIP
    - Fiscal year 2019 – Projects over $1M
    - White Tanks Flood Retarding Structure (FRS) #4, Rawhide Wash, South Phoenix and Laveen (Hidden Valley)
        - Technical Problems – geotechnical, archeological, environmental, permitting complications, and regulation changes.
    - Powerline, Vineyard, and Rittenhouse FRS's
        - Federal partners said to stop in April 2017. Wanted to see complete plans and this is still being worked on. Still awaiting funding.
    - Durango Regional Conveyance Channel and Northern Avenue Parkway
        - Met budgets
    - Granite Reef Wash Drainage Improvements
        - Partner was not able to receive funding for fiscal year 2019, but did receive funding for going forward
    - Mandan Street, Palm Lane, and 27th Avenue/Olney
        - Partner was trying to obtain FEMA grants and recently were successful in getting them. This project will be moving forward.
    - Cave Buttes Dam and McMicken Dam
        - FCDMC leading on their own without partners. FCDMC inherited and maintaining currently. Rehabilitation is needed with oversight from ADWR. FCDMC struggles to answer some questions from ADWR.
- Major Maintenance Projects
    - Included for first time in fiscal year 2019
    - Projects that could not be accommodated in operating budget. Projects that did not escalate to CIP level.
    - Spent 56% of what was budgeted.
    - Arizona Canal Diversion Channel (ACDC) Fencing
        - 20-foot (*varies) drop into ACDC
        - Fencing has deteriorated to where some portions are falling in.
        - FCDMC discovered they needed a different procurement method for the replacement of the fencing.
        - Went before Flood Control Advisory Board and approved
        - Now has escalated to the point of being part of the CIP
- FCDMC Revenue, Expenditures, and Fund Balance
    - History of the FCDMC bank account balance – ebbs and flows
        - Currently on an upward tick for the bank account balance

        - End of fiscal year 2018 approximately $91M and approximately $109M in the bank account
        - Projecting a balance of approximately $90M at the end of fiscal year 2020 based on current budgeted expenditures
        - Comment from participants that funds should be expended for public safety, not held back.
- Fiscal Year 2019 versus Fiscal Year 2020 Budget Comparison
    - Revenue
        - Increase in revenue by about $5M due to increase in property values
        - Intergovernmental agreement was reduced by about $3M
        - Net effect is about 3% increase in revenue
    - Expenditures
        - Operating fund increase by about $5M
            - Usually pretty steady but this last year went and asked for different appropriations for purchasing of equipment and maintenance of buildings. Buildings built in early 1990's and need to have some improvements.
            - Chillers replaced for FCDMC building – originally budgeted as $600K and is not about $1.7M. Cost creep.
        - Equipment
            - Vehicles and large field equipment can vary year-to-year.
        - CIP
            - Increase by about $25M due to projects carried over from fiscal year 2019, project rolling continues.
            - Hoping to be able to spend the allocated money in fiscal year 2020
- Questions/Comments
    - (Patti Trites) – Are there shovel ready projects that FCDMC has that are ready for when partner agencies have the money? It is a public safety issue and FCDMC has only spent 54% of what their budget is.
        - FCDMC is special funded – it is not use it or lose it
    - (Ray Dovalina) – Ultimately, cities and towns do not have dedicated funding source. The dedicated funding source is a much bigger issue at hand. Glendale has it and Kelly Hargadin said other groups try to steal the funding.
    - (Randy Goettsche) Problem getting construction going due to the busy contractors and escalating prices.
        - The biggest struggle is the increase in cost. Construction companies can find the people to build it, but costs are increasing. Buckeye project and the price increase year-over-year.
    - (Randy Goettsche) Thinking about pushing out projects to slower construction periods to mitigate rising costs?
        - No, want to move along due to public safety.

- **Communications and Public Outreach – Lisa Blyler**
    - Mitigating flood risk through education and outreach
    - What do we do?
        - Art – not necessarily science

        - Concise, timely, accurate, and consumable information to the right people in the right place at the right time
    - Interface between FCDMC and the Public
        - Public meetings – moderating and facilitating
    - Multiple ways of communicating
        - Changes by audience
        - Match message to method
    - STEM Program
    - Emergency communications
- STEM Curriculum
    - Focus education on children
    - Lessons aligned to the Arizona Science Standards
    - Inquiry-based, hands-on lessons
        - Meteorology, emergency planning, and engineering
    - Children are great messengers to their family
        - Raise awareness to risks
- Emergency Communications
    - Keep community engaged and informed
    - Message coordination
        - Maricopa County Department of Emergency Management (MCDEM)
        - Internal FCDMC Staff
        - Media
            - Make sure FCDMC staff can do their jobs as the media comes for questions
    - Social media
        - How to talk to people in the right way
- We see things a little differently
    - Convey complex, technical information to wide audience
        - Figure out a way the information is consumable for the public
    - Every communication is an opportunity
        - How do you make use of the limited time you will get with people?
        - Educate
        - Inform
        - Effect behavior
    - Creative content to reach community in new ways
        - Videos, flyers, fact sheets, etc.
- Right people, Right Place, Right Time
    - One size does not fit all
        - Public expectations and timelines have changed
        - The public needs to be able to find information when they want
    - Not only new construction projects
        - Maintenance activities
            - Created brochure to hand out as to why they are doing their maintenance (tree removals, fencing repairs, etc.)
        - Drone flights
        - Proactive educational efforts
    - Partnership with other agencies

        - Partnership to help push messaging by using agency methods for outreach as well
    - Keep people engaged
        - Keep on timelines so when messages are necessary, they show up on their feeds
    - Website
        - All social media posts draw people back to the website to get the information
        - Give people the information they are wanting
- Ways to follow
    - Facebook, Twitter, Instagram, and YouTube
- Questions/Comments
    - (Kelly Hargadin) For outreach, are judges are needed for STEM events?
        - No.
        - FCDMC goes to schools. D-backs had a STEM night. ASU West for Science Fest.
        - FCDMC goes to hosted events and usually don't sponsor events
    - (Patti Trites) Going through HOA's to electronically send information. HOA's can disperse information to their groups. HOA can be another layer to reach out to and get to the areas that a frequent flooding areas.
        - Good suggestion, FCDMC needs to develop a list of active HOA's and points of contact for communications.
    - (Kelly Hargadin) City is responsible for getting together HOA list. Sent out information and got less than half response.
        - It is a struggle to find the "change maker" to push the message.
    - (Randy Goettsche) Lists for unincorporated, who maintains the HOA lists?
        - FCDMC does this.
        - When and how? What is sent?
    - (Pete Weaver) Directs requests to social media and the news media picks it up. Pot holes images and locations can be tweeted, and the City will respond back through social media to get a response unit out. Phones are ringing less because a lot is done digitally. Solved in days, not months.
        - It has changed. The methods of outreach have changed.
        - Media – do television spots during monsoon season. Already meeting with media outlets to get messaging set for 2020 monsoon season.
        - Can target zip codes and demographics through the media. Taken the approach of more is better but have to be cognizant of when is too much.
    - (Ed Taylor) As FCDMC is developing message for next year, could direct people to find local HOA or local community organization to know where they can go to for information. NextDoor posts help get real time information out to people.
        - Good idea. Keep connection with community. FCDMC can only reach so many people but can help point people to right place.

Flood Hazard Identification

- Review Maps and 8 FMP watersheds
  - Divided to support where water flows to the 5 major water courses
  - The 8 overall watersheds are then broken down even more by FCDMC to determine projects for ADMP's and other mitigation projects
  - Done to help organize data within the county for the FMP
  - Before the breakout group session, committee members brainstormed ideas on what "Flood Threat" means to them.

- Around the Room: Define "Flood Threat"
  - Not defined in state statutes – looking to see what communities think "Flood Threat" "means. What does "Flood Threat" mean to you?
  - Group 1 – Agua Fria River Watershed
    - Wildcat developments – not defined flood protection at all. "I don't like that wash I am going to build something there to move it"
  - Group 2 – Cave Creek/Salt River and Verde River Watersheds
    - When remediation is needed after a flood event. Flowing water may be inconvenience, but damage to home is a bigger concern.
    - New River – new development. Wash in the area get channelized and the neighbors start getting water on property and home that have never had issues in decades. New development diverting water to where it previously did not go. Interface between new development/prior development and regulations. What is going on downstream when new development comes in- existing and future analysis. No regard for the downstream areas when new development comes in. Does not look outside of property boundaries. Should be better controlled- can't rely on single county permit.
    - Public information concern – landscaping done to alter the flow of water and the people do not realize they need permits for this.
    - Emphasis on rain harvesting – zoning issue. More of an incentive for builders or regulation to help educate people to maintain a small retention area. This would help recharge water. Underground tanks for irrigation has been encourage in New River. Rain harvesting could help attenuate the flow. Encouragement from zoning and government to get builders to do this, especially on lot splits. Give them an incentive to put in rain harvesting systems. Would help with water shortage and excess flood waters.
    - Adoption of GI/LID techniques throughout county
  - Group 3 – Gila River/Queen Creek Watershed
    - Flood warning, flooded washes – stay out of the washes
    - Water in the street is not a flood threat, it is acceptable to a certain level.
    - Flood threat is a public safety issue.
    - Floods are not always floodplain related
    - Flooding of a home.
    - Property damage.
    - Identifying the threat before you build there. Development opportunities.
    - Look at map and in flood zone X and development occurs in undeveloped lands where it never flooded. The displacement occurs that does end up causing flooding. New homeowners do not know they are within a potential flood threat because there have never been homes there.

        - When you purchase properties, identify and communicate in writing the flood threat to people. (washes, dams, levees, etc.)
        - Unregulated lot splitting.
        - Need data – getting more gages in the right places. Getting data is important to get the historical information in the area. Being able to gather data because rain comes so sporadically in areas so the threat can be identified.
        - Incorrect design and elevations of homes based on markers that had subsided in the area. Have not seen the impacts of this yet but forecast flooding impacts.
        - Maintenance issues – a lot of time the maintenance is not done, and this is a real flood threat. Infrastructure cannot perform to its optimum potential.
        - Data in the last 60 to 80 years the design standards have changed because more information has become available. Utilize the data we not have to determine improvements to the design standards.
        - The design standards need to change, which will be tough to do. Politically it will be difficult. FCDMC should lead the charge.
    - Group 4 – Centennial Wash and Hassayampa River Watersheds
        - Best Management Practices for flood measures
    - Group 5 – Lower Gila River and Waterman Wash Watersheds
        - Risk to property, life, and infrastructure due to rising floodwaters
        - Having some interface with planning and zoning so there are no hard edges between where events can occur and where people are living.
        - Sheet flooding that is not understood.
        - Elevated home could create island effect because roadways are not elevated
        - Pima County has done a study where ordinances came out for desert washes that dealt with development concerns. FCDMC should consider similar approach.

Break – All participants

Impacts of Hazards During Storms – Assessing the Problem

(Note: FMP 2020 focus is for unincorporated Maricopa County, but group should indicate all known flooding problems)

- FCDMC Project Managers in to help answer questions
    - Theresa Pinto
    - Spencer Bolen
    - Mark Frago
- Breakout Exercise – Groups to focus on each watershed
    - Grouped based on locations of communities within the watersheds
- Objectives - Mark up watershed maps and use worksheet to identify flooding problems
    - Overall objective – work through the handout on the floor
    - Write a structure definition of "Flood threat"
    - Flood hazards –a reference list was developed per 2015 findings, however please include any additional information that is a flood threat to your community not listed. Mark off if that is a threat to your community or not for the listed hazards.
    - Markup map locations with problems associated with hazards.

- **<u>Groups Report Out</u>**

- Group 1 – **<u>Agua Fria River Watershed</u>**
    - Flood Threat
        - Need to be aware of areas that flood. If you know the area floods, know how much water causes the flooding. Watch the gages to know when to take action for locations with known problems.
    - Key Hazards
        - Alluvial Fans
            - Development creeping toward alluvial fans (would like to see something in Wittmann ADMP Update)
        - Wildcat development (single-lot developments)
        - CAP Canal – ponding upstream
        - Old inactive mine in New River where water ponds – water stays there for months at a time
        - Tailwater
            - Development downstream – defined outfall locations
        - Local/Urban flooding
            - Major issue within Glendale
        - Unmaintained drainage facilities
            - Maintained by HOA's – not sure what they are responsible for – need better understanding of maintenance requirements.
- Group 2 – Cave Creek/Salt River and Verde River Watersheds
    - Flood Threat
        - Interruption of transportation and emergency service during storm events
    - Key Hazards
        - **<u>Verde River Watershed</u>**
            - Repetitive losses on roadways
            - Head-cutting of roadways and banks
            - Single-lot development – hardscape and un-natural landscaping
        - **<u>Cave Creek and Salt River Watershed</u>**
            - Street flooding – no storm sewers in area
            - Building below street grade
            - Outdated infrastructure feeding into canals
            - Multiple jurisdictions – SRP in control of canals and city storm sewers
            - No impoundment areas as it is older part of City of Phoenix
            - Hardscaped roads, houses, and others preventing infiltration
            - Action – build more storm sewers in the area
- Group 3 – **<u>Gila River/Queen Creek Watershed</u>**
    - Flood Threat
        - Public safety – which encompasses hospitals, emergency services, water treatment facilities, airports
    - Key Hazards
        - Flash flooding and transportation
- Group 4 – **<u>Centennial Wash and Hassayampa River Watersheds</u>**
    - Flood Threat

        - Risk to life, structures, and economic development.
    - Key hazards
        - Limited infrastructure
        - At-grade crossing leading to flooding of transportation corridors
        - Development in the areas – large areas
        - Management of alluvial fans (More in Hassayampa Watershed)
- Group 5 – **Lower Gila River and Waterman Wash Watersheds**
    - Flood Threat
        - Risk from mapped and unmapped areas on structures, life, and infrastructure.
        - Land use conversion without consideration of impacts. Mainly in areas that were historically agriculture.
    - Key Hazards
        - Gila Bend – areas that are not SFHA but should be. Inflow of areas that get pooled by embankments – highways and railroad.
        - Major flood events on the Gila River – breakouts along the river. Infrequent high-volume events.
        - Split flow in Hassayampa and Centennial tributaries.
        - At-grade crossings severely damaged during monsoon events.
        - Single-lot developments
        - El Rio Masterplan for Gila River – good coordination with communities has helped with development in the area. Levee constructed in the area recently done in conjunction with the Maricopa Trail.
        - Suburban-Urban Interface
        - Tamarisk – fire threat, impact to capacity of waterways, and impacts to flow patterns.
        - Wildlife areas – Game and Fish areas. Natural resource value.
- Additional hazards not identified elsewhere
    - Urban Development and Densification
    - Subsidence and Fissures
    - Block Walls or Fences
    - Fill in Washes
    - Flood Warning Signage and Depth Gauges

Next Steps

- Public Meeting on November 4, 2019 at District – Main Building
    - 3:00 to 6:00 PM
    - Online survey if you are unable to make it
        - Kelli Sertich will send out link to survey to committee members to share with communities / agencies to solicit additional feedback.
- Committee Meeting #3 November 14, 2019 – Set FMP Goals
    - 9:00 AM to 12:00 PM
    - Send committee reminder for meeting week of event.
- Committee Meeting #4 December 5, 2019 – Review Possible Activities
    - Send committee reminder for meeting week of event.

Flood Control District of Maricopa County
2801 W. Durango Street
Phoenix, AZ 85009

FLOODPLAIN MANAGEMENT PLAN 2020 UPDATE
SIGN-IN SHEET

Meeting #2:	Access the Problem	**Meeting Date:**	Thursday – October 24, 2019
Facilitator:	Mark Fountain, Black & Veatch Corporation	**Place/Room:**	Cave Buttes Conference Room

Initial	Name	Title	Organization	Phone	Alternate Phone
BE	Brandon Espinoza	Development Services & Code-Compliance Officer	Town of Gila Bend	602-679-0355	
	Brian Cosson	ADWR NFIP and Flood Warning Coordinator	Arizona Department of Water Resources	602-771-8657	
DN	Dan Nissen	Sr. Civil Engineer	City of Peoria	623-773-7237	
DF	David Fritz	Engineering Branch Manager	Maricopa County Department of Transportation	602-506-2826	
EA	Ed Taylor	President - New River/Desert Hills Community Association	Citizen	602-739-1235	
N	~~Gregory Arrington~~ NICOLE SMART	Community Development Manager Community Development Coor	Town of Youngtown	623-933-8286	NICOLE SMART
~~JH~~	Jesus Haro	Emergency Services Planner	Maricopa County Emergency Management	602-273-1411	
KH	Kelly Hargadin	Engineering Project Manager	City of Glendale	623-930-3641	
KV	Ken Vonderscher	Planning and Development Manager	Maricopa County Parks and Recreation	602-506-9503	
	Kristin Tytler	Assistant Director/City Engineer	City of Surprise	623-222-6153	
MW3	~~Lance Webb~~ Melody Zybond	Deputy Engineer	City of Mesa	480-644-2399	
	Liz Foster	Executive Director	Maricopa County Farm Bureau	480-635-3631	
LW	Lynn Whitman	Flood Control District Director	Yavapai County	928-771-3196	
ME	Mark Edelman	Planning and Engineering Manager	Arizona State Land Department	602-542-6331	

Flood Control District of Maricopa County
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Initial	Name	Title	Organization	Phone	Alternate Phone
MR	Mike Shelton	Floodplain Risk Map Coordinator	Arizona Department of Water Resources	602-771-8428	
	Noel Carter	Buckeye Water Conservation and Drainage District	Irrigation District & Electrical Districts Association	623-386-2196 (Main Office)	
NL	Nuning Lemka (backup)	Public Works Manager	City of Surprise	623-222-6148	
PT	Patti Trites	President of Southern Hills HOA, member of South Mountain Village Planning Committee	Citizen	402-213-7126	602-603-9033
PW	Pete Weaver	Emergency Management Coordinator	Town of Gilbert	480-503-6333	
RG	Randy Goettsche	Board Member Rio Verde Horsemen's Association	Citizen		
RD	Ray Dovalina	Assistant Public Works Director	City of Phoenix	602-534-5720	
REE	Robert Eroh	Project Engineer	City of Buckeye	623-349-6245	
	Rudy Perez	Emergency Services Planner	Maricopa County Emergency Management	602-273-1411	
	Sam Patton	Project Manager Multimodal Planning Division Corridor Planning Group	Arizona Department of Transportation	602-712-6168	
SK	Sami Korpelainen	Supervisor – Civil/Mechanical Engineering	Central Arizona Project	623-869-2631	
	Steve Trussell	Executive Director	Arizona Rock Products Association - ARPA	602-271-0346	
TS	Tice Supplee	Director of Bird Conservation	Audubon Society of Arizona	602-468-6470	602.380.3722
	Tom Condit	Development Engineer	Town of Gilbert	480-503-6815	
TE	Tom Ewers	Division Manager Plan Review	Maricopa County Planning & Development	602-506-7145	

Flood Control District of Maricopa County
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Initial	Name	Title	Organization	Phone	Alternate Phone
MF	MARK FOUNTAIN	WR REGIONAL PLANNER	B&V	602-381-4430	—
MH	Matt Hann	WR ENGINEER	B+V	602-381-4445	—
SMG	Sherrin McGuire	Program Coordinator	FCD	602-506-8378	—
JC	Joseline Castañeda	Planner	FCD	602-506-0503	—
GM	Gregg MONGER	MGR.	CEMEX	602-397-3961	—
SS	Sidney Stauffer	Env. Specialist	VMC	480-3658322	
AA	ANTONY ANCUTIEA	STORMWATER ENG	YCPACD	928-5390	
✓MMZ	Melody Zybert	Supervising Engineer	City of Mesa	480-644-5574	
LB	Lisa Bauler	Info Support FCD	FCD	6025066762	
	Kim McMahon	PIO	FCD	6025064871	
	KAREN SCOTT	FCD-FINANCE	FCD	64597	—
MF	Mark Frago	Project Manager	FCD	6-0750	
HM	HASAN MUSHTAQ	PLANNING BRANCH MGR	FCD	6-2929	
TB	Thu Dinh	Plng Branch	FCD	68127	
SB	Spencer Bda	Plng Branch	FCD	64064	

MEETING #3 AGENDA – SET GOALS

Floodplain Management Plan 2020 Update

Thursday, November 14, 2019
9:00 a.m. – 12:00 p.m.

OPS Building Conference Rooms - 2801 West Durango Street

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1. Introduction

- Safety Moment
  - Safe Travel Planning
- Around-the-room introductions
  - New participants
    - Rudy Perez – Maricopa County Department of Emergency Management (MCDEM)
    - Sabrina Lehrke – MCDEM
- Presentations – MCDEM Roles and Responsibilities – Jesus Haro
  - MCDEM Vision
    - Emergency Management seeks to create safer, resilient communities in Maricopa County with the capacity to respond to, cope with, and recover from hazards and disasters.
    - Proactively approach emergency management and working with partner agencies to deal with disasters.
    - During response phases – need to make sure there is concurrence with what needs to be done between jurisdictions.
    - Exercise activities with partners
    - Recovery – primarily when they work with non-governmental organizations (Red Cross and others) to recover from disaster
  - Essential Functions of MCDEM
    - Interaction with flood control – collaborate on plans and emergency action plans (EAP's) (levees and dams)
      - Thorough development of EAP's – advice for execution of action plans.
  - MCDEM Responsibilities
    - Notify various agencies per instructions of EAP's.
      - Tracking who get contacted and in what order
    - Provide evacuation maps
    - Update & Maintain notification list
      - Can involve multiple notification scenarios depending on structure.
    - Help coordinate flood exercises
    - Prepare after action reports
  - Potential Emergency Conditions
    - Reservoir pool inundation
    - Discharge from principal outlet
    - Discharge from emergency spillway
    - Potential or actual failure of Flood Retarding Structure (FRS) embankment
  - Communications Flowchart
    - Conceptual idea of how communications would occur in emergency
    - Off-hours duty officer available 24-hours a day, 7-days a week, (*Holidays)
    - Notifications take place using Everbridge software

        - Liaison from Flood Control District of Maricopa County (FCDMC) is critical for emergency management
    - Emergency Operations Center (EOC)
        - Located at Papago Park Military Reservation
            - May need to manage up to 25 people during emergency response
            - Emergency, exercises, emergency notifications (Everbridge, WEA, EAS)
            - Incident Command System (ICS)
                - Structure a response on different structures – very organized to help manage situations
    - Flow chart from EAP
        - Example provided from Guadalupe FRS – complicated FRS due to multiple points of failure which mean multiple point of notification. Example is complete failure of north dam.
            - Several agency notifications
            - Do not want to get bogged down on other actions – Keep focused on flow chart notifications
    - Everbridge Notifications
        - Key to notifications – manage notification alerts with software
            - Concise messaging – notifies agency what is happening and actions that should be done
        - Wireless alerts
            - Can draw polygon for area and alerts will only go out to that area
    - WebEOC
        - In-house messaging and documentation software
        - Every person that comes to the EOC has a log-in and actions are tracked within the WebEOC
    - Sheltering
        - Catastrophic failure of structure(s) will likely displace people
        - All incidents and emergencies start and end at the local level
            - Some jurisdictions want to handle everything on their own
        - MCDEM
            - Incident coordination, messaging, and resource management
        - Work closely with the American Red Cross, Arizona Voluntary Organizations Active in Disasters (AZVOAD), and Maricopa County Community Organizations Active in Disasters (COAD)
    - Questions
        - (Dan Nissen) How is COAD funded?
            - Depends on what the executives want to do. Usually non-profits
        - (Pete Weaver) All hazard jurisdiction plan is due in 2020 for Maricopa County. This will be updated soon, and notifications will come out. It is important to come and participate so your jurisdiction can be able to get federal funding for certain emergency management items. Short-time frame once announced. Reach out in advance to emergency manager to get information in early.
            - (Rudy) MCDEM may ask for an extension so it is not as condensed as schedule would otherwise be.
- Recap Meeting #2
    - Flood Control Financial Status
        - County has funds that are available for application to projects. Review of previous challenges with getting funding out to projects.
        - Opportunity for projects to be implemented.

- Communications and Public Outreach
    - How Maricopa County is using social media, mailers, meetings, workshops, and others to reach out to public to gather information and feedback for flooding within their neighborhoods. This aids in gathering information to develop projects.
    - Educating the public is key to what Maricopa County wants to do.
    - Managing and communicating the risk
- Flood Hazard Identification
    - What does flood hazard mean to the group?
- Impacts of Hazards During Storms
    - Each person has a different idea of what the impact on them is. Level and type of impact is created from individual experiences and knowledge.
- Hazards and Problems by Watersheds
    - Maps and identified known problem areas
    - What are the problems that need to be documented for each watershed?
        - What problems occur most often between the watersheds

2. Flood Threat Definition

- Develop consensus on definition
- Review of group reporting
    - Need to be aware of areas that flood. If you know the area floods, know how much water causes the flooding. Watch the gages to know when to act for locations with known problems.
    - Interruption of transportation and emergency service during storm events
    - Public safety – which encompasses hospitals, emergency services, water treatment facilities, airports
    - Risk to life, structures, and economic development
        - Public access and use along structures throughout county – are the risks being communicated the users and residents in the area
    - Risk from mapped and unmapped areas on structures, life, and infrastructure. Land use conversion without consideration of impacts. Mainly in areas that were historically agriculture.
- Group Definitions
    - Group 1 – Agua Fria River Watershed
        - Wildcat developments – no defined flood protection at all. “I don’t like that wash I am going to build something there to move it”
    - Group 2 – Cave Creek-Salt River and Verde River Watersheds
        - When remediation is needed after a flood event. Flowing water may be inconvenience, but damages to home is a bigger concern
        - New River - New development diverting water to where it previously did not
        - Public Information Concern – landscaping done to alter the flow of water and the people do not realize they need permits for this
        - Emphasis on Rain Harvesting – zoning issue. Rain harvesting may help attenuate the flow
        - Adoption of GI/LID techniques throughout County
    - Group 3 – Gila River and Queen Creek Watershed
        - Flood warning, flooded washes – stay out of the washes
        - Water in the street is not a flood threat, it is acceptable to a certain level
        - Flood threat is a public safety issue

        - Floods are not always floodplain related
        - Flooding of a home
        - Property damage
        - Identifying the threat before you build there. Development opportunities
        - Evaluate FEMA Zone X - New homeowners do not know they are within a potential flood threat because there have never been homes there before
        - When you purchase properties, identify and communicate in writing the flood threat to people. (washes, dams, levees, etc.)
        - Unregulated lot splitting
        - Need data – getting more gages in the right places.
        - Incorrect design and elevations of homes based on markers that have subsided in the area
        - Maintenance issues – a lot of time the maintenance is not done, and this is a real flood threat. Infrastructure cannot perform to its optimum potential
        - Data in the last 60 to 80 years the design standards have changed because more information has become available – Example NOAA14 Atlas 2.
        - Utilize the data we not have to determine improvements to the design standards
        - FCDMC should lead the charge for design standard changes
    - Group 4 – Centennial Wash and Hassayampa River Watersheds
        - Best Management Practices for flood measures
    - Group 5 – Lower Gila River and Waterman Wash Watersheds
        - Risk to property, life, and infrastructure due to rising floodwaters
        - Having some interface with planning and zoning so there are no hard edges between where events may occur and where people are living
        - Sheet flooding that is not understood
        - Elevated home could create island effect because roadways are not elevated
        - FCDMC should consider similar approach undertaken by Pima County for updating ordinances and addressing development concerns
- Group discussion of definition
    - Want to narrow down the 21 items that were brought up in the last meeting to define what flood threat is
        - National Weather Service – any threat to life and property due to flooding
        - FCDMC Capital Improvement Program (CIP) – Structures getting flooded
            - Does not consider life
        - Want to provide FCDMC staff direction for what flood threat means to the communities
    - (Greg Monger) Start with what Jesus Haro discussed – what is MCDEM's mission statement and approach.
        - (Jesus Haro) MCDEM deals with life safety – protection of people as opposed to structures and property. Structure protection is important but MCDEM is initially focused on life safety.
    - (Dan Nissen) What is the current definition?
        - (Kelli Sertich) There is no current definition within FCDMC documentation. Working to improve the CIP and the definition is very narrow.

- (Ray Dovalina) Tiering aspect because most everything is a threat. Can't spend what little money we have to do everything.
- (Greg Monger) Group 5 captured a solid definition
    - Risk to life, property, and infrastructure due to rising floodwaters.
- (Kelli Sertich) Like the idea of tiering.
- (Brandon Espinoza) Who are we defining this for?
    - (Kelli Sertich) Defining for FCDMC to aid in the discussions of the FMP focus over the next 5-years.
    - (Brandon Espinoza) More of the administration side versus the public side?
    - (Kelli Sertich) The definition itself.
- (Kelly Hargadin) Property and structures inundated with water.
- (Mark Fountain) A rise in floodwater changes the associated levels of risk. The risk level of property will be less than the risk to life.
- (Patti Trites) Use the word potential. There is potential for floodwater to impact your life and property.
    - (Kelli Sertich) If FCDMC included "potential threats" within Small Projects Assistance Programs (SPAP) there could be more proactive value.
- (Kelli Sertich) Probably have a broad enough statement to reword and present the definition to the group. The flood threat might be defined differently depending on programs. May have several levels to this definition.
- (Patti Trites) Property, lives, and infrastructure but this definition cannot be all encompassing.
    - (Kelli Sertich) The role of others may be directed to certain aspects of the definition.
- (Jesus Haro) Are we including critical facilities and infrastructure?
    - (Kelli Sertich) These components will be included within definition
- (Patti Trites) Can we take any thoughts from how California is managing their threats (mainly fire threat) and how we can be proactive.
    - (Ray Dovalina) Goes back to sheet flooding problem. Some properties do not realize they have a wash and start altering the wash and block them. Need to educate.
    - (Patti Trites) Education at the roots level was not there in California. Needs to be here to educate general public and management within jurisdictions. People who come from out of state and do not realize the risk.

- Team will develop a concise definition and present options for advancement at next FMP Committee Meeting

3. Summary of Flood Hazards

- Group summary of key Flood Hazards
    - Group 1 – Agua Fria River Watershed
        - Alluvial Fans
            - A problem in most watersheds within Arizona.
        - Wildcat development
            - Will continue to be a challenge.
            - Lot splitting – changes of landscape to hardscape.
        - CAP Canal (Upstream ponding)
            - Inundation upstream of the canal – delineated on maps but still building there.

        - Inactive mine (New River)
            - Stores/impounds significant amount of water and takes a while to drain.
        - Tailwater
            - Contributions to full washes – example in urban environment where storm sewers are undersized and cannot take in any stormwater.
        - Local/Urban Flooding
            - Densification of development.
            - Low Impact Development (LID) and Green Infrastructure (GI) can help limit urban/local flooding
        - Unmaintained Drainage Facilities
            - Infrastructure that is not maintained or inspected and may not successfully pass the design storm.
- Group 2 – Cave Creek-Salt River and Verde River Watersheds
        - Verde River Watershed (VERIFY)
            - Repetitive losses on roadways
            - Head-cutting of roadways and banks
            - Single-lot development (Hardscapes/un-natural)
        - Cave Creek-Salt River Watershed (VERIFY)
            - Street flooding
            - Building below street grade
            - Outdated infrastructure feeding canals
            - Multiple jurisdictions
            - No areas on impoundment
            - Hardscaped surfaces prevent infiltration
            - Action – build more storm sewers
                - (Tice Supplee) Storm drains can get overwhelmed in flash events and provide a false sense of security.
                - (Pete Weaver) Maintenance programs are frequently wiped from budgets and need to keep the thought of maintenance costs in mind when developing and building infrastructure.
- Group 3 – Gila River and Queen Creek Watershed
        - Public safety
            - Hospitals, emergency services, critical facilities
        - Flash flooding and transportation
- Group 4 – Centennial Wash and Hassayampa River Watersheds
        - Limited infrastructure
        - At-grade crossings contribute to transportation flooding
        - Large areas of development
            - Master planned communities in undeveloped desert – what comes into the community should be the same leaving the community.
            - Areas of staged development without continuity have issues with how developers and community at-large impacts the process.
            - Need additional awareness regarding development impacts the path and quantity of water within watershed
        - Management of alluvial fans (Hassayampa River Watershed)

- Group 5 – Lower Gila River and Waterman Wash Watersheds
    - Gila Bend – areas of risk not within Special Flood Hazard Area (SFHA)
    - Major flood events on Gila River
    - Split flow in Hassayampa River and Centennial Wash tributaries
    - At-grade crossings
    - Single-lot development
    - Suburban-urban interface
    - Tamarisk
        - Additional Invasive Species
    - Wildlife areas
- Other items
    - Urban redevelopment and densification
    - Subsidence and earth fissures
    - Block walls/Property fences
    - Fill within washes (vegetative and earthen)
        - (Dan Nissen) Historical flow patterns that residents ignore and revise at the local lot level.
    - Flood warning signage
    - Depth gages

4. Discussion of identified hazards/problems by watershed

- Group breakout to identify additional hazards or problems in the area
    - Revise previously provided information within problems matrix
    - Markup tabletop maps to indicate areas of additional flooding concerns

5. BREAK

6. Discussion of Potential 2020 FMP Goals

(Break into Group Discussion)

- Purpose of Goals
    - Goals are general statements concerning an aspect of the agency's desired ultimate physical, social and/or economic environment. Goals set the tone for development decisions in terms of the citizens' desired quality of life.
    - Objectives (Action Items) express the kinds of action that are necessary to achieve the stated goals without assigning responsibility to any specific action.
    - 2015 FMP Goals
        - Continue/Expand Public Outreach
            - Public education of flood hazards is essential to protecting lives and property. The FCDMC's existing program is very beneficial and should be expanded and directed to specific audiences of residents, managers of local, state, and federal agencies, and elected officials.
        - Improve Quality of Life
            - Implementing sound floodplain management practices will improve public safety and property protection and will help residents receive the full benefits of living in Maricopa County. Economic benefits of lower flood risk include reduced residential and commercial flood losses and reduced disruption of transportation and commerce due to flooding.
        - Strengthen Role as Regional Leader

        - FCDMC provides floodplain regulation and management for the unincorporated portions of Maricopa County and for 14 of the 24 municipalities. FCDMC also provides technical training and expertise, educational materials, design manuals, and flood warning services. FCDMC's continued leadership role should further integrate with other regional planning efforts, and FCDMC should actively seek public and private partnerships to maximize the value of infrastructure and support long-term sustainability.
    - Develop Lists of Resources
        - Severe flooding during the 2014 monsoon season created challenges in meeting the public's requests for flood-fighting resources and post-flood site visits. FCDMC could improve its response to public information requests by developing pre-programmed web pages and field-ready response kits.
    - Enforce/Enhance Regulatory Standards
        - FCDMC is committed to enforcing floodplain regulations and identifying flood hazards. This commitment could be enhanced to incorporate emerging flood control technologies, improve technical analysis tools, and support alternate solutions such as floodproofing or acquisition of flood prone properties.
    - Protect Natural Resources
        - Floodplains serve to capture and convey runoff through and away from the county during storms. Storm drainage is one of many important benefits provide by floodplains; other values to the community include:
            - Aggregate resources needed for local development, cultural resources, recreational opportunities, visual aesthetics, water conservation opportunities, and wildlife habitat and migration corridors
- Comments/Questions
    - (Greg Monger) How many of these goals were met?
        - (Kelli Sertich) Annually there is a review that goes over what has been done. In FMP Committee Mtg 1 a packet was provided which outlines what has been done and a few items were not completed from the 2015 FMP
    - (Greg Monger) Looking back, what would you change going forward?
        - (Kelli Sertich) Coming back to the first goal, outreach and education is a goal that FCDMC has struggled with. Social media has become more prevalent to help with messaging. FCDMC needs to do more as a regional leader.
    - (Greg Monger) Is this still important? It is likely more important now.
        - (Kelli Sertich) Yes, Lance from Mesa brought up the idea of having shared resources and this is an area that needs to be strengthened.
    - (Patti Trites) Since 2014 flood, you turn off power and do not have connectivity for internet and you are taking pictures for insurance.
        - Had to call the gas company when leak was smelled but would not go to neighbors because it was a separate call. Red Cross did not show up until day 3. List of resources for residents to have so they could immediately contact people for services needed. List of

resources has to be something that can be handed to residents to they know where to go and what the costs may be. Gives residents an idea of where they can rent equipment and an approximate cost. When an agency says “it’s on the website” it isn’t because in a situation like this you cannot access it. Entellus, with assistance of a third-party company, did a survey of areas that were flooded in 2014 and issues that came up were lack of maintenance and being prepared and knowing how to handle a flood. Came up with a list for the Homeowner’s Association (HOA) for a cost of certain services and equipment (blowers and de-humidifiers). In the middle of the night, companies came around and charged people way too much to help with flooding in their homes – home insurance won’t cover it and you don’t have help to cut drywall off yourself. A list of trusted contractors and equipment could be very beneficial to your residents.

- (Kelli Sertich) Even if the website is working, the items you are looking for could be buried so deep it becomes a problem. Need to have key information available in hard copy at the appropriate locations to support emergency events. Example – Fire Stations.
- (Ed Taylor) Couldn’t this be an education piece. Putting together an emergency pack with a checklist of information because prices change so often.
    - (Patti Trites) Did this so we knew we were not getting ripped off.

- Brainstorm Goals
    - Group 1 – Agua Fria River Watershed
        - Talked about existing goals
        - Increase capital funding for infrastructure and expand funds that already exist that haven’t been spent on projects
        - Funding for Drainage Master Plans new and updates as they age, and development occurs
        - Manual on maintenance
            - HOA and citizen guide for what needs to be done for maintenance purposes and who is responsible for what.
        - Public education
        - Floodplain delineations
        - Fences and walls
        - Brochure for HOA’s for what they need to do
            - City of Peoria got a call from an HOA wanting to clear vegetation for a fire break. Responded that they couldn’t but did not have a standard to say they couldn’t.
            - (Mark Fountain) Having standards and a plan of action helps the HOA take accountability and develop financial planning for how they will maintain it. They do not know what they need to set aside for the work that will be required in the future. Not included in reserves studies.
            - (Patti Trites) Agreed, they will not put any drainage information within reserve study. That is considered an operational expense or general expenditure. Cleaning out culverts do not get included – drainage items not included.

        - (Dan Nissen) Developers sometimes put something together but it is not widely done. New ordinance should be consider to require drainage maintenance plans and capital cost planning.
    - FCDMC to present about changes within guidelines and regulations (annual outreach to partners)
        - Keeping current with rule changes between agencies
    - Integrate technologies
        - Neighboring state agencies have a program where citizens get rain gages and the data is transmitted to the agency
            - Residents get rain gage sent to them and they monitor and report daily
            - Helps hydrologists and forecasters obtain data and what/where precipitation is happening – fills the gaps
            - Colorado (CoCoRAS) and Kansas are known states doing this program
- Group 2 – Cave Creek-Salt River and Verde River Watersheds
    - Outreach
        - Schools – bring home the knowledge to their parents
    - Jurisdictional communication overlaps
    - Self-sufficient for public education and outreach from local and state level
        - People need to be aware of what they should have prepared
        - Don't expect a rescue – be self-prepared!
    - Flood after fire is a real concern
    - Low water crossing mitigation
        - Bridge/culvert to provide transportation access
- Group 3 – Gila River and Queen Creek Watershed
    - Communication and Outreach Education
        - Time of crisis – county, cities, villages, HOA's and individuals
        - Non-time of crisis
            - Flo-2D and other resources
            - Lot splits and landscaping
    - Communication between County and Cities – checks and balances for Floodplain Administrator
    - Set of standards and implemented through development and planning
        - Taking the information from this group to the Cities
        - Set of standards for the Cities for floodplain management
    - Operation and maintenance manuals
        - From FCDMC to Cities to unincorporated to help educate
        - Could include private development – example modifying landscaping contracts to meet what is needed
        - Failure indicators
        - HOA maintenance and preparedness plan
    - Finished floor elevation inspection team
        - Similar to dust control
        - Spot team come out and verify elevations to make sure it is accurate – driven by FCDMC

- Group 4 – Centennial Wash and Hassayampa River Watersheds
    - Public outreach and education
        - Include agency and municipality outreach
    - Natural resources, wildlife, and habitat protection
    - Permitting and enforcement of regulations
        - (Mark Fountain) There is a challenge between the duty of the floodplain administrators and FCDMC and those issuing permits. Permits are being issued to areas clearly at risk, however without a defined FEMA floodplain it gets approved. Lack of cooperation with those approving permits. Does not remove County liability.
        - (Sami Korpelainen) This ties into the outreach goal with agencies and finished floor elevation enforcement.
- Group 5 – Lower Gila River and Waterman Wash Watersheds
    - Setting standard all organizations have to go by (County/City)
    - Outreach – mailers sent out to everyone within flood zone
        - Make it something they will actually look at – what resources are available

- Question
    - (Patti Trites) Is there any enforcement behind these goals?
        - (Kelli Sertich) The FMP is not an enforceable document. It is on the agency to police themselves because it matters to our citizens. FEMA requires updates to the goals annually.
    - (Patti Trites) Dust control can shut down projects because they are not meeting their regulations. Who checks when developers are not doing the correct things? Are their fines or any repercussions?
        - (Kelli Sertich) Not as easy as dust control. Have to take it to court to identify what was done. Cannot enforce all the time. Rely on calls and notifications. Can shut people down if there is a violation until it is remedied.
    - (Patti Trites) Someone is violating the plan and no one catches this. A flood occurs and people want to know who the developer was. Is there a library that documents who is frequently violating regulations?
        - (Kelli Sertich) Can report to Register of Contractors or Board of Technical Registration on where violations are occurring.
    - (Ray Dovalina) Goal to talk about Policies and Procedures. To address enforcement issues.
        - (Patti Trites) There has to be some teeth in what is supposed to be done. To make people know they have to go with the procedures.
        - (Ray Dovalina) The developer community is really strong with the politicians. When it comes down to making changes could be very difficult.
        - (Patti Trites) That is why shame works. Make it known that builders/developers are building, and the structures are still getting flooded.
    - (Dan Nissen) A lot of times it isn't the big developers it is the individual home developments. They do the initial inspection and then do not go back, and the homeowner makes changes after occupancy is approved.

7. Next Steps

- FMP Committee reflect on Goals developed and possible Action Items
- Meeting #4 – Review Possible Activities – Thursday, December 5, 2019
- Meeting #5 – Draft an Action Plan, will be held Thursday, January 16, 2020
- Public meeting Thursday, February 13, 2020
    - Join us at FCDMC, Adobe Conference Room from 3:00 – 6:00 PM

Flood Control District of Maricopa County
2801 W. Durango Street
Phoenix, AZ 85009

FLOODPLAIN MANAGEMENT PLAN 2020 UPDATE
SIGN-IN SHEET

Meeting #~~2~~ 3:	Set Goals	**Meeting Date:**	Thursday – November 14, 2019
Facilitator:	Mark Fountain, Black & Veatch Corporation	**Place/Room:**	Cave Buttes Conference Room

Initial	Name	Title	Organization	Phone	Alternate Phone
BE	Brandon Espinoza	Development Services & Code-Compliance Officer	Town of Gila Bend	602-679-0355	
	Brian Cosson	ADWR NFIP and Flood Warning Coordinator	Arizona Department of Water Resources	602-771-8657	
DN	Dan Nissen	Sr. Civil Engineer	City of Peoria	623-773-7237	
DF	David Fritz	Engineering Branch Manager	Maricopa County Department of Transportation	602-506-2826	
EA	Ed Taylor	President - New River/Desert Hills Community Association	Citizen	602-739-1235	
GA	Gregory Arrington	Community Development Manager	Town of Youngtown	623-933-8286	
JH	Jesus Haro	Emergency Services Planner	Maricopa County Emergency Management		
KH	Kelly Hargadin	Engineering Project Manager	City of Glendale	623-930-3641	
KV	Ken Vonderscher	Planning and Development Manager	Maricopa County Parks and Recreation	602-506-9503	
	Kristin ~~Tytler~~ Nunnis	Assistant Director/City Engineer	City of Surprise	623-222-6153	
	Lance ~~Webb~~ Melody	Deputy Engineer	City of Mesa	480-644-2399	
	Liz Foster	Executive Director	Maricopa County Farm Bureau	480-635-3631	
	Lynn Whitman excused	Flood Control District Director	Yavapai County	928-771-3196	
ME	Mark Edelman	Planning and Engineering Manager	Arizona State Land Department	602-542-6331	

MEETING #3

Flood Control District of Maricopa County
2801 W. Durango Street
Phoenix, AZ 85009

Initial	Name	Title	Organization	Phone	Alternate Phone
	Mike Shelton	Floodplain Risk Map Coordinator	Arizona Department of Water Resources	602-771-8428	
	Noel Carter	Buckeye Water Conservation and Drainage District	Irrigation District & Electrical Districts Association	623-386-2196 (Main Office)	
	Nuning Lemka (backup)	Public Works Manager	City of Surprise	623-222-6148	
	Patti Trites	President of Southern Hills HOA, member of South Mountain Village Planning Committee	Citizen	402-213-7126	602-603-9033
	Pete Weaver	Emergency Management Coordinator	Town of Gilbert	480-503-6333	
	Randy Goettsche	Board Member Rio Verde Horsemen's Association	Citizen		
	Ray Dovalina	Assistant Public Works Director	City of Phoenix	602-534-5720	
	Robert Eroh	Project Engineer	City of Buckeye	623-349-6245	
	Rudy Perez	Emergency Services Planner	Maricopa County Emergency Management	602-273-1411	
	Sam Patton	Project Manager Multimodal Planning Division Corridor Planning Group	Arizona Department of Transportation	602-712-6168	
	Sami Korpelainen	Supervisor – Civil/Mechanical Engineering	Central Arizona Project	623-869-2631	
	Steve Trussell Greg	Executive Director	Arizona Rock Products Association - ARPA	602-271-0346	
	Tice Supplee	Director of Bird Conservation	Audubon Society of Arizona	602-468-6470	
	Tom ~~Condit~~ Pete W	Development Engineer	Town of Gilbert	480-503-6815	
	Tom Ewers	Division Manager Plan Review	Maricopa County Planning & Development	602-506-7145	

MEETING #3

Flood Control District of Maricopa County
2801 W. Durango Street
Phoenix, AZ 85009

Initial	Name	Title	Organization	Phone	Alternate Phone
MF	MARK FOUNTAIN	WR PLANING LEADER	B&V	602-381-4430	—
SL	Sabrina Lenke	MCDEM intern	MCDEM	602-273-1411	—
MMZ	Melody Zybart	Supervising Engineer	City of Mesa	480-644-5574	
GM	GREGG MONGER	MGR	CEMEX	602-397-3961	
SS	Sydney Staff	Env Spec	VMC	480-305-8322	
RA	RANDY GROTSCHE	RESIDENT	RIO VERDE HORSEMANS	623 451 3025	

MEETING #4 MINUTES – REVIEW POSSIBLE ACTIVITIES

Floodplain Management Plan 2020 Update

Thursday, December 5, 2019
9:00 a.m. – 12:00 p.m.

OPS Building Conference Rooms - 2801 West Durango Street

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1. Introduction

- Opening business comments
  - Safety Moment
    - Winter Driving
      - Prepare for being delayed or stranded
      - AZ511 for road closure updates (Call 511 or AZ511.gov)
      - Wear warm clothes and pack emergency kit
      - Tire chains and ice scraper
      - Slow down leave extra room and respect the plow
  - New participants (See attached sign-in sheet for all participants)
    - Aireona Raschke – Central Arizona Conservation Alliance (CAZCA)
    - Elise Moore – City of Phoenix
    - Terry Weter – Town of Gila Bend
    - Annia Quiroz – CAZCA
- **Presentation 1 – Maricopa County Parks and Recreation Department – Ken Vonderscher)**
  - Connect people with nature – Goal of Maricopa County Parks and Recreation
  - Educational programs, trails, concessions and partnerships, camping, picnicking, and volunteer opportunities
  - Over 90% self-funded through fees
    - Maricopa County will help for capital projects
  - Volunteers
    - Core volunteers
    - Community volunteers
    - Day of service volunteers
    - 95,536 volunteer hours that are worth approximately $2.2M
  - County Parks and Flood Control
    - White Tanks Regional Park
      - McMicken Dam
      - Buckeye town limits and Buckeye FRS #2 and 3
      - Largest park within County
    - Adobe Dam Recreation Area
      - Different concession parks in the area
    - Cave Creek Regional Park
      - Adjacent to Apache Wash and other washes that feed into Cave Buttes Dam
    - McDowell Mountain Regional Park
      - Next to the Verde River

        - Usery Mountain Regional Park
            - Development encroaching around this park and others
        - San Tan Mountain Regional Park
            - Within Pinal County – approximately 3,500 acres in trust land and 10,000 acres total
        - Estrella Mountain Regional Park
            - Near the Gila River
            - Applied funds over the last few years to revamp the park for additional amenities
        - Buckeye Hills Regional Park
            - South of the Gila River
            - Joe Foss Shooting Range
        - Maricopa Trail
            - Connects to all the Maricopa County Regional Parks
            - Working to connect to Buckeye Hills and into the Hassayampa River Preserve
            - 315 miles – combination of Maricopa County trails and other agency trails
        - Hassayampa River Preserve
            - Longest stretch of Willow and Cottonwood
            - Important habitat for bird enthusiasts
        - Lake Pleasant Regional Park
            - Helps drive funding for the parks department
            - Desert Outdoor Center
        - Spur Cross Ranch Conservation Area
            - Area saved from development by multiple agencies/municipalities
        - Vulture Mountains Recreation Area
            - Newest area within portfolio
            - Approximately $40M in development in the area
                - Currently at 95% plans
                - Camping areas and road access
            - Box Wash goes through the area
    - For more information refer to: www.maricopacountyparks.net
    - Questions
        - (Tice Supplee) Is there a map that shows the other municipality and agency parks and open areas?
            - Maricopa Association of Governments (MAG) has a recreation layer on their website/map
            - Maricopa County has a map to show Maricopa County features and land ownership

- **Presentation 2 – CAZCA – Aireona Raschke**
    - Two goals today – Discuss multi-use potentials for floodplains and tools that CAZCA has for future land use planning

- Natural cover in desert washes have immense value for the people and animals of Maricopa County
    - How do we entice people to come to Maricopa County – both people and companies?
- The Greenprint
    - Expertise from all corners of Maricopa County
        - The Nature Conservancy (TNC), Arizona Game and Fish Department (AZGFD), CAZCA, Sonoran Institute
        - Happy to receive feedback as they are working through the process
- Map of the Phoenix metropolitan area
    - Floodplains shown in the area to depict overlaps
        - Future development layer shown – large floodplains through areas that have water flow through
            - Need for how floodwaters will pass through
            - New ways to deal with flooding – multi-use areas
        - Parks need analysis
            - Areas that people do not have adequate access to park facilities
            - Areas along washes available for parks
        - Habitat connectivity corridors
            - Shows areas and corridors that show potential for wildlife to pass through the city
            - Maintaining these is important to the health of the city, parks, animals, and people in the area
- Visualizing Equity and Habitat Integrity
    - CAZCA Greenprint
        - Parcel level data and other information to help with land development planning
        - Key analyses available:
            - Mitigate heat risk through nature-based solutions
            - Protect water resources
            - Ensure habitat integrity
- Accessing the Greenprint
    - For more information refer to: https://web.tplgis.org/CAZCA
    - A username and password is required to access the map portal
    - Click “Create a new account” to setup free account
- Questions
    - (Patti Trites) South Mountain area is experiencing a lot of growth – zoning approvals for changes are needed – how does CAZCA’s Greenprint overlap with the City of Phoenix General Plan? When a citizen comes to the zoning board and wants a variance, they always bring up the City of Phoenix General Plan.
        - The General Plans have not been integrated into the Greenprint. However, it is still helpful to show existing use to see what is going on.

- (Patti Trites) Monthly people are coming through making changes and removing vegetation/structures. The development gets passed through permitting.
    - This tool is meant to deal with issues currently happening to communicate to the people you are working with. This helps provide data to show why different developments may not be beneficial.
- (Patti Trites) Zoning board talks about General Plan. They talk about trees and conservation.
    - CAZCA would like to present the tool and how it can be beneficial for communicating issues and analyses
- (Kelli Sertich) The Flood Control District of Maricopa County (FCDMC) is tasked with finding areas to build basins and other features to protect the area.
- (Terry Weter) The State Department and Department of Real Estate has to approve these developments.
    - We are here to share our resources and seek ideas of where CAZCA should go next to present the Greenprint tool and educate people about what is available.
- (Gregg Monger) Where does CAZCA funding come from?
    - Funded by a foundation and nested within the Desert Botanical Garden. Long-term it is unknown at this point in time.
- (Gregg Monger) Perhaps one of our goals should be implementing and using, to some capacity, associations like CAZCA to implement new ideas.

2. Review Flood Threat Definition

- Develop consensus on definition – Active group discussion on definition
    - Three options of the potential flood threat definition were presented:
        - Option 1 – Risk to life, property, and infrastructure due to rising floodwaters.
        - Option 2 – The vulnerability of people, property, structures, infrastructure, the environment, critical facilities, and economic development due to flooding impacts in Maricopa County.
        - Option 3 – Potential risks and vulnerability to people, property, environment, economy, structures, and infrastructure as a result of rising floodwaters during or after a storm event which cause interruptions to a normal operating condition and way of life.
- Open Dialogue and Feedback:
    - (Ed Taylor) Shouldn't you have "prior to" the floodwaters? To be proactive it should contain all three – prior, during, and after. We know several days in advance before a big storm.
    - (Patti Trites) Is the proper word "preparedness"? You need to have the awareness and preparedness.
    - (Brandon Espinoza) We are just defining the flood threat not what needs to get done.
    - (Ed Taylor) Setting up sand bag locations should not be done in times when it is not needed.
    - (Kelli Sertich) If we are talking about our small projects program, capital improvements program, or new delineations, what does a flood threat mean to determine project's needs.
    - (Terry Weter) Potential risk means considering all risks that come to site.

        - Keep the potential in the definition
    - (Gregg Monger) Likes option 1, simple and clean, but add in the understanding of the potential flood threat risk .
    - (Patti Trites) Option 3 has critical information for the normal operating condition and way of life. Road may wash out and strand people. Their homes are okay, but they can't get anywhere.
    - (Tony Angueira) There is a difference between a threat and vulnerability. The threat is there whether there is a vulnerability or not.
    - (Kelli Sertich) As a refresher, groups redefined the definition and the FMP team took the definitions and combined them into different options.
    - (Randy Goettsche) The difference between risk and vulnerability.
        - (Jesus Haro) Vulnerability is often associated to socio-economic factors.
        - (Mark Fountain) Would the group like to define it as threat or vulnerability?
            - (Tom Ewers) Threat the definition is vulnerability. The different options build on each other.
    - (Kelli Sertich) Suggested to the committee - How do we take this definition to management so the different communities can come knowing what to expect is needed to get approval for their projects?
    - (Brandon Espinoza) Option 3 remove vulnerability because we are defining in more detail.
        - (Mark Fountain) Suggested for conversation - each person has a different level of vulnerability.
    - (Tom Condit) Is it a given that we know what the definition of risk or potential risk is?
        - (Mark Fountain) Risk ties in separately – existing condition for evaluating a site or an emergency as a result of a storm or the changes communities are going through as development encroaches into drainage areas.
    - (Patti Trites) If this is for funding? If you leave it to during or after a storm event is that limiting the request to where the area has to be flooded before funding can be taken. And/or matters to the definition. Committee agrees.

- **REVISED and RECOMMENDED Option 3** – Potential risk to life, property, environment, economy, structures, or infrastructure anticipated from a flood event which causes interruptions to a normal operating condition or way of life.

3. Review Potential 2020 FMP Goals

- Select Goals Developed – formulated from FMP Committee feedback
    - Review of goals and objective definitions
    - Complimentary to industry examples
    - Goals versus objectives
        - **Goals** are general statements concerning an aspect of the agency's desired ultimate physical, social and/or economic environment. Goals set the tone for development decisions in terms of the citizens' desired quality of life.
        - **Objectives** (Action Items) express the kinds of action that are necessary to achieve the stated goals without assigning responsibility to any specific action. Goals review
    - Action - develop consensus of goals

- **Goal 1** – Transportation and low water crossing mitigation (top noted item from group break outs in prior FMP Committee Meetings)
    - The District will work with transportation agencies and the communities to mitigate public concerns on transportation routes that result in interruptions to normal operating conditions, delays of emergency services, negatively impact the economy, and pose safety risks due to flooding.
        - (Tice Supplee) Possible action would be working with the communities for emergency action procedures. Change "and" to "or".
            - (Mark Fountain) Documentation from FCDMC includes these procedures.

REVISED Goal 1: The District will work with transportation agencies and the communities to address public concerns on transportation routes that result in interruptions to normal operating conditions, delays of emergency services, negatively impact the economy, or pose safety risks due to flooding.

- **Goal 2** – Funding evaluation of process and dedicated resources
    - The District shall evaluate its various programs and funding processes working with stakeholders to assure funds continue to be invested back into the communities.
        - (Mark Fountain) Goal does not set a timeline – goal supports funding for community to reduce the risk throughout Maricopa County.
        - (Gregg Monger) Would add in "fiscal opportunities" because funds are limited. This should be a clear goal during these times – being creative with funding.
        - (Tice Supplee) FCDMC should work in partnership with stakeholders.
            - (Gregg Monger) I think partnership should be added in.
        - (Patti Trites) Was this goal to drive FCDMC's to fund projects independently of the stakeholders if they do not have funding.
            - (Kelli Sertich) That could be an option but not intended to be the only option. Keeps flexibility.
            - (Mark Fountain) There are times when the partner agencies do not have the funding and come to FCDMC for assistance. Does not create a restriction.
            - (Patti Trites) FCDMC could deem a project important enough to fund it without partner money.
            - (Dan Nissen) Through an IGA FCDMC could front the money and the municipality can pay back over time.
            - (Kelli Sertich) Previously, a city would get a grant and FCDMC would say this reduces FCDMC's cost share in the project.
        - (Randy Goettsche) Add any condition to get the project done in the most cost advantageous method to get it into the community.

        - (Mark Fountain) That might be a qualifier an could limit the goal. Suggest putting this into an action item.
    - (Patti Trites) Do you want to put in "timely" so that projects do not get shelved?
        - (Mark Fountain) Asked - What is timely? It is ambiguous and projects may not stay within a certain timeframe. Perhaps action items might better inform the timing of the goal.

REVISED Goal 2: The District shall work in partnership with stakeholders to evaluate its various programs, fiscal opportunities, and funding processes to assure funds continue to be invested back into the communities.

- **Goal 3** – Education/Technical resources
    - The District shall work with stakeholders and local organizations on consistent county-wide technical and educational materials for flood mitigation with materials available in physical locations as well as on the District's web page.
        - (Gregg Monger) Direct tie into CAZCA along with Parks and Recreation department.
        - (Tom Ewers) Developing documents or already developed documents?
            - (Kelli Sertich) FCDMC has a variety of prepared documents. Consistent messaging to the public for different flood awareness items.
            - (Mark Fountain) A guidance document was previously developed before to inform Homeowner's Associations (HOA) and communities of wash maintenance, but there is concern it is not readily available or up to date.
            - (Terry Weter) This would be a large expense to FCDMC
                - (Kelli Sertich) We have staff that does this work anyway.
                - (Terry Weter) Paper products would be a large expense.
                - (Mark Fountain) Part of the County's responsibility is to have guidance materials available for different communities.
        - (Tony Angueira) Face-to-face interaction may be an activity for this goal. Would want some direct interaction with the public.
            - (Mark Fountain) When we come back to activities this could be an item added. Could be a measurable action to get out to the communities a certain number of times per year.
        - (Kelli Sertich) Change it to digitally and hard copy materials. Provide flexibility for how the documents are shared.
        - Suggested change to: materials available in physical locations as well as electronically. Also, change "mitigation" to "preparedness"

REVISED Goal 3: The District shall work with stakeholders and local organizations on consistent county-wide technical and educational materials for flood

preparedness with materials available in physical locations as well as electronically.

- **Goal 4** – Managed open space
  - The District shall continue pursuing nature based solutions for flood mitigation, working with stakeholders to identify open space opportunities in conjunction with flood control projects.
    - (Ken Vonderscher) Revise to "identify and acquire open space in conjunction…"
    - (Dan Nissen) Should there be coordination with the development community?
      - (Mark Fountain) Developers are included within "stakeholders."
    - Recommendation for adding "acquire".

REVISED Goal 4: The District shall continue pursuing nature based solutions for flood mitigation, working with stakeholders, to identify and acquire open space in conjunction with flood control projects.

- Goal 5 – Regional leadership
  - The District shall continue to perform duties as the regional leader in floodplain management communicating information, guidelines, and regulations across communities in Maricopa County and to adjacent Counties.
    - (Mark Fountain) This goal supports proactive bringing the information out to the community. Provide access to information from FCDMC.
    - (Patti Trites) Do you want to add in any money into this? Leader of the finance side flood control projects?
      - (Kelli Sertich) This would be a part of the regular budget process.
    - (Tice Supplee) Communities infers municipalities. Land is owned and managed by government entities in unincorporated areas and should be brought forward sooner in the conversation.
      - (Terry Weter) State land is not the same as public land.
    - (Patti Trites) FCDMC is the "key communicator" doesn't FCDMC have a financial responsibility?
      - (Kelli Sertich) That could be assigned an action item.
    - (Tom Condit) Instead of "communicating" change to "collaborating"
    - (Tice Supplee) Is there a way to phrase it to where it is truly collaborative to where complementary guidelines and regulations are at the subdivision level as well as the County-level.
      - (Kelli Sertich) The County has no real authority over the communities, however it provides information and support.
    - (Patti Trites) Regional expert in floodplain management – dispensing your expertise.

REVISED Goal 5 – The District shall continue to perform duties as the regional leader in floodplain management. District shall provide and communicate information, guidelines, and regulations to agencies and communities throughout Maricopa County and to adjacent Counties.

An agreement was reached by committee participants for the working edits applied on screen during the meeting, resulting in the recorded proposed goals within the power point deck.

The committee took a 10-min break and reconvened to for the next steps of developing possible activities with each agreed upon goal.

4. Discussion of Possible Activities

- Define action items that may be conducted within the next 5-years or items to be implemented and continue beyond 5-years.
- **Goal 1** – Transportation and low water crossing mitigation
  - (Tom Ewers) **Identify locations of risk/concern. Categorize**
  - (Lynn Wittman) Is there a reason that it is limited to transportation crossings?
    - (Kelli Sertich) This was repeatedly brought up as a flood hazard by the different groups during breakout. We want to capture what is happening all the time, but this is an element of the mitigation efforts.
    - (Mark Fountain) These are in addition to current FCDMC operations.
  - Jesus Haro brought up the thought during break that mitigation usually means physical changes to the location.
  - (Tom Ewers) **Design and funding options**
  - (Lance Webb) **Triggers or warning to let the public know to avoid area**
  - (Mark Fountain) Identify new traffic routing. How is the risk communicated?
  - (Tice Supplee) Is there a place where adjacent land modifications can be evaluated to see if this is a problem?
    - (Kelli Sertich) This should be taken care of during the permitting process.
    - (Mark Fountain) **Evaluate areas of impact**
  - (David Fritz) **Cost sharing partnerships**
  - (Lance Webb) **Matrix of prioritization**
    - What makes one location a higher priority than another.
    - (Mark Fountain) Example – Levels of use and location.
    - (Lance Webb) Data to identify prioritization. A standard for prioritization.
  - (Patti Trites) **Partnership with Emergency Services** to not reinvent the wheel of how to handle events
  - **Coordination with transportation agencies for crossing risks**
  - (Mark Fountain) What about depth gages and other warnings?
    - (Ken Vonderscher) You may drive two miles to get to a crossing that is closed when a flashing sign could be further up the road to advise drivers. Need additional signage at risk and in advance of risks.
  - (Mark Fountain) Partnership with other agencies for low water crossings. Who takes the lead?
    - (Lance Webb) If it is within a city, the city should take the lead.
    - (Tom Ewers) If the city has no funding, where can it come from.

        - (Mark Fountain) The cities would have to identify and communicate the areas of risk to prioritize for funding requests.
    - (Kelli Sertich) FCDMC will have a strategic plan and we want some key concepts that will then be flushed out in the strategic goal.

- **Goal 2** – Finding evaluation of process and dedicated sources
    - (Tice Supplee) **FCDMC to communicate availability of Federal funding**
        - (Patti Trites) FCDMC could help prepare or write the grant.
    - (Tice Supplee) **IGAs for fiscal partners**
        - (Mark Fountain) There are some currently but could be increased.
    - (Patti Trites) **Regular review cycle for funding status and how they are evaluated to the communities**
        - Report out to communities for status.
    - (Patti Trites) This forum could be done annually to publicly announce what FCDMC is doing and where funding is at. **Funding based communication to the community**
        - (Mark Fountain) The FMP will undergo annual status reviews and the FMP Committee is invited back annually to review the FMP actions. FCDMC will extend an invite for future meeting date.
        - (Patti Trites) Once we get to the next goals, it will always come back to money. If there is no money, the projects do not happen.
    - (Terry Weter) Competition of grants from large and small communities. Would mean more to smaller communities than larger. **Particular definition of process and evaluation.**
        - (Lance Webb) Mesa knows the ground rules from FCDMC so they are confident they meet the parameters to get funding. The Capital Improvements Program (CIP) process of evaluation needs a bit more definition.
        - (Terry Weter) Projects dating back decades that have not been pushed forward due to cost. Developable land is within floodplains. It is easier to fund small projects versus larger. It is tough for small communities to compete with larger communities. The impact to a small community will not show it is as beneficial to more people due to size but the risks are real.
    - (Randy Goettsche) Are you looking for FCDMC to present how to get a winning application?
        - (Terry Weter) Have hired engineers to design and FCDMC says it costs too much money.
    - (Patti Trites) Guidance for grant writing and advisement of funding by the District.

- **Goal 3** – Education/ Technical Resources
    - (Tom Ewers) Doesn't the CRS require the FMP to be within the library?
        - (Mark Fountain) Yes, it does.
        - (Sharon McGuire) Within multiple libraries (Gilbert as well) and online to see where to find them.
    - (Tom Ewers) **Identifying additional physical locations for documents**
    - (Patti Trites) Getting information to HOA level. **Combine technical resource materials with emergency service information – federal resources, local known hazards for each city, etc.** Getting the information out: schools, public

meetings, town halls, FCDMC meetings, HOA meetings and others. Having a hard copy of the materials available somewhere. **Utilities and Points of Contact (city and service are specific).** Also, **Outreach to HOA's for flood preparedness and wash management.** Emergency services has information of health issues with flooding.

- (Lance Webb) A manual for **how to maintain drainage infrastructure after it is built**. Mesa documented who was responsible for each wash corridor. The maintenance does not generally cause the flood, but it can be. A manual or material that is a regional resource that municipalities can use to show citizens what general practices are to maintain. Mesa will tell residents this could be tied into landscaping contracts for the neighborhood/HOA.
    - (Dan Nissen) The HOA board is subject to changes and nothing is left behind. Knowledge transfer is lost.
    - (Mark Fountain) Need a County centralized location for the resource.
    - (Patti Trites) Define and communicate where to get the information from.
    - (Mark Fountain) Information could be added to the annual Flood Facts Brochure. The District can identify resources and locations.
    - (Tom Ewers) Is there anything done with schools?
        - (Mark Fountain) Yes, flyer could be developed and handed out in conjunction with school STEM presentations.
    - (Lance Webb) Develop how to videos. Illustrative to show how different drainage infrastructure features are maintained. Mesa goes around and presents this to people but a video would be helpful to direct people to.
        - **Illustrative literature and "how to" maintenance videos**
        - Use County or Districts YouTube for video uploads.
    - (Tom Ewers) **Home and garden show booth to present and educate**
        - (Kelli Sertich) Used to do this regularly but have not in a while.
    - (Lance Webb) The Hydrology/Hydraulics manuals are well done, and the process could be done to fill a void for the maintenance side of infrastructure.
- (Randy Goettsche) **Support check dams and water retention for recharge.** Smaller lot development – green infrastructure and low impact development. Water retention for individual lots.
    - (Mark Fountain) FCDMC and City of Phoenix have literature currently available for green infrastructure and low impact development guidance.
    - **Distribution of Green Infrastructure and Low Impact Development literature**
    - (Randy Goettsche) We are 20-square miles of 1 acre lots.
        - (Mark Fountain) There are issues with how this information could be communicated to the residents.
- (Patti Trites) Vegetation within the wash – do not want another Los Angeles River. How much needs to be taken out to meet requirements.
    - **Characterization of acceptable vegetation within wash corridors**
- (Mark Fountain) **Adverse impacts of walls**
- (Mark Fountain) **Citizen rain gage program**

- **Goal 4** – Managed open space
  - (Tom Ewers) What FCDMC is doing now. The definition of the goal says continuing. Kelli Sertich provided a response.
  - (Ken Vonderscher) **Coordination and cooperation with Communities and Stakeholders.** If they need drainage infrastructure, FCDMC could step in to provide resources and support.
  - (Tom Condit) Is there any guidance or priority for where heavy development is occurring?
    - (Mark Fountain) **Prioritization for areas poised for risk**
  - (Tice Supplee) There is a meeting between the City of Tempe, City of Phoenix, and FCDMC for flood issues.
  - (Mark Fountain) **Prioritizing the locations where floodplain delineations and re-delineations are needed**
    - (Nuning Lemka) There are areas that are identified as risks but have not being delineated. **Additional identification of flood risks**
    - (Dan Nissen) Doesn't have to be a wash. Residents do no want to have to buy flood insurance.
    - (Tome Ewers) Aren't there flood areas that are not FEMA floodplains.
      - (Mark Fountain) Yes, Maricopa County has additional areas of flood hazards and best available information.
  - (Patti Trites) Other known risks in the area not mapped as a floodplain
  - (Mark Fountain) Recharge opportunities for open space. **Best practice for locations where recharge locations are best suited**
  - (Mark Fountain) Removal of invasive species in floodways.
    - (Tice Supplee) A good document has been written on tamarisk and is in review. Information for landscaping choices and linked with County Parks. Arid tolerant plants that are highly invasive and still being used.
  - (Mark Fountain) **Connectivity of open space**
  - (Patti Trites) **Coordination with the General Plans of different communities**
    - (Kelli Sertich) Area Drainage Master Plans look at existing and future development and where open space can be planned for.
    - (Tice Supplee) There is a large network of planned roads.
    - (Ed Taylor) There are master plans that have been developed where as you chase to issues the developer will build based on the master plan.
- **Goal 5** – Regional leadership
  - (Mark Fountain) **Annual meeting and communication of changes in regulations and policies.** Be proactive to educate and notify communities of changes.
  - (Ed Taylor) Review existing information and update to current practice. **Review current information and guidelines available.**
    - (Mark Fountain) What would be the timeframe of the review?
    - (Ed Taylor) At least annually, but bi-annual would be good. May be a big ask.
    - (Lance Webb) Bi-annual might be a bit too frequent. Things do not change that frequently. Even annually certain documents may be too much.
      - (Kelli Sertich) Most manuals are on a 3 to 4-year cycle.
    - (Lance Webb) **Define a review cycle for literature.**

- (Randy Goettsche) Does FCDMC have enough legislative authority to due its job? **Identify regulatory authority.** How do we break this cycle and prevent development where it does not belong?
- (Mark Fountain) **Incorporating agency best practices**
- (Mark Fountain) Per early committee meeting - finished floor inspection services. Group to conduct spot finished floor elevation checks.
    - (Dan Nissen) Would be a tough one to enforce.
    - (Lance Webb) The risk relies on the surveyor that seals the elevation certificate.
    - (Patti Trites) Dust control permits are required for building. Why is there not a mechanism to periodically inspect the finished floor elevation?
        - (Lance Webb) Some municipalities rely on FCDMC and some do it themselves. The responsibilities are set differently. Ultimately, the liability is on the person that seals the elevation certificate or plans.
        - (Kelli Sertich) Elevation certificates are a requirement of permits.
        - (Tom Condit) A check of the elevation certificates during the Community Assistance Visits by the Arizona Department of Water Resources.
    - Group agreement, this should not be set as an actionable item, defer responsibility to ADWR.
- (Mark Fountain) Per early committee meeting - **Permitting enforcement and regulation.** Identify when corners are being cut during development.
    - (Tice Supplee) Being proactive with the federal definition of waters of the U.S. where major washes in Maricopa County may not be under the same protection it previously was.
        - (Kelli Sertich) The state can still have its own waters. Needs to have some coordination with the state.
        - (Mark Fountain) The state is currently seeking to define waters and washes the require preservation at the local level- more information is forthcoming.
        - **Changes of Section 404 and protection of open space**
    - (Dan Nissen) 408 permits are also coordinated with FCDMC.

5. Next Steps

- FMP Committee reflect on possible Action Items
- FMP Committee Meeting #5 – Draft an Action Plan – Thursday, January 16, 2020
- FMP Public Meeting #2 – Thursday, February 13, 2020 at FCDMC
- Please continue to solicit feedback for online survey
    - Floodplain Management Plan Survey

Summary of Possible Activities Per Goal

Goal 1 – The District will work with transportation agencies and the communities to address public concerns on transportation routes that result in interruptions to normal operating conditions, delays of emergency services, negatively impact the economy, or pose safety risks due to flooding.

- Identify and categorize locations of risks and concern
- Develop a matrix of prioritization
- Design and funding options
- Establish triggers or warnings for areas to avoid
- Additional cost sharing partnerships
- Partnership with emergency services
- Coordination with transportation agencies for crossing risks

Goal 2 – The District shall work in partnership with stakeholders to evaluate its various programs, fiscal opportunities, and funding processes to assure funds continue to be invested back into the communities.

- Regular review cycle for funding status and community evaluation
- FCDMC to communicate availability of Federal funding
- Funding based communication to the community
- Develop definition of process and evaluation
- IGAs for fiscal partners

Goal 3 – The District shall work with stakeholders and local organizations on consistent county-wide technical and educational materials for flood preparedness with materials available in physical locations as well as electronically.

- Identifying additional physical locations for documents
- Combine technical resource materials with emergency service information
- Utilities and points of contact for emergency response
- Outreach to HOA's for flood preparedness and wash management
- Characterization of acceptable vegetation within wash corridors
- How to maintain drainage infrastructure after it is built
- Illustrative literature and "how to" maintenance videos
- Home and garden show booth to present and educate
- Support check dams and water retention for recharge
- Distribution of Green Infrastructure and Low Impact Development literature
- Communicate / educate on adverse impacts of walls
- Citizen rain gage program

Goal 4 – The District shall continue pursuing nature based solutions for flood mitigation, working with stakeholders, to identify and acquire open space in conjunction with flood control projects.

- Coordination and cooperation with Communities and Stakeholders
- Prioritization for areas poised for risk
- Prioritize locations where floodplain delineations and re-delineations are needed
- Additional identification of flood risks
- Best practice for locations where recharge locations are best suited
- Connectivity of open space

- Coordination with the General Plans of different communities

Goal 5 – The District shall continue to perform duties as the regional leader in floodplain management. District shall provide and communicate information, guidelines, and regulations to agencies and communities throughout Maricopa County and to adjacent Counties

- Annual meeting and communication of changes in regulations and policies
- Review current information and guidelines available
- Define a review cycle for literature
- Identify regulatory authority
- Incorporate agency best practices
- Permitting enforcement and regulation
- Changes of Section 404 and protection of open space

Flood Control District of Maricopa County
2801 W. Durango Street
Phoenix, AZ 85009

MEETING #4

FLOODPLAIN MANAGEMENT PLAN 2020 UPDATE
SIGN-IN SHEET

Meeting #4:	Review Possible Activities	**Meeting Date:**	Thursday – December 5, 2019
Facilitator:	Mark Fountain, Black & Veatch Corporation	**Place/Room:**	Cave Buttes Conference Room

Initial	Name	Title	Organization	Phone	Alternate Phone
BE	Brandon Espinoza	Development Services & Code-Compliance Officer	Town of Gila Bend	602-679-0355	
	Brian Cosson/ mike	ADWR NFIP and Flood Warning Coordinator	Arizona Department of Water Resources	602-771-8657	
DN	Dan Nissen	Sr. Civil Engineer	City of Peoria	623-773-7237	
DF	David Fritz	Engineering Branch Manager	Maricopa County Department of Transportation	602-506-2826	
EA	Ed Taylor	President - New River/Desert Hills Community Association	Citizen	602-739-1235	
	Gregory Arrington	Community Development Manager	Town of Youngtown	623-933-8286	
JH	Jesus Haro	Emergency Services Planner	Maricopa County Emergency Management		
KH	Kelly Hargadin	Engineering Project Manager	City of Glendale	623-930-3641	
KV	Ken Vonderscher	Planning and Development Manager	Maricopa County Parks and Recreation	602-506-9503	
	Kristin Tytler/ Nunning	Assistant Director/City Engineer	City of Surprise	623-222-6153	
LW	Lance Webb	Deputy Engineer	City of Mesa	480-644-2399	
	Liz Foster	Executive Director	Maricopa County Farm Bureau	480-635-3631	
LW	Lynn Whitman	Flood Control District Director	Yavapai County	928-771-3196	
ME	Mark Edelman	Planning and Engineering Manager	Arizona State Land Department	602-542-6331	

Flood Control District of Maricopa County
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MEETING #4

Initial	Name	Title	Organization	Phone	Alternate Phone
MS	Mike Shelton	Floodplain Risk Map Coordinator	Arizona Department of Water Resources	602-771-8428	
	Noel Carter	Buckeye Water Conservation and Drainage District	Irrigation District & Electrical Districts Association	623-386-2196 (Main Office)	
NL	Nuning Lemka (backup)	Public Works Manager	City of Surprise	623-222-6148	
PT	Patti Trites	President of Southern Hills HOA, member of South Mountain Village Planning Committee	Citizen	402-213-7126	602-603-9033
	Pete ~~Weaver~~ Tom	Emergency Management Coordinator	Town of Gilbert	480-503-6333	
RG	Randy Goettsche	Board Member Rio Verde Horsemen's Association	Citizen		
	~~Ray Dovalina~~ Elsie Moore	Assistant Public Works Director	City of Phoenix	602-534-5720	
	Robert Eroh	Project Engineer	City of Buckeye	623-349-6245	
	Rudy ~~Perez~~ Jesus	Emergency Services Planner	Maricopa County Emergency Management	602-273-1411	
S	Sam Patton	Project Manager Multimodal Planning Division Corridor Planning Group	Arizona Department of Transportation	602-712-6168	
	Sami Korpelainen	Supervisor – Civil/Mechanical Engineering	Central Arizona Project	623-869-2631	
	Steve ~~Trussell~~ Gregg	Executive Director	Arizona Rock Products Association - ARPA	602-271-0346	
VG	Tice Supplee	Director of Bird Conservation	Audubon Society of Arizona	602-468-6470	
TC	Tom Condit	Development Engineer	Town of Gilbert	480-503-6815	
TE	Tom Ewers	Division Manager Plan Review	Maricopa County Planning & Development	602-506-7145	

Flood Control District of Maricopa County
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MEETING #4

Initial	Name	Title	Organization	Phone	Alternate Phone
ALA	TONY ANGUEIRA	STORMWATER ENGINEER	YCFCD	(928) 771-5390	
GRM	Gregg Monger	mgr	ARPA	6023973961	
EM	Elise Moore	Floodplain Manager	City of Phoenix	602-262-4026	
AR	Aireona Raschke	Program Director	CAZCA	602-684-8256	
TW	TERRY WETZEL	DPW	TOWN of GILA BEND		
MF	MARK FOUNTAIN	WRP PLANNING LEADER	B&V	602 3814430	

MEETING #5 MINUTES – DRAFT ACTION PLAN

Floodplain Management Plan 2020 Update

Thursday, January 16, 2020
9:00 a.m. – 12:00 p.m.

OPS Building Conference Rooms - 2801 West Durango Street

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1. Introduction

- Safety Moment
  - Stretching at the workstation
    1. Micro breaks each hour to stand up and/or stretch.
    2. Look away from the screen occasionally and focus your eye on an object far away.
- Opening Business Comments
  - Kelli Sertich and Sharon McGuire retired in December 2019
    1. Michael Fulton and Tim Murphy will be joining the FMP Committee to help wrap up the project.
  - FMP Committee Introductions (Refer to attached sign-in sheet for attendees)
- Presentation
  - Flood Control District Use of Geographic Information Systems (GIS) – Kevin LaVallee (GIS Supervisor for Flood Control/Maricopa Department of Transportation
    - What is GIS
      - Simplest answer, Cartography – map making
    - FIRM Panels at the Beginning
      - Originally utilized a digitizer to digitize the FIRM panels to create the original map layers. Used the FIRM panels to follow the floodplain boundaries, cross sections, base flood elevations (BFEs). 1988 was the first year that FEMA issued the FIRMs in the county wide format for Maricopa County . Helped standardize the documentation of floodplains.
    - Early Issues in Digitizing FIRM Panels
      - Only point of reference was streets and could easily place someone within a floodplain by placing a floodplain boundary since no parcels were provided on the FIRM panels.
    - Progress in FIRM Panels
      - Lined up floodplains feature that cross over different FIRM panels.
      - Only reference was FEMA section references, not Maricopa County references.
    - Improvements in Early 2000's
      - Noticing many areas that have errors and the only way to correct them is with a LOMR.
      - Digital FIRM (DFIRM) panels were starting to be developed. Flood Control District of Maricopa County (FCDMC) approached FEMA asking if FCDMC could develop DFIRMs.
    - 2005 DFIRMs for Maricopa County
      - Created easier view of floodplains (colored blue) and included a background aerial to provide better guidance and reference.
      - Added ability to provide FIRM Panels to FEMA digitally and do any other revisions digitally.
    - GIS ArcMap

        - Now utilized by FCDMC with approximately 40 users.
    - Regulatory Initial Inquiry
        - Resident calls and request information to build when their property may be near or within a portion within floodplain.
        - GIS helps provide more accurate answers to the residents.
    - Flood Control GIS Database
        - Aerial information for parts of Maricopa County dating back to the 1930s.
        - Yearly aerial photography coverage starting in 1999.
        - Refer to Maricopa County Historic Aerials for reference and coverage applicability.
        - Available to the public to review historical aerials
    - Floodplain Viewer (Online)
        - Anyone can access this map to locate properties of interest and determine the location of a floodplain around the property.
    - Web Applications
        - Web links
            - GIS Mapping Applications main page
                - https://www.maricopa.gov/3942/GIS-Mapping-Applications
            - Floodplain Viewer
                - https://gis.maricopa.gov/FCD/FloodplainViewer/
            - Historical Aerials
                - https://gis.maricopa.gov/GIO/HistoricalAerial/index.html
    - Kevin provided a live demonstration of accessing different web applications – starting with main GIS webpage for Maricopa County.
            - Floodplain Map Viewer also includes access to view Elevation Certificates
    - Questions from the Committee
        - (Patti Trites) How does the aerial imagery definition (down to 4-inches) correlate to the FLO-2D models developed?
            - The models do not get down to this definition because the models would take a very, very long time to run.
            - (Mark Fountain) Models are developed usually around the 20- to 50-foot grid level.
        - (Patti Trites) Builder of my property said they elevated the homes in the area.
            - Property is not within a floodplain and no Elevation Certificate provided within FCDMC Floodplain Viewer, why?
            - (Tim Murphy) FCDMC does not have all the Elevation Certificates for the entire county. Different municipalities may have them. FCDMC does not collect Elevation Certificates unless the property is within the floodplain.
            - If the property is located within City of Phoenix, seek to obtain elevation certificate from them.
        - (Patti Trites) If there is an intense 100-year event, runoff will get to areas that previously were not shown as a potential hazard.
            - (Tim Murphy) Communities and FEMA try to remove as many properties from the floodplain. There any many areas still subject to flooding outside the FEMA floodplains because not every wash has been delineated or identified on a FEMA

FIRM panel. Other issues come along with delineating and adding properties into the floodplain (property values, flood insurance, etc.).

- (Tice Supplee) When there are large storm events in the mountains, the runoff is not defined anywhere, and communities are impacted.
    - (Patti Trites) Neighborhood flooded in 2014, 2015, 2016, 2017, and 2018 before things were done to help prevent. This isn't an isolated event because it is happening in other communities that are not within a floodplain.
    - (Tim Murphy) We have to be careful with how things are phrased. Not every area that is subject to flooding is identified as a floodplain on the FIRM panel. There are still areas subject to flooding outside the floodplain. There are other issues that come about when delineating floodplains through a developed area.
- (Patti Trites) The City of Phoenix came in to develop basins in the area to help protect the homes.
    - (Michael Fulton) With support from FCDMC.
- (Pattie Trites) As people move from elsewhere, they may not be aware of the risks in the area.
- (Ed Taylor) Why do we not incorporate the different municipalities flood plans with what we are doing?
    - (Kevin LaValle) FCDMC works with the different cities to identify areas for delineations. All FEMA delineated floodplains are shown on the FCDMC Floodplain Viewer, whether delineated by FCDMC or by others.
    - (Tim Murphy) FCDMC has ADMSs and ADMPs to identify local flood issues throughout the county. Looking at a watershed and working with cities to identify problems. The ADMPs help to develop potential solutions to the flooding problems in the watershed. Small Project Assistance Program (SPAP) is a FCDMC program offered to help cities with localized problems.
    - (Ed Taylor) Seems more reactive than proactive.
    - (Tim Murphy) As part of the studies, hydrology and hydraulics are done to identify areas at risk to flooding and develop solutions for the area.
    - (Patti Trites) My neighborhood had historical flooding that was not designated by the City of Phoenix and then developers bought the land and built on it. Neighbors did not have flood insurance to help with impacts to home from flooding. No one wants to get their home designated in floodplain after the fact.
- (Michael Fulton) The real opportunity is getting ahead of development and determine flood risks before construction. Examples include area on the fringes of the county to determine existing flood risks. Some cities act as their own floodplain managers and they are responsible for doing this for their jurisdiction (Example: City of Phoenix). There is a cost of knowing a property is a flood risk. It is a challenge. Working to avoid flooding issues that have happened in the past.

        - (Brandon Espinoza) Does the map viewer show areas they do not oversee?
            - The designation of cities are displayed as different colors to show jurisdictions. The unincorporated area of Maricopa County is not shaded.
- Group Summary - There is a plethora of information to show where risks are or may be present. GIS mapping helps to identify areas for future projects to mitigate flooding at individual properties. FCDMC continuously looks to delineate and re-delineate floodplains as studies and structural projects are completed. The delineation with studies before construction comes in helps to get ahead of development to identify and inform developers where they should build and how to protect the proposed features. The jurisdiction that manages the floodplain is responsible for whether they choose to move forward with creating a new floodplain delineation.

2. Review of Online FMP Survey Results

- Overview of Feedback
    - 59 surveys completed from October 24, 2019 to December 6, 2019
        1. Note: Not all survey participants answered every question
    - Response Theme: Flooding Hazards / Drainage Problems
        1. Impassible Roads and Street Closures
            - Evident in most responses
        2. Overwhelming Drainage
            - Individual properties not providing enough drainage relief/storage
        3. Adverse Development Impacts
            - Maintain forward thinking to mitigate risks
- Summary of Findings (Review of responses)
    - How do you receive information about flooding?
        1. Social media is the largest response, followed by television/news station and radio stations.
            - Social media used to send information out to neighbors, example road closures.
        2. FCDMC Mobile Tools was the lowest response – future opportunity.
    - Have you used FCDMC's Mobile Tools?
        1. 9 yes and 9 no
        2. 39 of the 57 responses were unaware of the tools available.
        3. (Brandon Espinoza) People are not thinking about these tools because of the priority of the other items they use on their phones. They don't need it until monsoon season so they do not think about it.
        4. Do not think of the risks until it is already monsoon season.
        5. Opportunity for FCDMC to provide more information to show these tools are available for public use.
    - Have you used the Floodplain Viewer on the FCDMC website to check if your home is in a FEMA designated floodplain?
        1. 27 of the 58 responses were unaware of the tool.
            - Mark Fountain provided a reference to a query (outside of engineering) if individuals knew of the tool, they reported they were generally unaware of the tool or how to use it.

    2. The information can be linked to each jurisdictions webpage, which helps tie into the Community Rating System (CRS) program.
- Question for damage to structure, purchased flood insurance, improved property to prevent flooding, live in a FEMA floodplain, experienced flooding in your home.
    1. 10 have improved their property to prevent flooding while 7 have purchased flood insurance.
    2. 4 experienced flooding in their homes – missed opportunity to provide more information on Report-a-Flood.
    3. (Patti Trites) At December HOA meeting, 15 homes in neighborhood had flooding. FCDMC staff came to the meeting. 14 residents showed up, but only 2 of them were flooded. Even though people know they are at risk they do not show up to be educated.
- Have you ever been stranded trying to leave or return from home due to flooding?
    1. 39 people said they have not been stranded compared to 18 who have been
        - Without information for where the people who responded live, it is tough to evaluate these physical drivers for their responses.
        - With the number 1 risk being transportation, the risk is not at their home, but it is somewhere else within the surrounding areas. Additional clarification may be needed for future public surveys.
- Have emergency services been delayed to your area due to flooding?
    1. 41 responded no and 12 yes
        - Perhaps some of the “no” responses may be are linked to not needing emergency services during flooding and not heard from neighboring properties.
- Is there anything else you would like us to know to help shape the Floodplain Management Plan?
    1. Expanded responses from surveys that indicate the different reoccurring themes. Refer to meeting minute attachments for survey reference.
- Question
    1. (Brandon Espinoza) Does information go out to properties now that they would be in a floodplain?
        - (Mark Fountain) Studies require a varying amount of public outreach to communicate changes to the floodplain. Public meetings are held to get feedback on the changes and again when the changes are completed. However, public meetings are usually poorly attended. Tough to get public participation to help raise awareness.
        - (Brandon Espinoza) In Gila Bend, homes were previously not in a floodplain as it was near their homes/school but with an update, the new mapping indicated 3 or 4 feet into properties. Are these parcels notified?
            - (Mark Fountain) When the floodplain is changed through FEMA notification to residents is required as part of the process.
            - (Michael Fulton) When a delineation is done, FCDMC works to spread the information to the public. They provide information to people if they are going to be within a floodplain due to a change from re-delineation. FCDMC

offers Elevation Certificates to be done, free of charge, for homes that are put within a floodplain from re-delineation. As our understanding of the environment changes, it is FCDMC's obligation to present the risk to the public and help people adjust to that change.

3. Break

4. Remarks from Michael Fulton – Director of FCDMC

- Thank you for participation throughout the series of FMP Committee Meetings. FCDMC plans to take the responses and implement them. This is an eye opener for him as he has been at FCDMC for around a year and a half. The efforts conducted within this committee help to develop budgets and other plans for Maricopa County. He looks forward to sharing the results with the management team and identifying how to respond to what is developed within the FMP update.

5. Review of Meeting #1-4

- Meeting #1
  - Review of Existing Programs (FCD Staff Presentations)
    1. Hazard Identification Studies and Plans, Programs/Projects – Don Rerick
    2. Operations and Maintenance – Charlie Klenner
    3. Permitting and Delineations – Cathy Regester
    4. Engineering Division Program Highlights – Scott Vogel
    5. ALERT and Flood Response Plans – Steve Waters
  - Review of Hazard in 2015 Plan
    1. 21 total identified hazards within four categories – structural, regulatory, natural, and human-caused
  - Status of 2015 Plan Goals & Action Plan
    1. Success of a number of objectives completed in 2015 FMP
- Meeting #2 – Identify Hazards
  - Review of Featured District Programs
    1. District Budget – Karen Scott
    2. Communications and Public Outreach – Lisa Blyler
  - Group breakout to define "flood threat" and identify flood hazards
    1. Each group provided information as to what they feel a "flood threat" is.
    2. Flood hazards were identified as part of the group breakout for each FMP watershed.
    3. District Project Managers came in to answer particular questions about the watersheds being evaluated for flood hazards.
    4. Flood hazards included, but not limited to: alluvial fans, wildcat development, unmaintained drainage facilities, transportation corridors (loss of crossings/washout), invasive species of vegetation, amongst other group inputs.
- Meeting #3 – Set Goals
  - Review of Maricopa County Department of Emergency Management (MCDEM)
    1. Jesus Haro provided background into MCDEM
  - Review of definitions provided for "flood threat"

        1. Group discussion on the different definitions from each group. The FMP team took the comments to provide a concise definition in FMP Meeting #4.
    - Finalized the Flood Hazards identified by each group
        1. Allowed groups to revisit the list they previously provided to include new flood hazards not thought of previously or remove ones they did not agree with anymore.
    - Brainstorm FMP 2020 Goals
        1. Review of the 6 main goals within the 2015 FMP
        2. Group breakout to provide new goals for the 2020 FMP Update
- Meeting #4 – Review of Possible Activities
    - Presentations
        1. Maricopa County Parks and Recreation Department – Ken Vonderscher provided a review of how the Parks and Recreation Department interacts with the District
        2. Central Arizona Conservation Alliance (CAZCA) – Dr. Aireona Raschke provided information about multi-use potential for floodplains and tools that CAZCA has for future land use planning
    - Finalized definition of "Flood Threat"
        1. Potential risk to life, property, environment, economy, structures, or infrastructure anticipated from a flood event which causes interruptions to a normal operating condition or way of life.
    - Review of Potential 2020 FMP Goals
        1. REVISED Goal 1: The District will work with transportation agencies and the communities to address public concerns on transportation routes that result in interruptions to normal operating conditions, delays of emergency services, negatively impact the economy, or pose safety risks due to flooding.
        2. REVISED Goal 2: The District shall work in partnership with stakeholders to evaluate its various programs, fiscal opportunities, and funding processes to assure funds continue to be invested back into the communities.
        3. REVISED Goal 3: The District shall work with stakeholders and local organizations on consistent county-wide technical and educational materials for flood preparedness with materials available in physical locations as well as electronically.
        4. REVISED Goal 4: The District shall continue pursuing nature-based solutions for flood mitigation, working with stakeholders, to identify and acquire open space in conjunction with flood control projects.
        5. REVISED Goal 5 – The District shall continue to perform duties as the regional leader in floodplain management. District shall provide and communicate information, guidelines, and regulations to agencies and communities throughout Maricopa County and to adjacent Counties.
    - Discussion of Possible Activities
        1. Goal 1: Transportation and low water crossing mitigation
            - Identify locations of risk/concern – categorize
            - Design and funding options
            - Triggers or warning to let the public know to avoid area
            - Evaluate areas of impact

- Cost sharing partnerships
- Matrix of prioritization
- Partnership with Emergency Services
- Coordination with transportation agencies for crossing risks

2. Goal 2: Finding evaluation of process and dedicated sources
    - District to communicate availability of Federal funding
    - IGAs for fiscal partners
    - Regular review for funding status and how they are evaluated to the communities
    - Funding based communication to the community
    - Particular definition of process and evaluation
3. Goal 3: Education and Technical Resources
    - Identifying additional physical locations for documents
    - Combine technical resource materials with emergency service information – Federal resources, local know hazards for each city, etc.
    - Utilities and Points of Contact (city and service area specific)
    - Outreach to HOAs for flood preparedness and wash management
    - How to maintain drainage infrastructure after it is built
    - Illustrative literature and “how to” maintenance videos
    - Home and garden show booth to present and educate
    - Support check dams and water retention for recharge
    - Distribution of Green Infrastructure and Low Impact Development literature
    - Characterization of acceptable vegetation within wash corridors
    - Adverse impacts of walls
    - Citizen rain gage program
4. Goal 4: Managed Open Space
    - Coordination and cooperation with communities and stakeholders
    - Prioritization for areas poised for risk
    - Prioritizing the locations where floodplain delineations and re-delineations are needed
    - Additional identification of flood risks
    - Best practice for groundwater recharge locations
    - Connectivity of open space
    - Coordination with the General Plans of different communities
5. Goal 5: Regional Leadership
    - Annual meeting and communication of changes in regulation and policies
    - Review current information and guidelines available
    - Define a review cycle for literature
    - Identify regulatory authority
    - Incorporating agency best practices
    - Permitting enforcement and regulation

- Changes of Section 404 and protection of open space

6. Recommend Action Items by Category – Matrix Results

- FMP Committee participated in an active working session (on-screen) utilizing an Excel spreadsheet to populate a matrix, defining which action items pair to the defined goals and action item categories – refer to attached sheet for matrix of FMP Committee input
- Action Item Categories
  - Preventative
  - Property Protection
  - Natural Resource Protection
  - Emergency Services
  - Structural Projects
  - Public Information

7. Prioritize Recommended Action Items

- Solicit Feedback and Establish Ranking
  - The FMP Committee reviewed the Matrix Results and identified which action items obtained the most votes and applied to the most Categories.
  - Upon review the FMP Committee discussed the priority of Action Item IDs. The formal recommendation of the FMP Committee was recorded as Matrix ID 1, 27, 35/36, 18, 31.
  - Priority of Action Items (from matrix results and open discussions):
    1. #1 Identify and categorize location of risks and concern.
    2. #27 Prioritize locations where floodplain delineation and re-delineation are needed.
    3. #35/36 Incorporate agency best practices/Permitting enforcement and regulation.
    4. #18 How to maintain drainage infrastructure after it is built.
    5. #31 Annual meeting and communication of changes in regulations and policies.

8. Next Steps

- Draft Floodplain Management Plan Update 2020 – February 2020
- Committee and Public Review of Draft FMP – Feb/March 2020
- Public Meeting #2 February 13, 2020
- Update Completion Process
- Flood Control Advisory Board – March/April 2020
- Boards of Directors/Supervisors – June 2020

Second Draft: **Draft Committee Feedback: 2020 Floodplain Management Action Plan** **FCD2019C019** **Work Assignment #1** **30-Jan-20**

FMP RANKING	ID	Action	1 Public concerns for transportation	2 Partnerships for community investments	3 County-wide technical and education materials	4 Open space preservation / flood mitigation	5 Continue role as regional leader	Preventative	Property Protection	Natural Resource Protection	Emergency Services	Structural Projects	Public Information	FCDMC - PPM Division	FCDMC - Engineering Division	FCDMC - Operations & Maintenance Division	FCDMC - Floodplain Permitting Division	FCDMC - Executive Division or Ombudsman	FCDMC - Public Information and Outreach	Maricopa County Planning & Development	Maricopa County Department of Transportation	Partner Cities / Agencies
			2020 FMP Goals					Action Item Categories						Responsible Parties								
#1	**1**	Identify and categorize locations of risks and concern	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	2	Develop a matrix of prioritization	X	X		X	X	X	X	X	X	X	X	FCDMC to Identify Responsible Parties								
	3	Design and funding options	X	X		X		X	X	X	X	X	X									
	4	Establish triggers or warnings for areas to avoid	X	X			X	X			X		X									
	5	Additional cost sharing partnerships	X	X		X	X	X	X	X	X	X	X									
	6	Partnership with emergency services	X				X	X			X		X									
	7	Coordination with transportation agencies for crossing risks	X			X	X	X			X		X									
	8	Regular review cycle for funding status and community evaluation	X	X			X	X					X	FCDMC to Identify Responsible Parties								
	9	FCDMC to communicate availability of Federal funding	X	X		X	X	X		X	X	X	X									
	10	Funding based communication to the community	X	X			X	X					X									
	11	Develop definition of process and evaluation	X	X			X	X					X									
	12	IGAs for fiscal partners	X	X		X	X	X		X	X	X	X									
	13	Identifying additional physical locations for documents			X		X	X			X		X	FCDMC to Identify Responsible Parties								
	14	Combine technical resource materials with emergency service information	X	X	X		X	X			X		X									
	15	Utilities and points of contact for emergency response	m		X		X	X			X		X									
	16	Outreach to HOA's for flood preparedness and wash management		X	X		X	X	X				X									
	17	Characterization of acceptable vegetation within wash corridors		X	X	X	X	X	X				X									
#4	**18**	How to maintain drainage infrastructure after it is built	X	X	X	X	X	X	X	X	X	X	X									
	19	Illustrative literature and "how to" maintenance videos	X		X		X	X	X	X	X	X	X									
	20	Home and garden show booth to present and educate	X		X		X	X	X	X	m		X									
	21	Support check dams and water retention for recharge	X	X	X	X	X	X	X	X	X	X	X									
	22	Distribution of Green Infrastructure and Low Impact Development literature			X	X	X	X				X	X									
	23	Communicate / educate on adverse impacts of walls	X	X	X	X	X	X	X	X	X	X	m									
	24	Citizen rain gage program		X	X		X	X					X									
	25	Coordination and cooperation with Communities and Stakeholders	X	X		X	X	X	X		X		X	FCDMC to Identify Responsible Parties								
	26	Prioritization for areas poised for risk	X	X		X	X	X	X	X	X	X	X									
#2	**27**	Prioritize locations where floodplain delineations and re-delineations are needed	X	X	X	X	X	X	X	X	X	X	X									
	28	Additional identification of flood risks	X	X		X	X	X	X	X	X	X	X									
	29	Best practice for locations where recharge locations are best suited	X	X	X	X	X	X	X	X	X	m	X									
	30	Connectivity of open space	X	X	X	X	X	m		X	X	X	X									
#5	**31**	Annual meeting and communication of changes in regulations and policies	X	X	X	X	X	X	X	X	X	X	X	FCDMC to Identify Responsible Parties								
	32	Review current information and guidelines available					X						X									
	33	Define a review cycle for literature			X		X						X									
	34	Identify regulatory authority			X		X						X									
#3	**35**	Incorporate agency best practices	X	X	X	X	X	X	X	X	X	X	X									
	36	Permitting enforcement and regulation	X	X	X	X	X	X	X	X	X	X	X									
	37	Changes of Section 404 and protection of open space	X		X	X	X	X	X	X	X	X	X									

Legend: "X" denotes a majority vote by FMP Committee Members. "M" denotes a vote offered by an individual member of FMP Committee Member.
The FMP Committee tasked FCDMC with identifing the responsible parties.

Flood Control District of Maricopa County
2801 W. Durango Street
Phoenix, AZ 85009

FMP Committee Meeting No. 5

FLOODPLAIN MANAGEMENT PLAN 2020 UPDATE
SIGN-IN SHEET

Meeting #5:	Draft an Action Plan	**Meeting Date:**	Thursday – January 16, 2020
Facilitator:	Mark Fountain, Black & Veatch Corporation	**Place/Room:**	Cave Buttes Conference Room

Initial	Name	Title	Organization	Phone	Alternate Phone
BE	Brandon Espinoza	Development Services & Code-Compliance Officer	Town of Gila Bend	602-679-0355	Yes-
	Brian Cosson	ADWR NFIP and Flood Warning Coordinator	Arizona Department of Water Resources	602-771-8657	
DN	Dan Nissen	Sr. Civil Engineer	City of Peoria	623-773-7237	
DF	David Fritz	Engineering Branch Manager	Maricopa County Department of Transportation	602-506-2826	
	Ed Taylor	President - New River/Desert Hills Community Association	Citizen	602-739-1235	YES
	Gregory Arrington	Community Development Manager	Town of Youngtown	623-933-8286	
	Jesus Haro	Emergency Services Planner	Maricopa County Emergency Management		
KH	Kelly Hargadin	Engineering Project Manager	City of Glendale	623-930-3641	
	Ken Vonderscher	Planning and Development Manager	Maricopa County Parks and Recreation	602-506-9503	YES
	Kristin Tytler	Assistant Director/City Engineer	City of Surprise	623-222-6153	
	Lance Webb	Deputy Engineer	City of Mesa	480-644-2399	
	Liz Foster	Executive Director	Maricopa County Farm Bureau	480-635-3631	
	Lynn Whitman	Flood Control District Director	Yavapai County	928-771-3196	
	Mark Edelman	Planning and Engineering Manager	Arizona State Land Department	602-542-6331	

Flood Control District of Maricopa County
2801 W. Durango Street
Phoenix, AZ 85009

FMP Committee Meeting No. 5

Initial	Name	Title	Organization	Phone	Alternate Phone
MS	Mike Shelton	Floodplain Risk Map Coordinator	Arizona Department of Water Resources	602-771-8428	
SB	~~Noel Carter~~ STEVE BALESSE	Buckeye Water Conservation and Drainage District	Irrigation District & Electrical Districts Association	623-386-2196 (Main Office)	
NL	Nuning Lemka (backup)	Public Works Manager	City of Surprise	623-222-6148	
PT	Patti Trites	President of Southern Hills HOA, member of South Mountain Village Planning Committee	Citizen	402-213-7126	602-603-9033 X INTerest IN NEXT Meeting
	Pete Weaver	Emergency Management Coordinator	Town of Gilbert	480-503-6333	
	Randy Goettsche	Board Member Rio Verde Horsemen's Association	Citizen		
	Ray Dovalina	Assistant Public Works Director	City of Phoenix	602-534-5720	
	Robert Eroh	Project Engineer	City of Buckeye	623-349-6245	
	Rudy Perez	Emergency Services Planner	Maricopa County Emergency Management	602-273-1411	
S	Sam Patton	Project Manager Multimodal Planning Division Corridor Planning Group	Arizona Department of Transportation	602-712-6168	
S	Sami Korpelainen	Supervisor – Civil/Mechanical Engineering	Central Arizona Project	623-869-2631	
	Steve Trussell	Executive Director	Arizona Rock Products Association - ARPA	602-271-0346	
VS	Tice Supplee	Director of Bird Conservation	Audubon Society of Arizona	602-468-6470	
TC	Tom Condit	Development Engineer	Town of Gilbert	480-503-6815	
TE	Tom Ewers	Division Manager Plan Review	Maricopa County Planning & Development	602-506-7145	YES

Flood Control District of Maricopa County
2801 W. Durango Street
Phoenix, AZ 85009

FMP Committee Meeting No. 5

Initial	Name	Title	Organization	Phone	Alternate Phone
ALA	Tony Anguieira	Stormwater Engineer	YCFCD	928-771-5340	Will Particip
SBJ	Steven Bales Jr	Land Owner	Bales Hay Sales	623-386-2981	
MF	Mark Fountain	WR Planning Leader	B&V	602-381-4400	
JC	Joseline Castañeda	Planner	FCD	602-506-0503	
MMZ	Melody Zybert	Supervising Engineer	City of Mesa	480-644-5574	
TMM	Tim Murphy	Project Branch Manager	FCDMC	602-506-4605	
MAF	Mike Fulton	Director	FCDMC	602-506-4708	

Flood Control District of Maricopa County
Flood Control Advisory Board

Meeting Minutes October 23, 2019

Board Members Present: Hemant Patel, Chairman; DeWayne Justice, Richard Schaner; Gregg Monger; Kyle Tilghman; Ray Dovalina

Staff Members Present: Michael Fulton, Director; Angie Flick, Chief Administrator; Jean Rice, General Counsel; Kristine Rabe, Clerk of the Board

1) CALL TO ORDER

Chairman Patel called the meeting of the Flood Control Advisory Board (FCAB) to order at 2:00 p.m. on October 23, 2019.

2) PLEDGE OF ALLEGIANCE

The Pledge of Allegiance was recited.

3) APPROVE THE MINUTES OF JUNE 26, 2019 AND SEPTEMBER 25, 2019

ACTION: It was moved by Mr. Justice and seconded by Mr. Monger to approve the minutes as submitted. The motion carried unanimously, and the minutes were approved.

4) ACTION ITEM - ELECTION OF OFFICERS

Presented by Mr. Hemant Patel

The objective is to determine whether the advisory board should elect the officers nominated: Mr. DeWayne Justice, Chairman; Mr. Dick Schaner, Vice Chairman; and Mr. Gregg Monger, Secretary, for the period of November 2019 to October 2020 based on the slate recommended by the staff or open to the Board nominations for officers.

ACTION: Mr. Schaner moved to elect. Mr. Monger seconded the motion. The motion carried unanimously.

5) ACTION ITEM - APPOINTMENT TO THE FCAB STANDING COMMITTEES

Presented by Mr. DeWayne Justice

provide any flood control benefit. However, we are partnering with MCDOT to improve the channel conditions there.

In summary, we are recommending the Glendale storm drain project, two be deferred for further analysis and resubmittal and the Sun City West Canal Crossing project is not recommended. For the one project being recommended the approximate total project cost is $5,250,000 with the approximate total District cost of $2,100,000.

STAFF RECOMMENDS THE FOLLOWING ACTION: The Flood Control Advisory Board endorse and recommend that the Board of Directors approve the District Evaluation Committee's results for the Fiscal Year 2020/2021 Capital Improvement Program Prioritization Procedure.

ACTION: Mr. Dovalina made a motion to move for the recommendations to the CIP. Mr. Patel seconded the motion. The motion carried unanimously.

8) FLOODPLAIN MANAGEMENT PLAN 2020 UPDATE – PROCESS AND PLANNING COMMITTEE MEMBERS

Presented by Ms. Kelli Sertich, Policy, Planning, and Coordination Branch Manager

STAFF RECOMMENDS THE FOLLOWING ACTION: The Flood Control Advisory Board formally acknowledges the Floodplain Management Plan 2020 Update Process and Planning Committee as identified in Attachment A in the Board book.

Ms. Sertich stated that she would be giving a brief overview of what this process is. Maricopa County participates in the national flood insurance program and its community rating system (CRS) program. The CRS program is a like score card, like the Energy Star program, that grades the District, emergency management, planning development - the collective county agencies that deal in flood hazard mitigation - on all of the work that we do to keep the population safe from flooding. We are given a score based on a series of activities and it is 500 points for each step to move up in the system.

Currently, that score card has the County at a Class 4 (you start in the program at 10 and 1 is the highest). The Class 4 rating gives up to a 30% discount on flood insurance for residence in unincorporated Maricopa County who have purchased flood insurance. Then various cities that might participate in the CRS, their residents would get a discount in accordance at what class they are rated at.

In order to participate in these programs, there are certain requirements. Having a Floodplain Management Plan is one of these requirement to maintain the Class 4 rating. The District has had a Plan in place for years and it is required to be updated every five years and this is the exercise we are going through right now. The Floodplain Management Plan communicates an overall strategy of all of our programs and projects

and the different measures that the District and others do that help to mitigate flood risks, whether it is through education or building structures. The Plan committee will also help identify remaining flood hazards for unincorporated county.

The Federal program has a specific process to follow. The first step is to establish a planning committee. The planning committee will participate in five workshops where they have specific exercises that must be done following this guidance as we work through this process. We will also hold three public meetings, one at the beginning of the process, which is scheduled for Monday, November 4, so that we can start getting input from folks beyond the committee. The meeting will be held at the District and there is information on our website as well as a survey for those that cannot attend the meetings in person. We will also hold a public meeting in the middle of the process when we have a draft document, and one again at the adoption process. We are going to look at the possibility of holding more meetings around the county but please understand that we will probably have to use social media as much as possible to inform the public about this process and document.

Then we will come before the FCAB in March April of next year for endorsement of the Floodplain Management Plan. Once approved, then the adoption of the Plan by the County Board of Supervisors and Flood Control District Board of Directors will be in June 2020.

We last updated the Floodplain Management Plan in 2015 and as I've noted there is a very specific process that we must follow from the CRS User's Manual that has a 10 step process we are following. The first step is of the plan is conducted through a planning committee. The manual suggest certain members such as building officials and emergency management. This committee is helping us to identify and prioritize our flood hazard problems and potential solutions.

For the 2020 Plan update we have established this committee. Earlier this year, the District Director, Michael Fulton, sent out an email explaining the purpose of the Floodplain Management Plan, the commitment from those volunteering, and meeting dates to all of our cities and towns in Maricopa county, select county agencies, state agencies, federal agencies, as well as many organizations that we deal with regularly for flood mitigation, and then some members of the general public from key areas in unincorporated county where there is a larger population.

This County is very large so it's hard to try and bring the 300,000 to 400,000 people in unincorporated county to the table to help us shape this Plan. We have tried to get as broad a range as possible through organizations with the hope that they will then take the message back to the membership and help spread the word on the process and also bring feedback back to us from the group.

This committee consists of the following: representation from nine of our 25 cities and towns in Maricopa County, five county agencies including the District and one other Arizona county, because water doesn't respect political borders. There are three state agencies, five other associations and organizations such as the Farm Bureau, CAP, in the Audubon Society, and then we have three private citizens representing the Laveen/South Mountain, New River, and Rio Verde areas. Ms. Sertich stated that they had a good first meeting and they are looking forward to the input from the committee as we progress.

STAFF RECOMMENDS THE FOLLOWING ACTION: It is moved that the Flood Control Advisory Board acknowledges the Floodplain Management Plan 2020 Update Process and Planning Committee Members as identified in Attachment A (in Board book).

ACTION: Mr. Schaner made a motion to move to acknowledge the Floodplain Management Plan 2020 Update Process and Planning Committee. Mr. Patel seconded the motion. The motion carried unanimously.

Appendix C

Public and Stakeholder Involvement

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Flood Control District
of Maricopa County

PUBLIC NOTICE

Published in Arizona Business Gazette on October 10th and October 24th

The Flood Control District of Maricopa County (District) administers the National Flood Insurance Program's (NFIP) Community Rating System for unincorporated Maricopa County. As part of the program, the District is updating its 2015 Floodplain Management Plan (FMP). The plan identifies flood hazards in the community, sets goals, and recommends a program of activities to address the county's vulnerability to flooding. It also addresses public education about loss reduction measures and the beneficial functions of floodplains to reduce flood hazards within the county.

We welcome your input. A public open house has been scheduled at the Flood Control District of Maricopa County's Office:

Floodplain Management Plan 2020 Update
Monday, November 4, 2019
3:00 PM to 6:00 PM
Adobe Conference Room
2801 W. Durango Street, Phoenix, AZ 85009

The 2020 FMP is a 5-year plan that will serve as a road map for addressing flooding issues in unincorporated Maricopa County. You are welcome to stop in any time during the open house to discuss:

- The plan's development process
- Any flooding issues you may have and/or concerns that should be included in developing the plan
- Preliminary assessment of problems

Floodplain Management Plan 2020 Update Public Meeting No. 1

Kelli Sertich, AICP, CFM – Policy, Planning & Coordination Branch Manager, *FCDMC*

November 4, 2019

Floodplain Management Plan
2020 Update - Public Meeting
Nov 4, 2019

Flood Control District of Maricopa County
2801 W. Durango Street
Phoenix, AZ 85009

Name	Title	Organization	Phone
Joe Wagner	Mapping Survey	FCD	602 506 2203
ARVID VEDMARK	RESIDENT	MOONVALLEY	602 694 2841
Donna Cawthon			602-944-8170
TED ANGUS	Resident	Self	805-539-7694
ERIC MEYEROWITZ	RESIDENT	MARION ESTATES	310-739-3966
F.W. BELLAMAK	RESIDENT	MARION ESTATES	602-799-1103
Matt Hann	WR Engineer	B+V	602-381-4445
MARK FOUNTAIN	WR PLANNING	B+V	602-381-4430
MERLE SCHWEBKE	RESIDENT		815-236-4439
DAVE SCHWEBKE	RESIDENT		815-245-4107
RON FANNIN	RESIDEND		602-920-7210
ARTURO SARACHU	RESIDENTS		(602) 373-2132
JOE TORRES	"		602-243-3495
Jennifer Rouse	President	Maryvalle Estrella Mountain Community Alliance	602-488-2933

Q1 Describe any flooding hazards or drainage problems that occur in your area

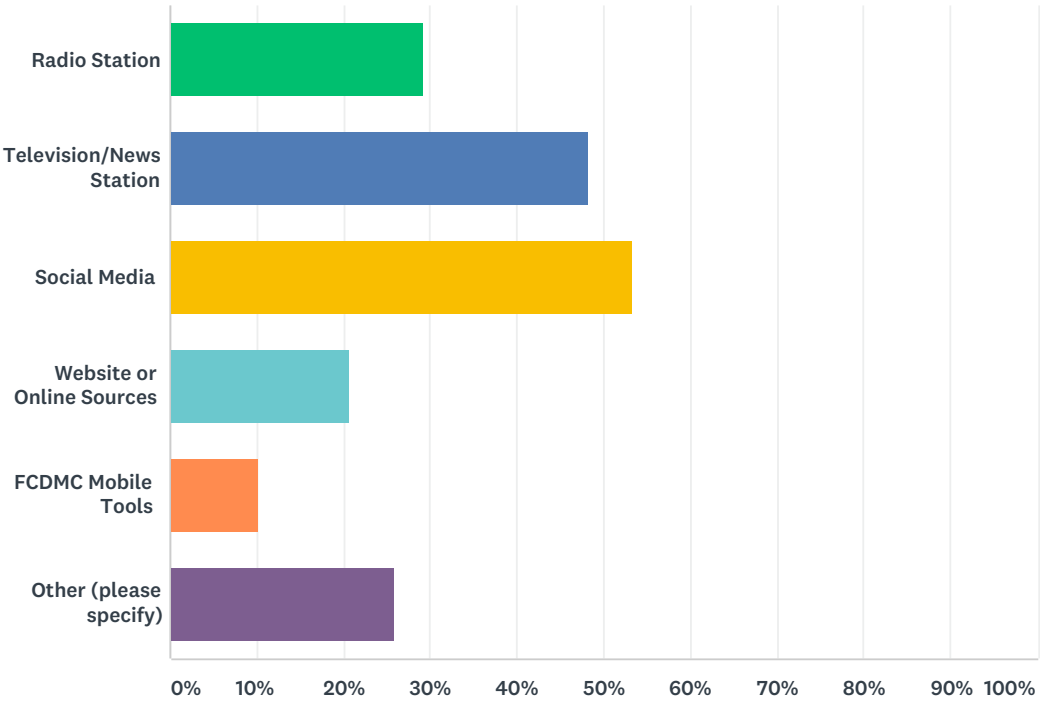
Answered: 44 Skipped: 15

#	RESPONSES	DATE
1	Flash flooding Roads out Homes flooded Homes built below basins	12/6/2019 1:31 AM
2	North Valley Parkway between Dixileta and Sonoran Desert Drive floods every time it rains in 85085.	12/3/2019 2:59 AM
3	The parks fill up and then it runs into the desert	12/2/2019 9:45 PM
4	Living at the base of a mountain, storm waters flow though my property. We have diverted the flow so that it goes around our pool however last month our neighbors build a garage (without proper permitting or draining and grading review) and now we are experiencing new problems.	12/2/2019 7:04 PM
5	North Valley Pkwy by Madison Granite	12/2/2019 3:45 PM
6	The road on N. Valley Parkway floods and the gates close. We have problems getting our kids to school.	12/2/2019 2:34 PM
7	Roadways	12/2/2019 2:16 PM
8	The street on gets a little over filled with water	12/2/2019 2:02 PM
9	Happy Valley at 47th Avenue floods in the westbound lanes with any significant rain. 43rd Avenue from Pinnacle Peak to Happy Valley floods all across the roadway during storms.	12/2/2019 12:52 PM
10	None	12/2/2019 12:48 PM
11	North valley pkwy shuts down every time it rains. With all of the construction and new builds in our area not only is it ridiculous to still only have 2 lanes having to drive 30 min out of the way to get home is difficult especially in the rain. Dixeleta is still not a street, there is no entrance back onto the 17 north from there so when the road floods you have to turn around and drive back down to jomax.	12/2/2019 12:47 PM
12	North Valley Parkway	12/2/2019 9:05 AM
13	None	12/2/2019 5:25 AM
14	North, Norterra Parkway floods by Granite mine. 7th Street floods by the FBI building.	12/2/2019 5:25 AM
15	North Valley Parkway has a spot between Melvern Trail and Sonoran Desert Drive that floods when it rains. There is a gate that is closed when it floods, but the road has become essential as the area grows. More houses, apartments, and retail are being built every year. The road needs to be reconstructed so that it doesn't flood.	12/2/2019 5:08 AM
16	Poor drainage on 55th ave between happy valley and pinnacle peak (highly traveled for school access)	12/2/2019 5:07 AM
17	Flooding in our backyard and greenbelt	12/2/2019 5:06 AM
18	We were in the path but the dam was built that changed our risk	12/2/2019 5:03 AM
19	67th ave South of Happy Valley floods. Jomax & 67th ave will often flood also.	12/2/2019 5:03 AM
20	North Valley Parkway - Closed when rains due to flood - We can't travel north or south ... its a pain	12/2/2019 5:00 AM
21	67th Ave continually floods between Jomax Ave and Mountain Ridge HS	12/2/2019 4:47 AM
22	I know Sandra Day O'Connor HS has dealt with flood damage a few times over the last 5 to 6 years.	12/2/2019 4:32 AM
23	Sometimes during heavy storms, neighboring lots overflow onto mine, overwhelming my drainage.	11/18/2019 9:59 AM

24	We live in the desert with minimal engineering to control flooding. I know other people in the area have had problems/damage from debris in washes. We, personally, need to fix a driving path that gets washed out infrequently, but understand that we will have more inconveniences living in a rural area and hope to keep it that way.	11/4/2019 11:57 PM
25	There is a drainage ditch that runs along side are home. It's not large enough and overflows to the other side of our house and often times in our house.	11/4/2019 2:10 PM
26	summer 2018 - flooding in Fairview Place district (16th Ave & McDowell). City is well aware of the issues (lack of drainage intake grates, problem with McDowell Rd being at a higher grade than the intersecting streets).	11/2/2019 9:50 PM
27	N/A	11/2/2019 4:51 AM
28	Large washes running during storms, main road in and out can be impassable. Only one road in RV foothills area	11/2/2019 4:27 AM
29	All water flows exactly where it needs to, on to & off of, our property.	10/31/2019 11:58 PM
30	South 10 ave between Buist st and Dobbins rd 85041 . Can the rain drain problem on 10 ave be improved?	10/31/2019 9:01 PM
31	Rio Verde Drive west of 136th street has a couple of washes that flood if there is a very heavy rainfall.	10/31/2019 7:23 PM
32	I live near the North Mountain Preserve, so my neighborhood is quite hilly. The water rushes down the street because we have no gutters and settles in front of my house. It slowly drains away, but because of the puddling in front of my house it leaves an enormous amount of dirt and debris behind.	10/31/2019 3:21 AM
33	Irrigation canals on Dobbins Rd. 19th, & 27th avenues. And landscaped areas on West Vineyard & 19th ave.	10/31/2019 1:49 AM
34	South of Baseline 19th ave to 51st ave	10/31/2019 1:01 AM
35	I live in Moon Valley. North of Thunderbird on Canterbury Dr. there are 2 wash crossing east to west, during rains these both back up due to sediment build up on the golf course where the washes drain into the golf course, these crossings can get 2-4' deep and are a huge safety risk. When both are flooded residence are trapped between the washes. Could these become box culverts? Also, north of Thunderbird on 7th street a natural wash drains onto 7th street and floods the roadway, new drainage pipes need installed to connect this to the wash at Roberts Rd.	10/30/2019 9:46 PM
36	low flow crossings where washes can run for hours or days and there is no access for residents to return or leave home	10/29/2019 8:18 PM
37	Washes and flash floods	10/28/2019 4:18 PM
38	Biggest potential for flooding I see is when the storm sewers are blocked by leaves along the streets.	10/26/2019 1:05 PM
39	none other than occasional street flooding when a lot of rain in a short amount of time -	10/26/2019 3:01 AM
40	163rd pretty much from Dynamite on up, with side roads like Dynamite and Peakview (the only way I can get home) becoming impassible on the rare occasion. The washes can run often but it doesn't take long for them to die down - unless it does and we're all spending the afternoon parked along 163rd getting to know each other...	10/25/2019 8:39 PM
41	Roadway flooding is probably the worst problem.	10/25/2019 2:49 PM
42	Washes in area seem to be carrying more water with the development that has occurred in the area	10/25/2019 2:55 AM
43	Flash flooding; water filling roads topping over sidewalks; homes flooding; new developments displacing water causing flooding in surrounding areas; South Mountain tributaries overpowering neighborhoods.	10/24/2019 10:19 PM
44	Widespread flooding of rural dirt roads. Occasional closure of arterial roads due to at-grade crossings.	10/24/2019 9:10 PM

Q2 How do you receive information about flooding? Check all that apply

Answered: 58 Skipped: 1

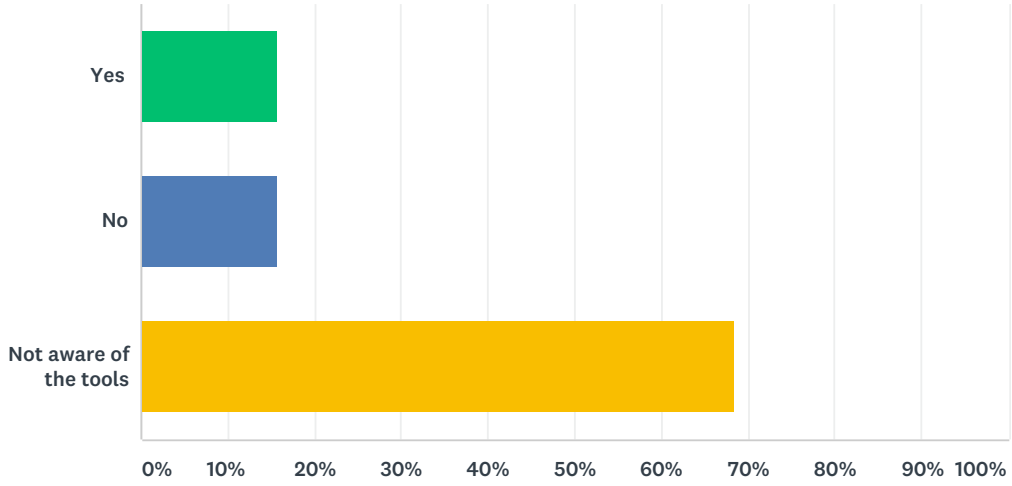


ANSWER CHOICES	RESPONSES	
Radio Station	29.31%	17
Television/News Station	48.28%	28
Social Media	53.45%	31
Website or Online Sources	20.69%	12
FCDMC Mobile Tools	10.34%	6
Other (please specify)	25.86%	15
Total Respondents: 58		

Other (please specify):
We usually find out about it when we drive up to it
City of Surprise Neighborhood alerts
word of mouth
phone alerts, weather apps, radar apps.
Weather Service alerts
Neighbors
Rio Verde Horsemans Association
We don’t receive any information
If driving, on the radio or road signs. Otherwise, only after the fact on the news websites. Emergency Notifications on Phone
Mortgage lender underwriting
Text from others driving in the area
No notice! Road closures are not even identified until you are at the closed area.
I usually just have to drive up to the road
HOA

Q3 Have you used the District's Mobile Tools (Alert.fcd.maricopa.gov) to track storms/flooding?

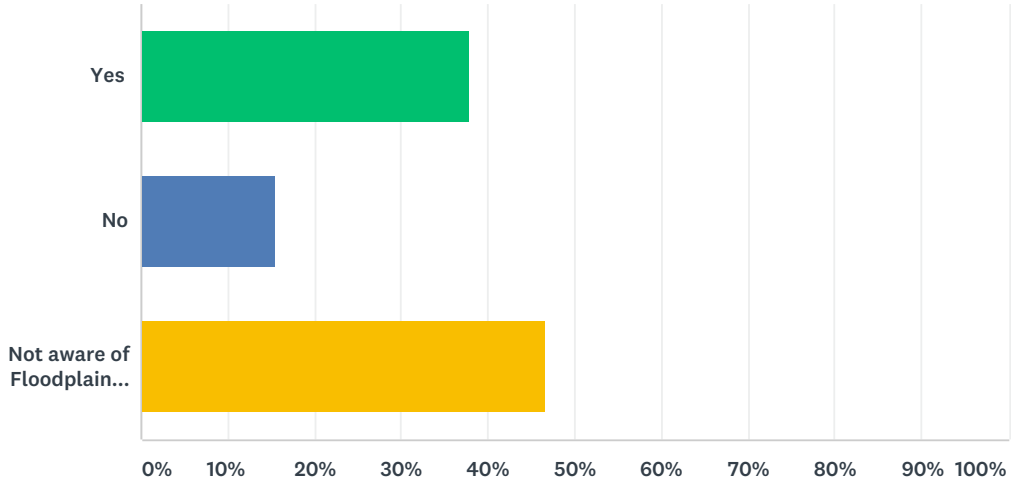
Answered: 57 Skipped: 2



ANSWER CHOICES	RESPONSES	
Yes	15.79%	9
No	15.79%	9
Not aware of the tools	68.42%	39
TOTAL		57

Q4 Have you used the Floodplain Viewer on the District's website to check if your home is in a FEMA designated floodplain?

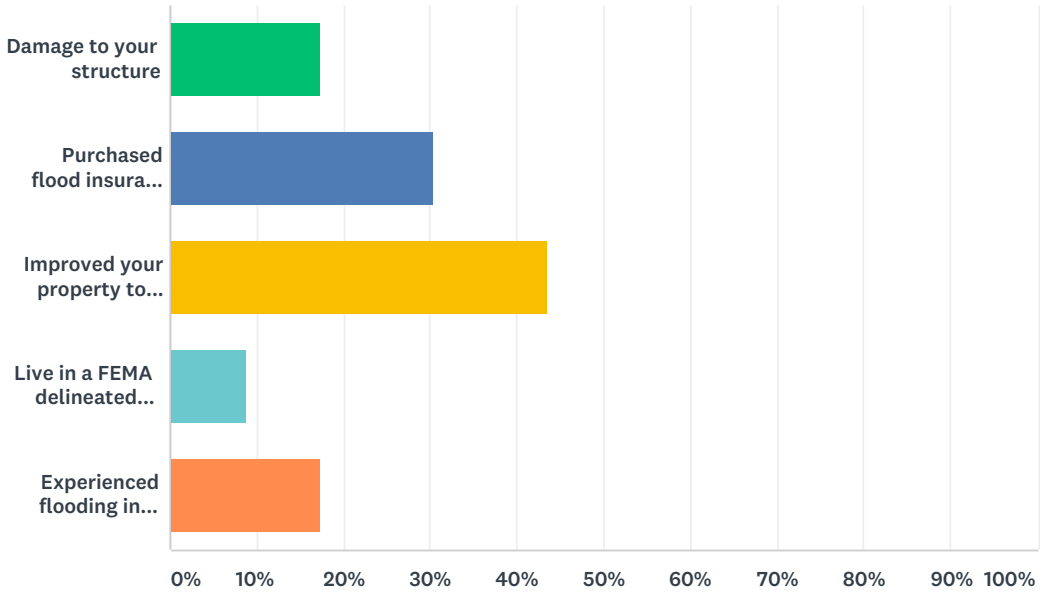
Answered: 58 Skipped: 1



ANSWER CHOICES	RESPONSES	
Yes	37.93%	22
No	15.52%	9
Not aware of Floodplain Viewer	46.55%	27
TOTAL		58

Q5 Check all that apply

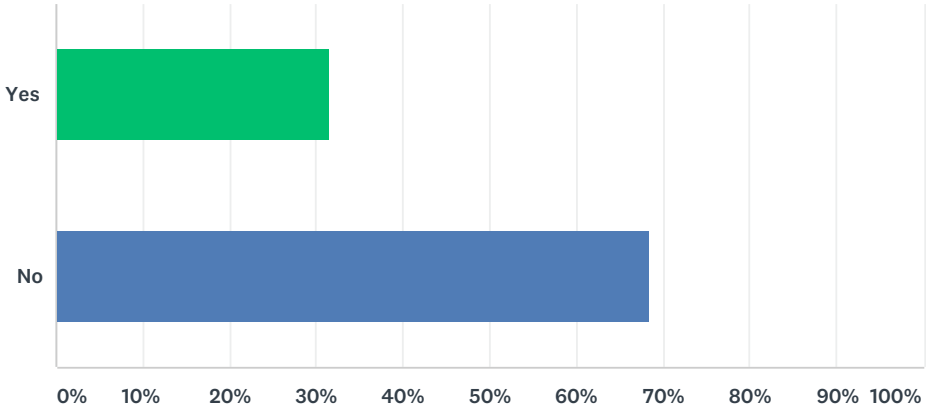
Answered: 23 Skipped: 36



ANSWER CHOICES	RESPONSES	
Damage to your structure	17.39%	4
Purchased flood insurance for structures	30.43%	7
Improved your property to prevent flooding	43.48%	10
Live in a FEMA delineated floodplain	8.70%	2
Experienced flooding in your home (photos can be uploaded to Report-a-Flood)	17.39%	4
Total Respondents: 23		

Q6 Have you ever been stranded trying to leave or return from home due to flooding?

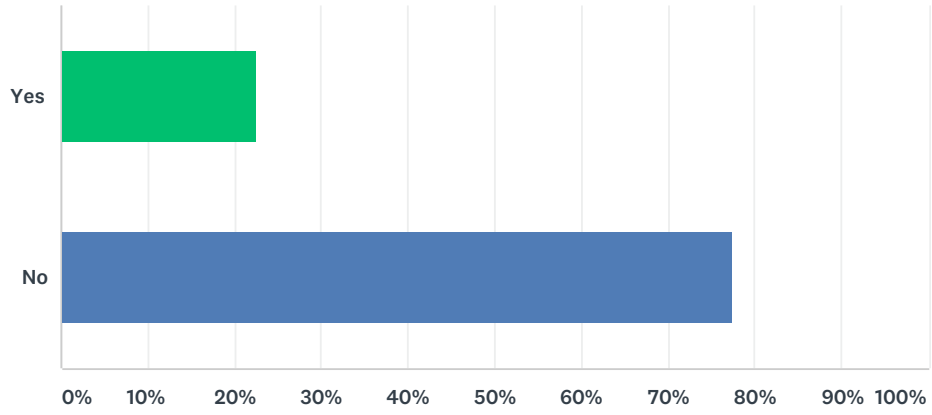
Answered: 57 Skipped: 2



ANSWER CHOICES	RESPONSES	
Yes	31.58%	18
No	68.42%	39
TOTAL		57

Q7 Have emergency services in your area been delayed due to flooding?

Answered: 53 Skipped: 6



ANSWER CHOICES	RESPONSES	
Yes	22.64%	12
No	77.36%	41
TOTAL		53

Q8 Is there anything else you would like us to know to help shape the Floodplain Management Plan?

Answered: 16 Skipped: 43

#	RESPONSES	DATE
1	Get North Valley Parkway a damn bridge already!!	12/2/2019 3:45 PM
2	No	12/2/2019 12:48 PM
3	There are so many new communities north of Norterra. We need the roads and infrastructure to support that and having a big flood plane right in our path is not only a hassle but a danger to the residents	12/2/2019 12:47 PM
4	fix north valley parkway north of dixilleta! by city of phoenix waste transfer plant Horrible for us 85085 residents	12/2/2019 5:00 AM
5	Although I haven't been stranded by flooding, one time I had to drive approximately 40 additional miles to get around flooding on McDowell Mountain Road between Fountain Hills and Rio Verde, north of the park entrance.	11/4/2019 11:57 PM
6	there needs to be more funding for small improvement projects and also policy about cleaning of storm drains during monsoon season.	11/2/2019 9:50 PM
7	With all the large developments going in it seems the way the washes run is being altered. Individual home owners have no influence compared to big developers with deep pockets.	11/2/2019 4:27 AM
8	When we moved in to our house in 2010, it was not in the flood plain. Then the flood plain changed & we are forced to buy insurance, which doubled our premium. Our house was built in 1999 & has never flooded.	10/31/2019 11:58 PM
9	Can any thing be done to improve problem?	10/31/2019 9:01 PM
10	FEMA requires me to pay for flood insurance in the event of a 100 year flood. A total rip-off. My yard couldn't flood as it is on a pretty steep plain.	10/31/2019 7:23 PM
11	Not at this time.	10/31/2019 1:49 AM
12	With new home developers in the Laveen area please make them and buyers aware of potential flooding areas	10/31/2019 1:01 AM
13	please remove washes draining onto roadways. thank you.	10/30/2019 9:46 PM
14	When the floodplain map is suddenly updated to include a property that was not previously on the floodplain map 1) the property owner would appreciate notice and 2)the property owner would like some assistance in securing an elevation map...	10/25/2019 8:39 PM
15	Coordinate with the City of Phoenix PRIOR to new development being built. Huge gap between FCD and COP Planning.	10/24/2019 10:19 PM
16	development seems to change the character of flooding events so it is hard to avoid minor damage.	10/24/2019 9:10 PM

Maricopa County, AZ

maricopa.gov/Calendar.aspx?EID=2118

Apps | Black & Veatch Acc... | B&V Manager | Dam Safety | FCDMC | Dads and Daughters | HomeBillings | JC Ref | Wittmann ADMSP | T2S | Other bookmarks

MARICOPA COUNTY

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Event Details

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Floodplain Management Plan 2020 Update - Public Meeting #2

Thursday, February 13, 2020

The Flood Control District of Maricopa County (District) invites you to attend an open house from 3 - 6 PM to learn about the Floodplain Management Plan (FMP) 2020 Update prepared for the unincorporated areas of the County. This meeting is your opportunity to learn about the process for developing the plan, its findings and recommendations and to ask questions about the plan. Participants can submit comments for review and consideration for possible modifications to the plan. The District administers the National Flood Insurance Program's Community Rating System for unincorporated Maricopa County. As part of the program, the District is updating its 2015 plan. This plan focuses on unincorporated areas and identifies flood hazards, sets goals and recommends a program of activities to address the County's vulnerability to flooding. It also addresses public education about loss reduction measures and the beneficial functions of floodplains to reduce flood hazards within the County.

Date:	February 13, 2020
Time:	3:00 PM - 6:00 PM
Location:	Adobe Conference Room (View Facility)
Address:	2801 W. Durango Street Phoenix, AZ 85009
Link:	Your feedback is important, please take a minute to fill the Citizen Survey.

Select Language

Hann, Matthew

From: Tim Murphy (FCD) <Tim.Murphy@Maricopa.Gov>
Sent: Wednesday, February 12, 2020 6:01 PM
To: reroh@buckeyeaz.gov; khargadin@glendaleaz.com; Lance Webb; dan.nissen@peoriaaz.gov; ray.dovalina@phoenix.gov; kristin.tytler@surpriseaz.gov; nuning.lemka@surpriseaz.gov; bespinoza@gilabendaz.org; Tom.Condit@gilbertaz.gov; Pete.Weaver@GilbertAZ.gov; GArrington@youngtownaz.org; Rudy Perez (EMG); Jesus Haro (EMG); Ken Vonderscher (PRK); Tom Ewers (PND); David Fritz (DOT); spatton@azdot.gov; btcosson@azwater.gov; meshelton@azwater.gov; medelman@azland.gov; skorpelainen@cap-az.com; steve@azrockproducts.org; tsupplee@audubon.org; ncarter@bwcdd.com; lynn.whitman@yavapai.us; lizfoster@azfb.org; pattihoash@gmail.com; etaylo855r@live.com; randygoettsche@gmail.com; tweter@gilabendaz.org; Sydney Stauffer; Gregg.Monger@cemex.com; NSmart@youngtownaz.org; Elise Moore (elise.moore@phoenix.gov)
Cc: Michael Fulton (FCD); Kristine Rabe (FCD); Fountain, Mark; Hann, Matthew; Lisa Blyler (FCD); Kim McMahon (FCD); Ellen Spielman (FCD)
Subject: Public Meeting #2 - Floodplain Management Plan (2-13-2020, 3:00 - 6:00 PM, 2801 W Durango St)

All,

Just a reminder that 2nd Public Meeting will be on 2/13/2020 from 3:00 – 6:00 PM in the Adobe Conference Room at the Flood Control District (2801 W Durango St, Phoenix, AZ). The Adobe Conference Room is in the main building.

The meeting will be Open House style. We will have exhibits displaying the Goals and Action Items developed by the Floodplain Management Plan Committee. Members of the Consultant's Team will be available for questions, as well as Flood Control District staff. During this meeting we will be collecting comments that people may have so far, and there will also be an opportunity in the future to provide comments.

We have been working on updating the web site for the Floodplain Management Plan 2020 Update. The Meeting Notes and Presentations for all 5 of the Committee meetings is now available on the web site. Additional information will be added as it becomes available.

The web address for the Floodplain Management Plan is, https://www.maricopa.gov/5423/Floodplain-Management-Plan-2020-Update.

If you can't make it to the Public Meeting you can submit comments to me by email anytime. Also, there will be additional announcements on future opportunities to review and comment on the Process, Goals, and Plan.

Tim Murphy, P.E., CFM
Project Management Branch Manager

Flood Control District of Maricopa County
2801 W Durango St, Phoenix, AZ 85009
(O) 602-506-4605 (F) 602-506-8561
Tim.Murphy@maricopa.gov
www.fcd.maricopa.gov

How are we doing? Click here to leave your feedback

Public Meeting No. 2 – 2020 Floodplain Management Plan for Unincorporated Maricopa County

Michael Fulton – Director, *FCDMC*

Tim Murphy, PE, CFM– Project Management Branch Manager, FCDMC

Mark Fountain, PE, CFM – *Black & Veatch*

February 13, 2020

When we continue to

Think • Plan • Act

we will achieve **Zero Injuries Today**

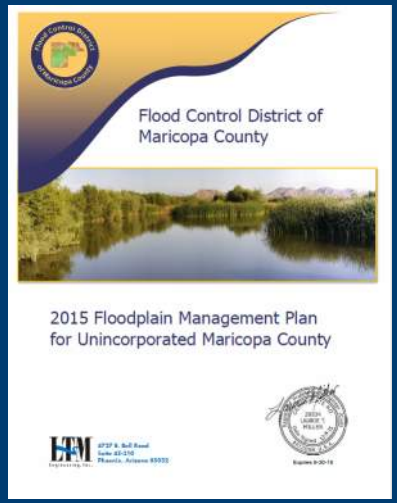
Image Source: ksl.com (Photos by Dennis Slavensky)

Safety Moment

- **Recreation Safety & Flash Flood Hazards**
  - Don't get caught!
    - Know the risks and have a plan.
    - Know the weather conditions in and around your location.
    - Don't camp or park in danger zones.
  - Have a backup plan in case weather changes.
  - Make sure children understand risks and what to do in case of flooding.
  - Abandon your possessions and seek high ground in emergency situations.

Floodplain Management Plan 2015 Reference

- NFIP Community Rating System:
  - Unincorporated MC = Class 4 Community
  - FMP Update Required (Committee*)
  - 5-year Update Cycle
  - Annual Program Review
- 2015 FMP Update (Reference)
  - Update Completed August 2015 – LTM Engineering, Inc.
  - Agenda Item C-69-16-012-6-00 (Nov 18, 2015)
  - Adopted - Board of Directors Resolution FCD2016R001
  - Final Sealed Product: December 8, 2015



Floodplain Management Plan (FMP) Update 2020 Process

- What does the FMP do?
  - Identify Hazards
  - Understand Problems Caused by Hazards
  - Set Goals
  - Develop/Evaluate Potential Actions
  - Prepare five-year Plan
  - Implement the Plan
    - Annually Monitor Progress

Floodplain Management Plan (FMP) Update 2020 Process

- How did the 2020 Update do it?
- Five Committee Workshops
  - Hosted at FCDMC Campus
  - October 3, 2019
  - October 24, 2019
  - November 14, 2019
  - December 5, 2019
  - January 16, 2020
- Two Public Meetings
  - November 4, 2019
  - February 13, 2020

Floodplain Management Plan (FMP) Update 2020 Committee Participants

- Arizona Department of Transportation
- Arizona Department of Water Resources
- Arizona Rock Products Association
- Arizona State Land Department
- Audubon Society of Arizona
- Irrigation and Electrical Districts Association
- Central Arizona Project
- City of Buckeye
- City of Glendale
- City of Mesa
- City of Peoria
- City of Phoenix
- City of Surprise
- Town of Gila Bend
- Town of Gilbert
- Town of Youngtown
- Three Maricopa County Residents
- Maricopa County Department of Emergency Management
- Maricopa County Parks and Recreation
- Maricopa County Planning and Development
- Maricopa County Department of Transportation
- Maricopa County Farm Bureau
- Yavapai County Flood Control District

Floodplain Management Plan (FMP) Update Meeting Framework

- Meeting 1 - Engagement
  - Committee Introductions
  - Featured District Presentations
  - Roadmap of Meetings
- Meeting 2 – Planning Process
  - Review of 8 FMP Watershed (Breakout Exercise)
    - Large Plots / Worksheet / Identify Hazards
  - Participants Draft Definition of "Flood Threat"
  - Group Discussion of Flood Hazards

Floodplain Management Plan (FMP) Update Meeting Framework

- Meeting 3 – Set Goals
  - Draft Flood Threat Definitions (Five Options)
  - Summary of Flood Hazards
  - Discussion of Hazards by Watershed
  - Discussion of Potential 2020 FMP Goals

Summary of Flood Hazards by Watershed Reference : FMP_Meeting#3_Committe11.14.19

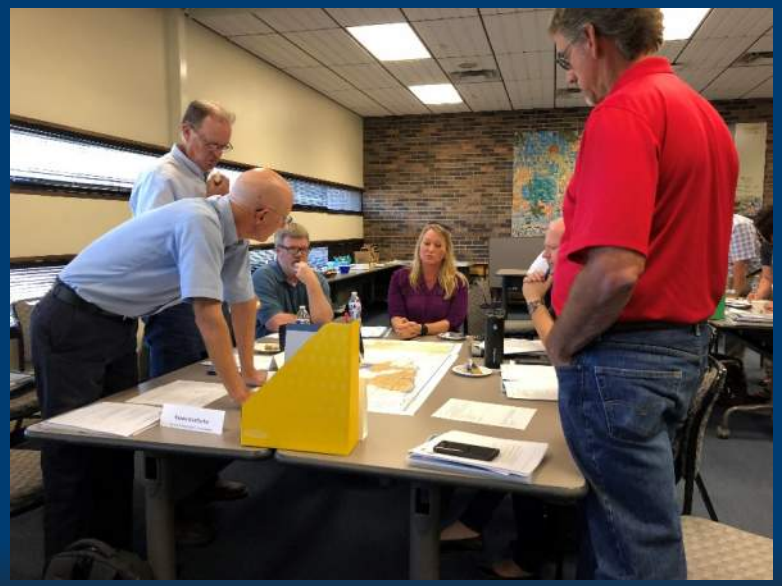
- Group 1 – **Agua Fria River Watershed**
- **Key Hazards**
  - **Alluvial Fans**
  - **Wildcat Development**
  - **CAP Canal (U/S Ponding)**
  - **Inactive Mine (New River)**
  - **Tailwater**
  - **Local / Urban Flooding**
  - **Unmaintained Drainage Facilities**

Summary of Flood Hazards by Watershed Reference : FMP_Meeting#3_Committe11.14.19

- Group 2 – **Cave Creek/Salt River and Verde River Watersheds**
- **Key Hazards (Verde)**
  - **Repetitive losses on roadways**
  - **Head-cutting of roadways and banks**
  - **Single-lot development (hardscapes/un-natural)**
- **Key Hazards (Cave Creek/Salt River)**
  - **Street flooding**
  - **Building below street grade**
  - **Outdated infrastructure feeding canals**
  - **Multiple jurisdictions**
  - **No areas of impoundment**
  - **Hardscaped surfaces prevent infiltration**
  - **Action – Build more storm sewers**

Summary of Flood Hazards by Watershed Reference : FMP_Meeting#3_Committe11.14.19

- Group 3 – **Gila River/Queen Creek Watersheds**
- **Key Hazards**
  - **Public safety**
    - **Hospitals / Emergency Services / Critical Facilities**
  - **Flash flooding and transportation**



Summary of Flood Hazards by Watershed Reference : FMP_Meeting#3_Committe11.14.19

- Group 4 – **Centennial Wash and Hassayampa River Watersheds**
- **Key Hazards**
  - **Limited infrastructure**
  - **At-grade crossings contribute to transportation flooding**
  - **Large areas of development**
  - **Management of alluvial fans (Hassayampa)**

Summary of Flood Hazards by Watershed Reference : FMP_Meeting#3_Committe11.14.19

- Group 5 – **Lower Gila River and Waterman Wash Watersheds**
- **Key Hazards**
  - **Gila Bend – areas of risk not within SFHA**
  - **Major flood events on Gila River**
  - **Split flow in Hassayampa and Centennial Tributaries**
  - **At-grade crossings**
  - **Single-lot developments**
  - **Suburban-urban interface**
  - **Tamarisk**
  - **Wildlife areas**

Summary of Flood Hazards by Watershed Reference : FMP_Meeting#3_Committe11.14.19

- Additional Hazards – Not identified elsewhere
  - **Urban Redevelopment and Densification**
  - **Subsidence and Fissures**
  - **Block Walls / Property Fences**
  - **Fill in Washes (Vegetative / Earthen)**
  - **Flood Warning Signage**
  - **Depth Gauges**

Floodplain Management Plan (FMP) Update Meeting Framework

- Meeting 4 – Review Possible Activities
  - Proposed Flood Threat Definition (5→3→1)
    - Review / Edit / Concurrence by Committee
  - Review of Potential 2020 FMP Goals
  - Discussion of Possible Activities

Floodplain Management Plan (FMP) Update Meeting Framework

- Meeting 5
  - Review of Online FMP Survey Results
  - Final FMP Flood Threat Definition
  - Review of Committee Meetings
  - Review of Goals and Assignment of Possible Activities

Definition of Flood Threat – FMP 2020

Potential risk to life, property, environment, economy, structures, or infrastructure anticipated from a flood event which causes interruptions to a normal operating condition or way of life.

Recommend Action Items by Category Reference : FMP_Meeting#5_Committe1.16.20

- Preventative
- Property Protection
- Natural Resource Protection
- Emergency Services
- Structural Projects
- Public Information

NFIP CRS: Series 500, Activity 510, Figure 510-4

Step 7 Categories

- Preventive measures (e.g., codes)
- Property protection (e.g., elevation)
- Natural resource protection
- Emergency services
- Structural flood control projects
- Public Information

Also see Figure 510-4.

1. **Preventive** activities keep flood problems from getting worse. The use and development of flood-prone areas is limited through planning, land acquisition, or regulation. They are usually administered by building, zoning, planning, and/or code enforcement offices.
   - Floodplain mapping and data
   - Open space preservation
   - Floodplain regulations
   - Erosion setbacks
   - Planning and zoning
   - Stormwater management
   - Drainage system maintenance
   - Building codes
2. **Property protection** activities are usually undertaken by property owners on a building-by-building or parcel basis.
   - Relocation
   - Acquisition
   - Building elevation
   - Retrofitting
   - Sewer backup protection
   - Insurance
3. **Natural resource protection** activities preserve or restore natural areas or the natural functions of floodplain and watershed areas. They are implemented by a variety of agencies, primarily parks, recreation, or conservation agencies or organizations.
   - Wetlands protection
   - Erosion and sediment control
   - Natural area preservation
   - Natural area restoration
   - Water quality improvement
   - Coastal barrier protection
   - Environmental corridors
   - Natural functions protection
4. **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.
   - Hazard threat recognition
   - Hazard warning
   - Hazard response operations
   - Critical facilities protection
   - Health and safety maintenance
   - Post-disaster mitigation actions
5. **Structural projects** keep flood waters away from an area with a levee, reservoir, or other flood control measure. They are usually designed by engineers and managed or maintained by public works staff.
   - Reservoirs
   - Levees/floodwalls
   - Diversions
   - Channel modifications
   - Storm drain improvements
6. **Public information** activities advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains. They are usually implemented by a public information office.
   - Map information
   - Outreach projects
   - Real estate disclosure
   - Library
   - Technical assistance
   - Environmental education

Floodplain Management Plan 2020 Goal #1 and Action Items

The District will work with transportation agencies and the communities to address public concerns on transportation routes that result in interruptions to normal operating conditions, delays of emergency services, negatively impact the economy, or pose safety risks due to flooding.

ACTION ITEMS

- *Identify and categorize locations of risks and concerns.*
- *Develop a matrix of prioritization.*
- *Design and funding options.*
- *Establish triggers or warnings for areas to avoid.*
- *Additional cost sharing partnerships.*
- *Partnership with emergency services.*
- *Coordination with transportation agencies for crossing risks.*

Goals and Action Items developed by Floodplain Management Plan 2020 Committee

Floodplain Management Plan 2020 Goal #2 and Action Items

The District shall work in partnership with stakeholders to evaluate its various programs, fiscal opportunities, and funding processes to assure funds continue to be invested back into the communities.

ACTION ITEMS

- *Regular review cycle for funding status and community evaluation*
- *FCDMC to communicate availability of Federal funding*
- *Funding based communication to the community*
- *Develop a definition of process and evaluation*
- *Intergovernmental Agreements for fiscal partners*

Goals and Action Items developed by Floodplain Management Plan 2020 Committee

Floodplain Management Plan 2020 Goal #3 and Action Items

The District shall work with stakeholders and local organizations on consistent county-wide technical and educational materials for flood preparedness with materials available in physical locations as well as electronically.

ACTION ITEMS

- *Identifying additional physical locations*
- *Combine technical resource materials with emergency service information*
- *Utilities and points of contact for emergency response*
- *Outreach to HOAs for flood preparedness and wash management*
- *Characterization of acceptable vegetation within wash corridors*
- *How to maintain drainage infrastructure after it is built*
- *Illustrative literature and "how to" maintenance videos*
- *Home and garden show booth to present and educate*
- *Support check dams and water retention for recharge*
- *Distribution of Green Infrastructure and Low Impact Development literature*
- *Communicate / educate on adverse impacts of walls*
- *Citizen rain gage program*

Goals and Action Items developed by Floodplain Management Plan 2020 Committee

Floodplain Management Plan 2020 Goal #4 and Action Items

The District shall continue pursuing nature-based solutions for flood mitigation, working with stakeholders, to identify and acquire open space in conjunction with flood control projects.

ACTION ITEMS

- *Coordination and cooperation with communities and stakeholders*
- *Prioritization for areas poised for risk*
- *Prioritize locations where floodplain delineations and re-delineations are needed*
- *Additional identification of flood risks*
- *Best practice for locations where recharge is best suited*
- *Connectivity of open space*

Goals and Action Items developed by Floodplain Management Plan 2020 Committee

Floodplain Management Plan 2020 Goal #5 and Action Items

The District shall continue to perform duties as the regional leader in floodplain management. District shall provide and communicate information, guidelines, and regulations to agencies and communities throughout Maricopa County and to adjacent Counties.

ACTION ITEMS

- *Annual meeting and communication of changes in regulations and policies*
- *Review current information and guidelines available*
- *Define a review cycle for literature*
- *Identify regulatory authority*
- *Incorporate agency best proactive*
- *Permitting enforcement and regulation*
- *Changes of Section 404 and protection of open space*

Goals and Action Items developed by Floodplain Management Plan 2020 Committee

Third Draft: **Draft Committee Feedback: 2020 Floodplain Management Action Plan** FCD2019C019 **Work Assignment #1** **9-Feb-20**

DRAFT

BLACK & VEATCH

FMP RANKING	ID	Action	2020 FMP Goals: 1 Public concerns for transportation	2 Partnerships for community investments	3 County-wide technical and education materials	4 Open space preservation / flood mitigation	5 Continue role as regional leader	Action Item Categories: Preventative	Property Protection	Natural Resource Protection	Emergency Services	Structural Projects	Public Information	Proposed Responsible Parties: FCDMC - PPM Division	FCDMC - Engineering Division	FCDMC - Operations & Maintenance Division	FCDMC - Floodplain Permitting Division	FCDMC - Executive Division or Ombudsman	FCDMC - Public Information and Outreach	Maricopa County Planning & Development	Maricopa County Department of Transportation	Partner Cities / Agencies
#1	1	Identify and categorize locations of risks and concern	x	x	x	x	x	x	x	x	x	x	x	x			X			X	x	x
	2	Develop a matrix of prioritization	x	x		x	x	x	x	x	x	x	x	x			X			X	x	x
	3	Design and funding options	x	x		x		x	x	x	x	x	x	x	x			x			x	x
	4	Establish triggers or warnings for areas to avoid	x	x			x	x			x		x		x						x	x
	5	Additional cost sharing partnerships	x	x		x	x	x	x	x	x	x	x	x				x			x	x
	6	Partnership with emergency services	x				x	x			x		x		x	x		x			x	x
	7	Coordination with transportation agencies for crossing risks	x			x	x	x			x		x		x						x	x
	8	Regular review cycle for funding status and community evaluation	x	x			x	x					x	x				X			x	
	9	FCDMC to communicate availability of Federal funding	x	x		x	x	x		x	x	x	x	x				X			x	
	10	Funding based communication to the community	x	x			x	x					x	X				X			x	
	11	Develop definition of process and evaluation	x	x			x	x					x	X				X			x	x
	12	IGAs for fiscal partners	x	x		x	x	x		x	x	x	x	x				X			x	x
	13	Identifying additional physical locations for documents			x		x	x			x		x				X	X	X		x	x
	14	Combine technical resource materials with emergency service information	x	x	x		x	x			x		x		X							x
	15	Utilities and points of contact for emergency response	m		x		x	x			x		x		X							x
	16	Outreach to HOA's for flood preparedness and wash management		x	x		x	x	x				x				X			X		x
	17	Characterization of acceptable vegetation within wash corridors		x	x	x	x	x	x				x			X	X			X		x
#4	18	How to maintain drainage infrastructure after it is built	x	x	x	x	x	x	x	x	x	x	x			X	X			X		x
	19	Illustrative literature and "how to" maintenance videos	x		x		x	x	x	x	x	x	x			X	X		X	X		x
	20	Home and garden show booth to present and educate	x		x		x	x	x	x	m		x	X			X		X			x
	21	Support check dams and water retention for recharge	x	x	x	x	x	x	x	x	x	x	x	X								x
	22	Distribution of Green Infrastructure and Low Impact Development literature			x	x	x	x				x	x	X						X		x
	23	Communicate / educate on adverse impacts of walls	x	x	x	x	x	x	x	x	x	x	m				X			X		x
	24	Citizen rain gage program		x	x		x	x					x		X							
	25	Coordination and cooperation with Communities and Stakeholders	x	x		x	x	x	x		x		x	X				X				X
	26	Prioritization for areas poised for risk	x	x		x	x	x	x	x	x	x	x				X			X		X
#2	27	Prioritize locations where floodplain delineations and re-delineations are needed	x	x	x	x	x	x	x	x	x	x	x				X			X		X
	28	Additional identification of flood risks	x	x		x	x	x	x	x	x	x	x				X			X		X
	29	Best practice for locations where recharge locations are best suited	x	x	x	x	x	x	x	x	x	m	x	X	X							
	30	Connectivity of open space	x	x	x	x	x	m		x	x	x	x							X		X
#5	31	Annual meeting and communication of changes in regulations and policies	x	x	x	x	x	x	x	x	x	x	x				X	X		X		
	32	Review current information and guidelines available					x						x	X			X			X		X
	33	Define a review cycle for literature			x		x						x	X			X		X	X		X
	34	Identify regulatory authority			x		x						x				X	X		X		X
#3	35	Incorporate agency best practices	x	x	x	x	x	x	x	x	x	x	x					X				X
	36	Permitting enforcement and regulation	x	x	x	x	x	x	x	x	x	x	x				X			X		X
	37	Changes of Section 404 and protection of open space	x		x	x	x	x	x	x	x	x	x	X								X

Next Steps - Assign Action Items to Responsible Parties

- Open Discussion
  - Flood Control District of Maricopa County
  - Maricopa County Planning & Development
  - Maricopa County Department of Transportation
  - Partner Cities / Agencies

Community Departments:

- Building department/code enforcement
- Engineering
- Land use planning/zoning
- Public works
- Emergency management/public safety
- Public information
- Environmental protection/public health
- Parks/recreation
- Board of Directors Member, BOD staff, or Flood Control Advisory Board member
- Housing/community development
- External Stakeholders

Floodplain Management Plan Update - Next Steps

- Tentative FMP 2020 Timeline
- February 2020
  - Review of Action Items & Proposed Responsible Parties
  - Comments on Proposed Parties
  - Draft FMP Update
- March-April 2020
  - Committee and District Review
  - Stakeholder Review
  - Public Comment Period
  - Comment Review and Resolutions
  - Finalize FMP Update
- June 2020
  - Recommendation for BOD & Supervisors Adoption
- September - October 2020
  - Finalized FMP Record Copy
  - 2020 FMP Submitted for Evaluation
  - Re-scheduled Verification Audit in November

Flood Control District of Maricopa County
2801 W. Durango Street
Phoenix, AZ 85009

FMP Public Meeting No. 2

Name: CHRIS + NAIMA BECKER

Optional Address: 29616 N. 62ND STREET, CAVE CREEK, AZ 85331

Phone: 630 624 2599 Email: cdb@sprintmail.com

Organization: PRIVATE

How did you hear about this meeting? MAILING

What are the top 3-5 priorities from the Action Items?

Future Action Items?

Would you like to be advised of future updates or public meetings? ☑ Yes ☐ No

Comments or Questions: CONCERNED AS TO WHEN NEW MAPS WILL BE ISSUED AND THE EFFECT OF NEW CONSTRUCTION DUE NORTH OF OUR PROPERTY WILL AFFECT WASH TO OUR NORTH CROSSING OUR PROPERTY AND WASH OFF DIXILETA AND 62ND ST.

FMP Public Meeting No. 2

Flood Control District of Maricopa County
2801 W. Durango Street
Phoenix, AZ 85009

Name: Phyllis Peshkin

Optional Address: 5421 E. Via Buena Vista

Phone: 480-406-2002 Email: pgpeshkin@gmail.com

Organization: resident - Town of Paradise Valley

How did you hear about this meeting? Next door App

What are the top 3-5 priorities from the Action Items? Would request that you evaluate the Cherokee Wash at Mockingbird Lane between 54th St. and 56th St. for capacity.

Future Action Items? Consider deepening the Cherokee Wash between 54th St and 56th St. along Mockingbird Lane in Paradise Valley to increase the capacity.

Would you like to be advised of future updates or public meetings? ☑ Yes ☐ No

Comments or Questions: Mark F. was very informative

Flood Control District of Maricopa County
2801 W. Durango Street
Phoenix, AZ 85009

FMP Public Meeting No. 2

FLOODPLAIN MANAGEMENT PLAN 2020 UPDATE SIGN-IN-SHEET	
Public Meeting #2	**Meeting Date:** Thursday – February 13, 2020
Facilitator: Flood Control District of Maricopa County	**Place/Room:** Adobe Conference Room

Name	Address	Phone Number/Email	Organization
Ellen Spielman	18038 W. Turquoise Ave, Waddell	azellen2005@gmail.com	Waddell Resident
Phyllis Peshkin	5421 E. Via Buena Vista, P.V. AZ	pgpeshkin@gmail.com	TPV resident
JOHN RODRIGUEZ	FCDMC	6025064378	FCDMC
Carl Knapp	9405 E ROSEMONTE	6024029830	MYSELF
Curtis + Nancy Buckel	2966 N. 62ND ST	6306422259	
Bob Haveline	1626 N. Litchfield Rd. Ste 150 Goodyear	bob.haveline@dibblecorp.com	Dibble
Rachel Marx	7878 N 16th St Suite 300	rachel.marx@dibblecorp.com	Dibble
Tim Murg	FCDMC 2801 W. Durango		FCDMC

Anthem

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FLOODPLAIN MANAGEMENT PLAN 2020 UPDATE

Maricopa County participates in the National Flood Insurance Program (NFIP) and its additional Community Rating System (CRS) Program. As a requirement of the CRS Program, the District developed and periodically updates its Floodplain Management Plan (FMP). The FMP communicates an overall strategy of programs, projects, and measures that when implemented should reduce the adverse impact of flooding in the community. The FMP also identifies flood hazards in the community and is used by the District as we addres flooding issues in unincorporated Maricopa County.

As a Repetitive Loss Community and holding a Class 4 in the NFIP CRS Program the County is required to have a Floodplain Management Plan. The Class 4 rating allows residents in the unincorporated county receive a 30 percent discount on flood insurance. Under the CRS, the flood insurance premiums of a community's residents and businesses are discounted to reflect that community's work to reduce flood damage.

Per the requirements of the CRS program, the County must prepare a FMP every five years. The District last updated the County's Plan in November 2015. The 2015 Floodplain Management Plan can be found in the On-Line Library on the Flood Control District's website. As part of the 2020 update, a Floodplain Management Plan Committee (Committee) has been established made up of representatives of Maricopa County, the State of Arizona, various federal agencies, municipalities, organizations, and the general public. The Committee will help identify and prioritize flood hazards and potential solutions.

What's Next?

February 2020

- Review of Action Items & Proposed Responsible Parties
- Comments on Proposed Parties
- Draft FMP Update
- Public Open House to Obtain Input on Recommendations

March-June 2020

- District Review

July 2020

- Obtain Additional Public Comments
  - Public review open until August 7, 2020
  - *DRAFT 2020 Floodplain Management Plan for Unincorporated Maricopa County*

Select Language

- Comments can be sent to Tim.Murphy@maricopa.gov

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- Stakeholder Review
- Committee review

August -October 2020

- Review Comments
- Finalize FMP Update
- Obtain BOD & Supervisors Adoption
- Finalize FMP Record Copy
- 2020 FMP Submitted for Evaluation
- Re-scheduled Verification Audit in November

Step 1 - Project Organization

Step 2 - Community Involvement Survey

Floodplain Management Plan Survey *(This survey is now closed.)*

Survey Results

Step 3 - Interagency Coordination

Step 4 -Identify and Assess the Hazard

Step 5 - Identify and Assess the Risk

Step 6 - Set Floodplain Management Plan Goals

Step 7 - Review Possible Activities

Step 8 - Select the Action Items

Step 9 - ADOPT the Plan

Step 10 - Implement, Evaluate and Revise the Plan

Project Schedule

Additional Documents

Select Language

February 13, 2020	3:00pm – 6:00pm	Public Open House

Public Notice

Presentation

Search

January 16, 2020 9:00am – 12:00pm Draft an Action Plan

Committee Presentation

Meeting Notes

Survey Results

December 5, 2019 9:00am – 12:00pm Review Possible Activities

Committee Presentation

Meeting Notes

November 14, 2019 9:00am – 12:00pm Set Goals

Committee Presentation

Meeting Notes

November 4, 2019 3:00pm - 6:00pm Public Open House

Public Notice

October 24, 2019 9:00am – 12:00pm Assess the Problem

Committee Presentation

Meeting Notes

October 3, 2019 9:00 am – 12:00pm Assess the Flooding Hazard

Committee Presentation

Meeting Notes

Related Documents

- Comprehensive Report and Program - 2015
- Floodplain Management Plan - 2015 Update

Select Language

Contact Info

Search

If you have any questions or comments regarding the plan, please address them to:

Tim Murphy, P.E, CFM

Project Management Branch Manager

602-506-4605

Tim.Murphy@maricopa.gov

Select Language

/

Hann, Matthew

From: Tim Murphy (FCD) <Tim.Murphy@Maricopa.Gov>
Sent: Friday, July 17, 2020 9:00 PM
To: Tim Murphy (FCD)
Cc: Fountain, Mark; Hann, Matthew
Subject: Draft 2020 Floodplain Management Plan for Unincorporated Maricopa County Available for Public Review

You have received this email announcing the availability of the draft *2020 Floodplain Management Plan for Unincorporated Maricopa* (2020 FMP) because you participated in the development of it, or your organization was identified as a potential stakeholder. In some cases people or organizations fall into both categories.

The Flood Control District of Maricopa County (District) is pleased to announce that the draft version of the 2020 FMP is available for public review and comment, and can be retrieved directly at https://www.maricopa.gov/DocumentCenter/View/61753. Unfortunately the file is too large (180MB) to be sent by email so you will need to download it from the web site. General information on the steps involved and progress on the development of the 2020 FMP can be found at https://www.maricopa.gov/5423/Floodplain-Management-Plan-2020-Update. The 2020 FMP was developed following the process outlined by the National Flood Insurance Program's (NFIP) Community Rating System (CRS), including making it available for review by the public and others.

The 2020 FMP was developed by a Committee consisting of several local residents, along with staff from interested organizations and stakeholders, including various state and local agencies and representatives from different Maricopa County Departments.

The Committee met 5 times during the planning process to identify and prioritize flood hazards and possible solutions, along with developing a list of Action Items. The dates and main topics of the meetings were as follows:
October 3, 2019 – Assess the Hazard
October 24, 2019 – Assess the Problem
November 14, 2019 – Set Goals
December 5, 2019 – Review Possible Activities
January 16, 2020 – Draft an Action Plan

The NFIP's CRS program requires the Floodplain Management Plan to be updated every five years. The 2020 FMP contains a number of Action Items that the Committee thought could be implemented to help reduce the adverse impacts of flooding. While the 2020 FMP was developed specifically for unincorporated Maricopa County, the District intends to implement the Action Items as appropriate in other areas of Maricopa County.

The District invites the public, interested stakeholders, and members of the Committee to review the draft 2020 FMP and provide any comments to Tim Murphy by email at tim.murphy@maricopa.gov by August 7, 2020. Furthermore, please provide any additional data or information on flooding or flood mitigation programs that your agency or organization might have that you feel is relevant to the development and completion of the 2020 FMP.

Information and comments received prior to August 7, 2020 will be considered in the development of the final version of the 2020 FMP.

If you have any questions on this please contact me by email at tim.murphy@maricopa.gov.

Tim Murphy, P.E., CFM
Project Management Branch Manager

For Information on the 2020 Floodplain Management Plan
https://www.maricopa.gov/5423/Floodplain-Management-Plan-2020-Update

Flood Control District of Maricopa County
2801 W Durango St, Phoenix, AZ 85009
(O) 602-506-4605 (F) 602-506-8561
Tim.Murphy@maricopa.gov
www.maricopa.gov/floodcontrol

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Appendix D

Assessment of Flood Insurance Coverage in Unincorporated Maricopa County

Federal Flood Insurance Assessment Community Rating System (CRS) Activity 370a Maricopa County (Unincorporated Areas)

Introduction

The National Flood Insurance Program's (NFIP) Community Rating System (CRS) recognizes floodplain management and outreach activities performed by communities that exceed the NFIP minimum standards. CRS, a voluntary program, recognizes these efforts by reducing the cost of flood insurance premiums by 5 to 45 percent for flood insurance policies in communities that participate in the CRS. The CRS recognizes 19 creditable activities organized under four categories: **Public Information**, **Mapping and Regulations**, **Flood Damage Reduction**, and **Warning and Response**. Communities can choose to undertake any or all of these activities. Based on the number of credit points received for each activity, a community is ranked in one of ten CRS *classes* with Class 1 requiring the most credit points and giving the largest premium reduction.

The CRS is widely seen as one of the more effective ways for communities to lessen the impact of flood insurance rate increases that are beginning to take effect for communities across the country because of the Flood Insurance Reform Act of 2012. Activity 370, 'Flood Insurance Promotion' is a new CRS activity within the Public Outreach activity series. As part of Activity 370, communities can receive credit for performing an assessment of flood insurance coverage within their community, and developing and implementing a coverage improvement plan based on that assessment. Detailed information about Activity 370 is provided in the 2013 CRS Coordinator's Manual.

Performing Activity 370 will have additional benefits for a community beyond CRS. Not only is it a way to obtain credit under CRS activities undertaken to improve overall flood insurance coverage within the community, it opens the opportunity to increase risk awareness and promote

Key Terms and Definitions

Flood Insurance Rate Map (FIRM)—*Official NFIP map of a community on which both Special Flood Hazard Areas and risk premium zones applicable to the community are shown.*

Floodway—*The stream channel and that portion of the adjacent floodplain which must remain open to permit passage of the base flood.*

Mandatory Purchase Requirement—*In communities participating in the NFIP, flood insurance is a prerequisite for receiving money from a Federal agency or a federally supported financial program for properties located in the SFHA.*

Special Flood Hazard Area (SFHA)—*The land area covered by the floodwaters of the 1% annual chance flood. It is the area where the mandatory purchase of flood insurance applies and includes the following zones relevant to this study: A, AO, AE, and AH.*

Insurable Structure—*Under the NFIP, a structure with 2 or more outside rigid walls and a fully secured roof affixed to a permanent site; a manufactured home affixed to a permanent foundation; or a travel trailer without wheels affixed to a permanent foundation and regulated under a community's floodplain management ordinance.*

mitigation measures to improve community resilience during outreach campaigns.

Objective of this Study

The NFIP's primary purpose is to insure those at risk against flood losses. This study is designed to (1) assess the proportion of households and businesses that have purchased federal flood insurance (the market penetration rate) in the community; (2) identify prior claims and vulnerabilities; (3) examine potential factors that affect the market penetration rate; and (4) identify some of the opportunities for improving the level of flood insurance coverage in identified target areas.

This assessment fulfils requirements of CRS Activity 370a (Flood Insurance Coverage Assessment) through the performance of the following:

- Identification of target areas with significant flood hazards and development present within the community;
- Mapping of flood insurance coverage within these identified target areas;
- Determination of the level of flood insurance coverage (including both structural and contents coverage) within each target area, including the comparison of coverage statistics with the number of buildings exposed to the hazard and potential losses from the 1% annual chance flood.;
- Development of this report summarizing the findings of the assessment.

Approach

In conducting this CRS Activity 370a assessment, the following data sets were used:

- The Federal Emergency Management Agency's (FEMA's) digital Flood Insurance Rate Map (FIRM) data;
- Current flood insurance policy and claims information available from FEMA;

Key Terms and Definitions, cont'd

Regular Program—*The final phase of a community's participation in the NFIP. In this phase, a FIRM is in effect and full limits of coverage are available.*

Pre-FIRM building—*A building for which construction or substantial improvement occurred on or before December 31, 1974, or before the effective date of an initial FIRM.*

Post-FIRM building—*A building for which construction or substantial improvement occurred after December 31, 1974, or on or after the effective date of an initial FIRM, whichever is later.*

Repetitive Loss Structure—*An insured structure for which two or more claims of more than $1,000 have been paid by the NFIP within any 10-year period since 1978. (e.g., two claims during the periods 1978–1987, 1979–1988, etc.)*

Zone AE—*SFHA where Base Flood Elevations are provided.*

Zone —*SFHA where no Base Flood Elevations are provided.*

Zone AH—*Shallow flooding SFHA. Base Flood Elevations in relation to a an elevation referenced to a vertical datum are provided.*

Zone AO—*SFHA with sheet flow, ponding, or shallow flooding. Base flood depths (feet above grade) are provided.*

- The most recent imagery available for Maricopa County;
- U.S. Census Block boundaries;
- Local tax assessment data.

These data were used to examine the seven communities in Maricopa County that were participating in CRS as of October 2013. Within each community, market penetration, claims, and vulnerabilities were examined on an overall basis as well as within designated target areas where significant flood hazards and/or multiple claims were found. Each target area is comprised of multiple census blocks. Census blocks were chosen as the basis of the boundary areas to ensure a standardized geographic unit for all of the analysis performed as part of this project. If a part of the census block was chosen for inclusion in the assessment due to its partial inclusion in the Special Flood Hazard Area (SFHA) or the existence of claims, the entire geographic area of the census block was included. As such, the target area boundaries do not follow SFHA boundaries or specific clusters of claims, but instead follow census block boundaries that include the area chosen for analysis.

Further information on the data and methodology used to support this flood insurance coverage assessment can be found in Appendix A of this report.

Organization of this Report

The sections that follow summarize the key findings of this report including an overall community level assessment of Maricopa County's flood insurance coverage, claims data, and potential loss estimation of structures in the SFHA. The additional sections that follow include similar assessments but instead focus on each target area identified within the community. The final section includes conclusions and some recommended approaches for increasing flood insurance coverage in the community and identified target areas.

Community Overview

Maricopa County Unincorporated Areas (CID 040037) joined the Regular Phase of the NFIP on July 2, 1979. It entered the CRS program on October 1, 1991, and currently has a class rating of 4. There are approximately 192,890 insurable structures in the community, with 4,842 of these structures located in the SFHA as shown on the FIRM for Maricopa County dated October 16, 2013. As of April 2013, there were 1,231 flood insurance policies with coverage for the building and 403 policies with content coverage in force within the SFHA in the community. The average value of coverage per policy in the County is $239,829 and $73,656 for structural and content coverage respectively within the SFHA.

As of April 2013, 262 claims were paid for structural damage and 192 claims were paid for contents within the community. Of those claims, the average value of claims paid was $11,198 and $3,013 for structural damage and contents respectively. The total value of claims paid was $2,933,953 and $848,801 for structural damage and contents respectively. As of April 2013, there were 63 repetitive loss properties located in the community. There are no severe repetitive loss properties located within the community. Information about general flood insurance coverage for Maricopa County is provided in Table 1.

Table 1 – General Flood Insurance Coverage

	# of Insurable Structures	# of Structures within SFHA	# of Structural Policies within SFHA	# of Contents Policies within SFHA	# of Rep Loss Properties
Maricopa County Unincorporated Areas (CID 040037)	192,890	4,842	1,231	403	63

A full summary table of community statistics is provided in Appendix B of this report.

Target Areas

Three target areas within Maricopa County have been identified on which to focus this CRS Activity 370a flood insurance coverage assessment. Each target area is comprised of multiple census blocks. Census block boundaries were chosen as the basis for the target areas to ensure a standardized geographic unit for all of the analysis performed as part of this project. Target area boundaries were delineated taking into account the location of:

- Current SFHA boundaries shown on the FIRM;
- Current flood insurance policy information;
- Repetitive loss property locations;
- Historical claims information;
- The most recent imagery available for Maricopa County.

Figure 1 indicates the location of each target area within the unincorporated areas of Maricopa County.

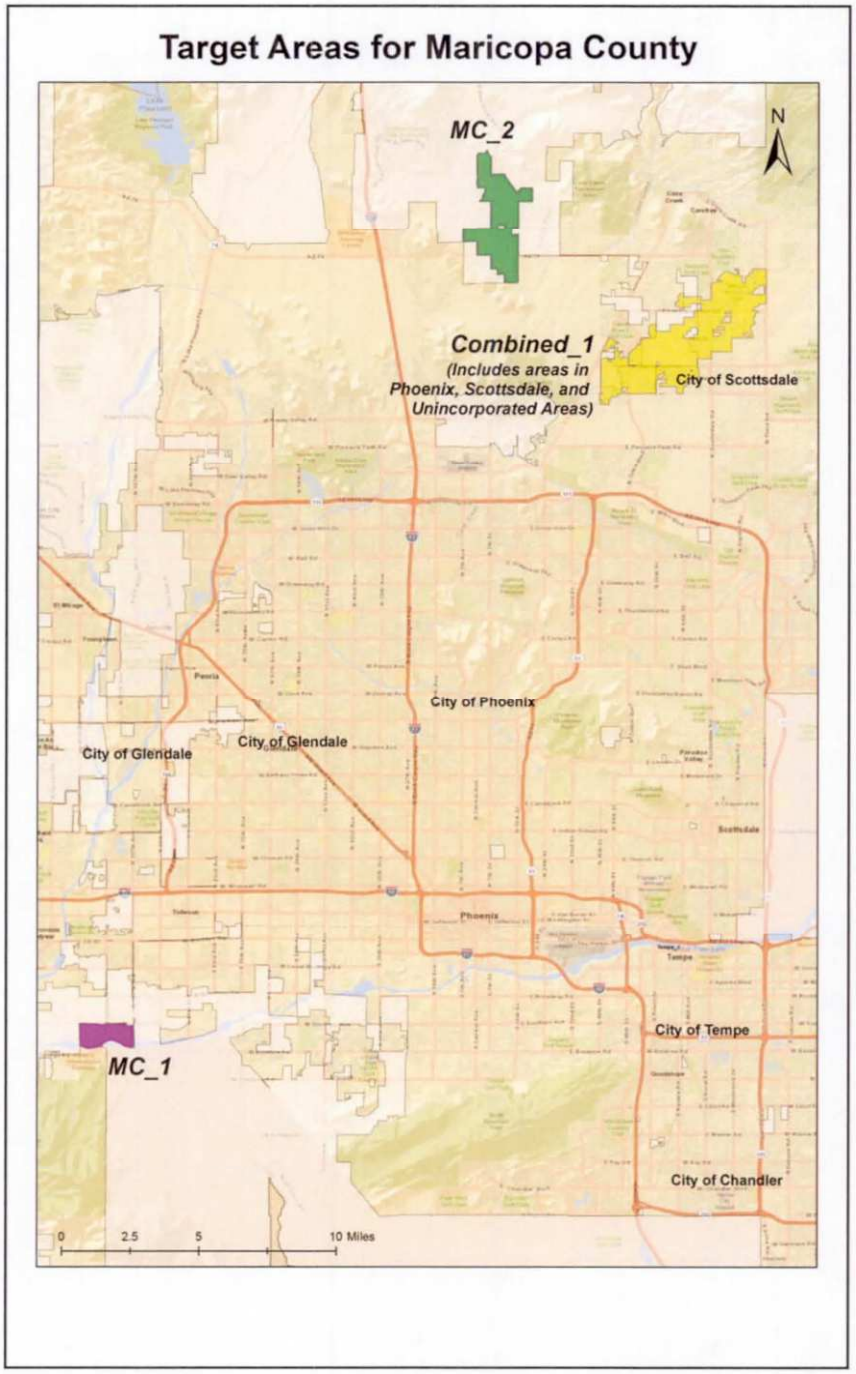

Figure 1: Target Areas within Maricopa County (Unincorporated Areas)

Each target area is mapped and described in detail in the sections that follow.

Target Area: MC_1

The *MC_1* target area is in the southwestern area of Maricopa County and is approximately 1.5 square miles in size. It is bounded by West Southern Avenue and Saint Johns Canal to the north, South 107th

Avenue to the east, Gila River and Salt River to the south, and South 123rd Avenue and South El Mirage Road to the west. The primary flooding source for this target area is the Gila River. The corresponding SFHA for the area is Zone AE. A portion of the area is also located in the regulatory floodway. This area includes pockets of residential properties surrounded by agricultural and vacant land.

A map summarizing data for the MC_1 target area is shown as Figure 2.

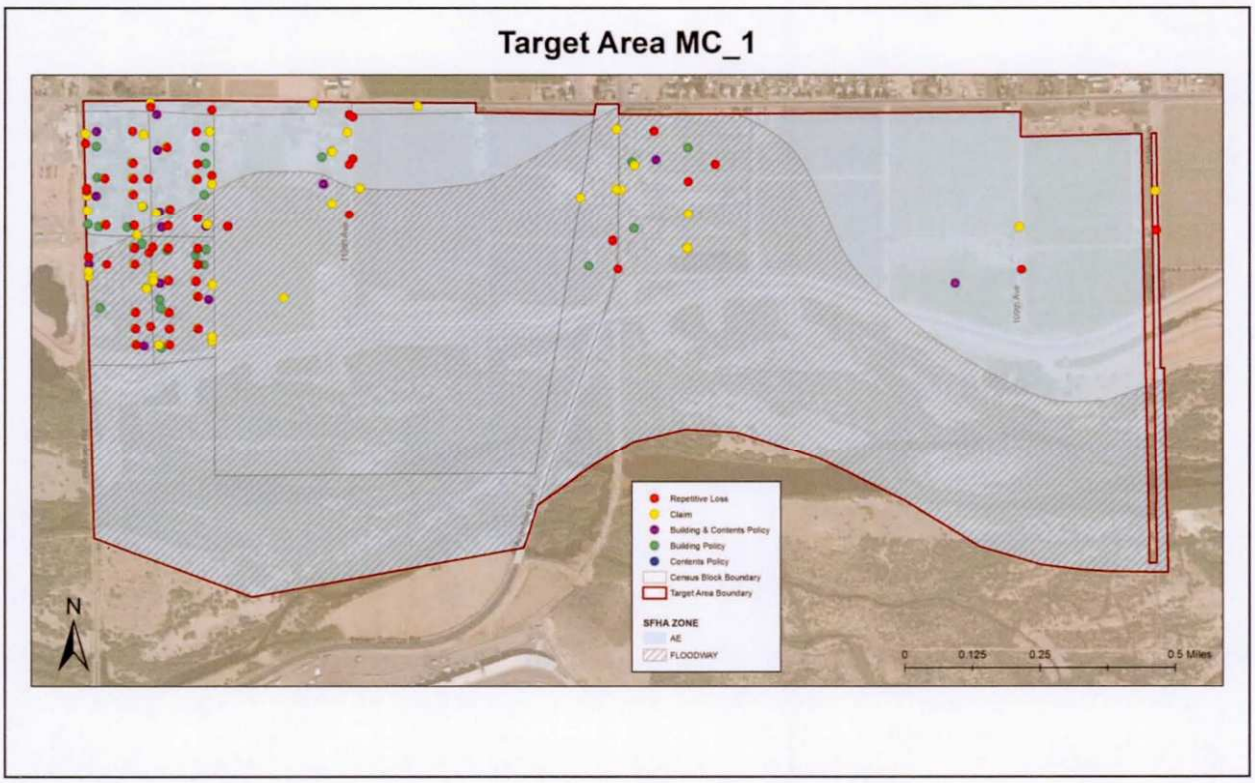

Figure 2: MC_1 Target Area

Flood Insurance Coverage and the SFHA

There are approximately 86 insurable structures located in this target area, and all of those 86 structures are located in the SFHA. Of these structures, there are 37 with structural flood insurance coverage and 14 with contents flood insurance coverage, representing a coverage rate of 43% and 16% for structural and contents policies respectively. These policies are predominantly for single family residential properties.

Table 2 – Flood Insurance Coverage Summary

			Structural Coverage		Content Coverage	
Target Area	**# of Insurable Structures**	**# of Structures within SFHA**	**# of Policies within SFHA**	**% of Buildings in SFHA with Coverage**	**# of Policies within SFHA**	**% of Buildings in SFHA with Coverage**
MC_1	86	86	37	43%	14	16%

Table 3 shows the breakdown of policies for Pre- and Post-FIRM structures within the target area as a whole.

Table 3 – Pre-FIRM versus Post-FIRM Policies

		Pre-FIRM		Post-FIRM	
Target Area	**Total # of Policies**	**# of Policies**	**% of Total Policies**	**# of Policies**	**% of Total Policies**
MC_1	33	31	94%	2	6%

Claims

As of April 2013, 119 claims were paid for structural damage and 112 claims were paid for contents within the target area. Of those claims, the average value of claims paid was $10,570 and $1,313 for structural damage and contents respectively. There are 55 repetitive loss properties located in the target area.

Potential Losses

The average amount of coverage per policy in the target area within the SFHA is $167,138 and $23,607 for structural and contents coverage respectively.

Homeowners can cover their structure for up to $250,000 and its contents for $100,000, and business owners can insure their structure and contents for $500,000 each under the NFIP. Insufficient flood insurance coverage can leave the property owner and community vulnerable. Many people only have coverage equal to the remaining balance of their mortgage, which may not be sufficient to cover the amount of damage that could result from a 1% annual chance flood. Table 4 shows the potential loss for buildings located in the SFHA in comparison with flood insurance coverage.

Table 4 – Estimated Potential Losses

Target Area	# of structures in SFHA	# of structural policies in the SFHA	Average Coverage in SFHA	Total Structural Coverage in the SFHA	Average Estimated Potential Losses in SFHA	Total Estimated Potential Losses in SFHA
MC_1	86	37	$167,138	$6,184,100	$62,000	$5,375,000

A complete data summary is also provided in Appendix C of this report.

Target Area: MC_2

The *MC_2* target area is in the northern area of Maricopa County and is approximately 5.3 square miles in size. It is bounded by North Central Avenue and North 7th Street to the north; portions of North 16th Street and 20th Street to the east; East Dove Valley Road to the south; and portions of West Cloud Road, North 7th Avenue, East Galvin Street, and Carefree Highway to the west. The primary flooding source for this target area is Desert Lake Wash. The corresponding SFHAs for the area are Zones A and AE. A

portion of the area is located in the regulatory floodway. Areas of moderate flood hazard, shaded Zone X, are shown on the FIRM throughout the target area. Zone X represents the flood that has a 0.2 percent annual chance of occurrence in any given year. By definition, it is not defined as the SFHA, and as such the structures included within areas of shaded Zone X do not carry a mandatory purchase requirement. This is a primarily residential area. A map summarizing data for the MC_2 target area is shown as Figure 3.

Target Area MC_2

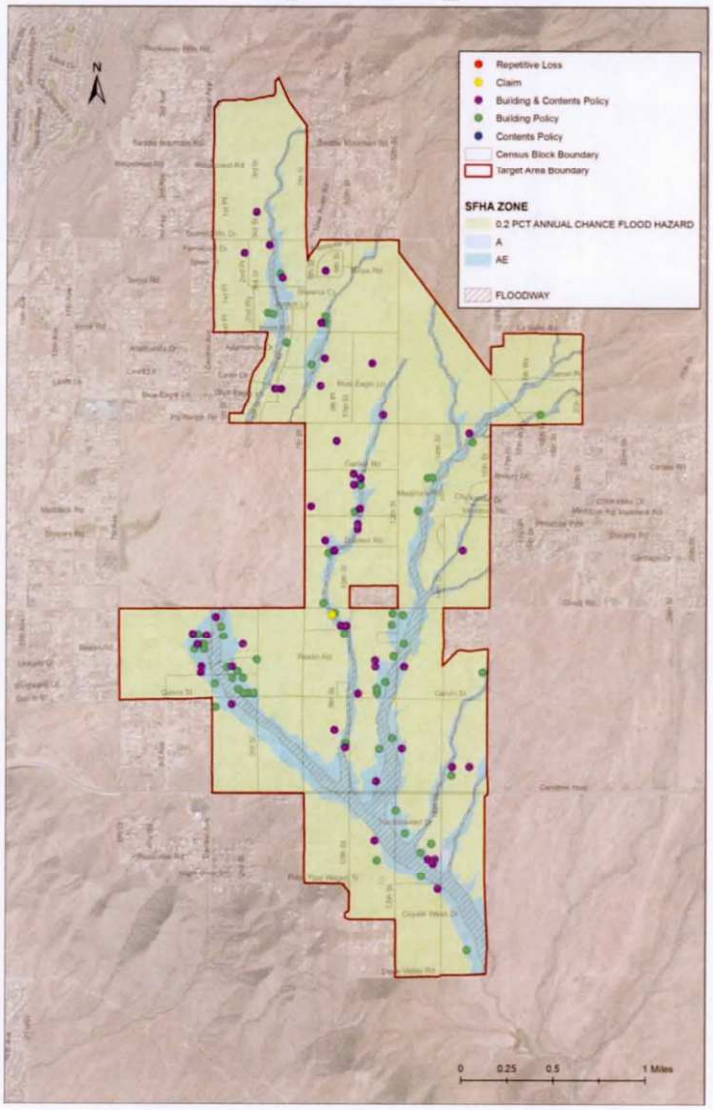

Figure 3: MC_2 Target Area

Flood Insurance Coverage and the SFHA

There are approximately 1,493 insurable structures located in this target area, with 113 of those structures located in the SFHA. Of those structures in the SFHA, there are 69 with structural flood insurance coverage and 27 with contents flood insurance coverage, representing a coverage rate of 61% and 24%

for structural and contents policies respectively. Almost all of these policies are for single family residential structures.

Table 5 – Flood Insurance Coverage Summary

			Structural Coverage		Content Coverage	
Target Area	**# of Insurable Structures**	**# of Structures within SFHA**	**# of Policies within SFHA**	**% of Buildings in SFHA with Coverage**	**# of Policies within SFHA**	**% of Buildings in SFHA with Coverage**
MC_2	1,493	113	69	61%	27	24%

Table 6 shows the breakdown of policies for Pre- and Post-FIRM structures within the target area as a whole.

Table 6 – Pre-FIRM versus Post-FIRM Policies

		Pre-FIRM		Post-FIRM	
Target Area	**Total # of Policies**	**# of Policies**	**% of Total Policies**	**# of Policies**	**% of Total Policies**
MC_2	103	3	3%	100	97%

Claims

As of April 2013, 1 claim has been paid within the target area for structural damage in the amount of $19,443. There are zero repetitive loss properties located in the target area.

Potential Losses

The average amount of coverage per policy in the target area within the SFHA is $219,464 and $49,711 for structural and contents coverage respectively.

Table 7 shows the potential loss for buildings located in the SFHA in comparison with flood insurance coverage.

Table 7 – Estimated Potential Losses

Target Area	**# of structures in SFHA**	**# of structural policies in the SFHA**	**Average Coverage in SFHA**	**Total Structural Coverage in the SFHA**	**Average Estimated Potential Losses in SFHA**	**Total Estimated Potential Losses in SFHA**
MC_2	113	69	$219,464	$15,143,000	$158,000	$17,821,000

A complete data summary is also provided in Appendix C of this report.

Target Area: Combined_1 (Maricopa County)

The *Combined_1* target area includes portions of Phoenix, Scottsdale and the unincorporated areas of the County. Specifically, it is located in northeast Phoenix, northwest Scottsdale and portions of the unincorporated areas of the County in the vicinity, to the east of 40th Street, to the north of Jomax Road, to the west of Pima Road, and to the south of Westland Drive. The portion of this target area within the unincorporated areas of the county is approximately 3.4 square miles in size. The flooding in this area is primarily due to the effects of alluvial fans. The corresponding SFHA for the area is Zones A, AO, and AE. This is a mainly residential area.

A map summarizing data for the *Combined_1* target area is shown as Figure 4.

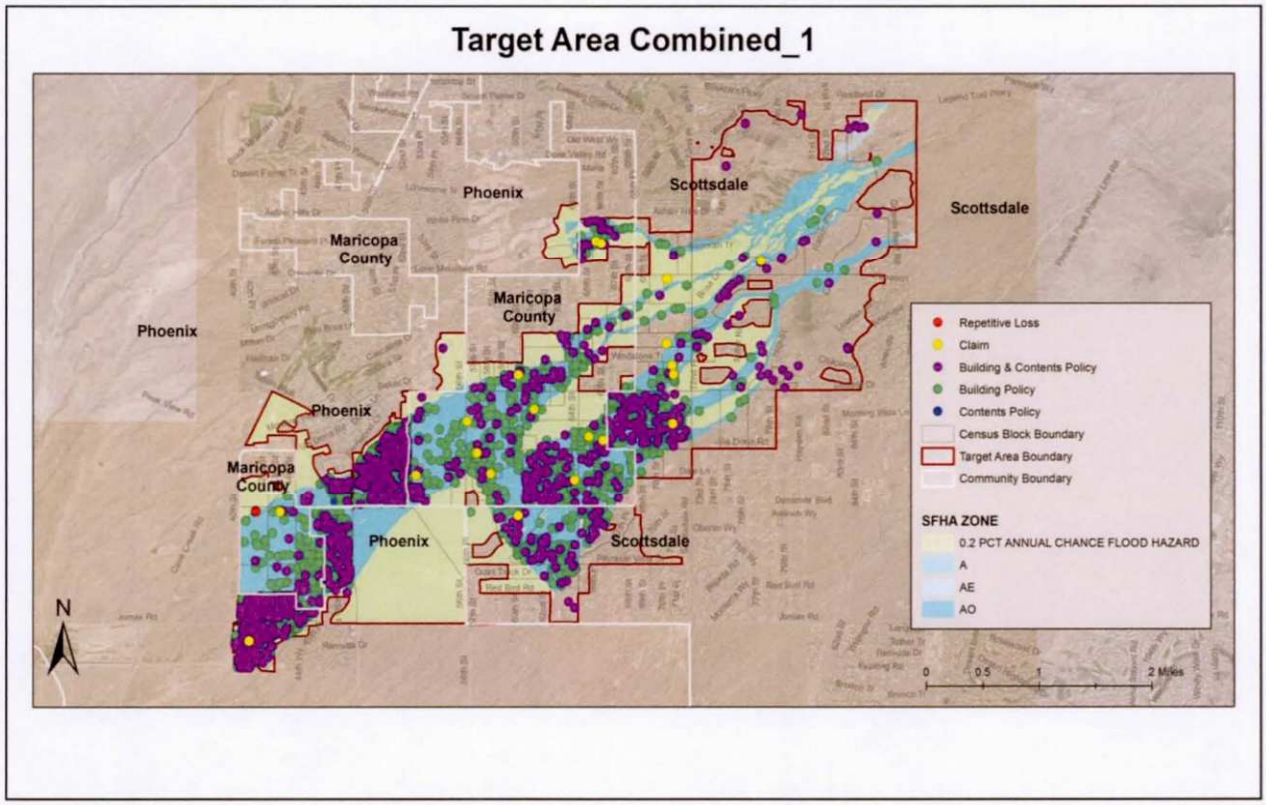

Figure 4: Combined_1 Target Area Including Phoenix, Scottsdale and Maricopa County (Unincorporated Areas)

Flood Insurance Coverage and the SFHA

Within the portion of *Combined_1* within the County, there are approximately 1,212 insurable structures located in this target area, with 791 of those structures located in the SFHA. Of those structures in the SFHA, there are 596 with structural flood insurance coverage and 177 with contents flood insurance coverage, representing a coverage rate of 75% and 22% for structural and contents policies respectively.

Table 8 – Flood Insurance Coverage Summary

			Structural Coverage		Content Coverage	
Target Area	**# of Insurable Structures**	**# of Structures within SFHA**	**# of Policies within SFHA**	**% of Buildings in SFHA with Coverage**	**# of Policies within SFHA**	**% of Buildings in SFHA with Coverage**
Combined_1 (County)	1,212	791	596	75%	177	22%

Table 9 shows the breakdown of policies for Pre- and Post-FIRM structures within the target area as a whole.

Table 9 – Pre-FIRM versus Post-FIRM Policies

		Pre-FIRM		Post-FIRM	
Target Area	**Total # of Policies**	**# of Policies**	**% of Total Policies**	**# of Policies**	**% of Total Policies**
Combined_1 (County)	623	63	10%	560	90%

Claims

As of April 2013, 15 claims were paid for structural damage and 1 claim was paid for contents within the target area. Of those claims, the average value of claims paid was $21,914 and $692 for structural damage and contents respectively. There is 1 repetitive loss property located in the target area.

Potential Losses

The average amount of coverage per policy in the target area within the SFHA is $238,167 and $70,879 for structural and contents coverage respectively.

Table 10 shows the potential loss for buildings located in the SFHA in comparison with flood insurance coverage.

Table 10 – Estimated Potential Losses

Target Area	**# of structures in SFHA**	**# of structural policies in the SFHA**	**Average Coverage in SFHA**	**Total Structural Coverage in the SFHA**	**Average Estimated Potential Losses in SFHA**	**Total Estimated Potential Losses in SFHA**
Combined_1 (County)	791	596	$238,167	$141,947,500	$235,000	$185,812,000

A complete data summary is also provided in Appendix C of this report.

Conclusions and Recommendations

The results of the analysis for Maricopa County Unincorporated County (CID 040037) show that of the 4,842 structures in the SFHA, there are 1,231 with structural flood insurance coverage and 403 with contents flood insurance coverage, representing a coverage rate of 25% and 8% for structural and contents policies respectively.

The failure to carry flood insurance is presumed to be either due to non-compliance with mandatory purchase requirements or owners in the target areas who do not have a federally backed mortgage on their property, and are opting to not purchase flood insurance on their property despite being located in a high risk flood zone. Given the available data, it is not possible to determine which situation applies more broadly.

Flood insurance coverage varied considerably across the target areas examined. The structural coverage rates in target area *MC_2* and *Combined_1* were considerably higher (61-75% percent) than in target area *MC_1* (approximately 43%). A large portion of target area *MC_1* is located in the floodway. The area includes 55 repetitive loss properties. As of April 2013, 119 claims were paid for structural damage and 112 claims were paid for contents within the target area.

While the data to fully evaluate the reasons for the lack of flood insurance coverage was not collected as part of this study, a number of patterns were observed. First, the coverage rate was higher in target areas *MC_2* and *Combined_1* where 90% or more of the buildings are post-FIRM buildings. Second, the coverage rate was greater in target areas with a greater number of buildings located in the SFHA (*Combined_1*). These findings are consistent with the findings of the study completed by the American Institute for Research for FEMA on flood insurance market penetration rates. That study found that the number of single family homes in a community's SFHA has a significant impact on the market penetration in the community. That study revealed a market penetration of 16 percent in communities with 500 or fewer homes in the SFHA, 56 percent in communities with 501 to 5,000 homes in the SFHA, and 66 percent in communities with more than 5,000 homes in the SFHA. The low market penetration rate in communities with relatively few homes in the SFHA is consistent with hypotheses that insurers market flood insurance less aggressively in such communities and that there are fewer agents in these communities familiar with the program writing policies. In addition, the results suggest that the mandatory purchase requirement is less vigorously enforced in communities with few structures in the SFHA. Further, such patterns might be the result of lower awareness of flood risk in communities with a lower percentage of homes in the SFHA (RAND Corporation, 2006).

On a whole, total structural flood insurance coverage in the SFHA was found to A low number of flood insurance policies in a community is not the only challenge communities face. Insufficient flood insurance coverage can leave both property owners and communities vulnerable. While homeowners can cover their structure for up to $250,000 and its contents for $100,000, and business owners can insure their structure and contents for $500,000 each under the NFIP, many under insure. Many people only have coverage equal to the remaining balance of their mortgage, which may not be sufficient to cover the amount of damage that could result from a 1% annual chance flood.

BW-12 could serve as a significant catalyst for change in market penetration. On the one hand, the potential elimination of subsidies and higher flood insurance rates could serve as a disincentive for those owners who do not have a federally backed mortgage on their property, and are opting to not purchase flood insurance on their property despite being located in a high risk flood zone. On the other hand, it could help improve market penetration going forward because BW-12 imposes new higher penalties on lenders who do not enforce mandatory purchase requirements for Federally-backed loans. These penalties increase from $350 to $2,000 under BW-12 which will likely serve as a strong incentive for lenders to ensure compliance.

The County has undertaken several outreach initiatives that have resulted in high flood insurance coverage in a number of areas. Other improvements might also be possible through increased focus on CRS Activities 320 and 330 and a focused campaign to help educate lenders, realtors, and insurers about mandatory purchase requirements and arming them with a suite of local tools that will help them better understand and communicate flood risk and share mitigation best practices. Other promising community engagement strategies that enlist community advocates and heighten risk awareness are outlined in *Developing a Program for Public Information* through FEMA's CRS Resource Center.

Appendix A: Summary of Data Sets and Sources

Target Area Boundary Delineation

Target areas determined for this CRS Activity 370a flood insurance coverage assessment are comprised of multiple census block boundaries. Census block boundaries were chosen as the basis for the target areas to ensure a standardized geographic unit for all of the analysis performed as part of this project. As such, the target area boundaries do not follow SFHA boundaries or specific clusters of claims, but instead follow census block boundaries that include the area chosen for analysis.

The census block boundaries used as the limits of the target areas were chosen by taking into account the location of the following:

- Current SFHA boundaries shown on the FIRM;
- Current flood insurance policy information;
- Historical claims information, including repetitive loss properties;
- The most recent imagery available for Maricopa County.

Datasets

The following datasets are described in greater detail below, with regards to usage for this flood insurance coverage assessment.

- **Maricopa County Tax Assessor/Parcel Data**

This dataset, provided in geospatial format by the Flood Control District of Maricopa County, was used to identify insurable structures within the community. Insurable structures were determined by identifying parcels for which attributes in the tax assessor database (fields 'PropertyUseShortDescription' and 'PropertyUseLongDescription') indicated the presence of a structure.

Structures impacted by the SFHA were determined by identifying structures for which 75% of the parcel was located within the SFHA.

Estimated potential losses for buildings in the SFHA were determined by using the improved full cash value (field name: ImprovementFullCashValue) of insurable structures within the SFHA as the replacement cost.

- **Flood Hazard Data**

The flood hazard boundaries used for this assessment were taken from the FIRM database for Maricopa County dated October 16, 2013.

- **FEMA Insurance Policy and Claims Data**

Flood insurance policy coverage (type of coverage, number of policies, $ amounts), flood insurance claims, repetitive losses, Pre-FIRM/Post-FIRM status, primary/non-primary residence status, number of PRPs were provided by FEMA to the Flood Control District of Maricopa County for use in this

assessment. The data was provided in April 2013. This information was joined to the insurable structure dataset referenced above in order to spatially reference the information.

For communities with repetitive loss properties, the list of those properties provided by FEMA was geocoded for this assessment using the Microsoft Bing geocoder. In some cases, no match was found. The assessment performed reflects only the properties for which a match was found. The property addresses which were not locatable will be provided to FEMA in accordance with CRS Activity 370 requirements to report possible data errors identified during the assessment process.

Appendix B: Maricopa County Community Data Summary

General Statistics	
Total number of insurable structures	192,890
Total number of insurable structures in the SFHA	4,842
Claims	
Total number of claims	303
Total number of paid claims (Structural)	262
Average Claim Paid $ (Structural)	11,198
Total number of paid claims (Contents)	192
Average Claim Paid $ (Contents)	3,013
Total Value of Claims Paid $ (Structural)	2,933,953
Total Value of Claims Paid $ (Contents)	848,801
Total number of Repetitive Loss Properties	63
Policy Information	
Total number of structural flood insurance policies (within the SFHA)	1,231
Average structural coverage per building ($) (within the SFHA)	239,829
Total number of contents flood insurance policies (within the SFHA)	403
Average contents coverage per building ($) (within the SFHA)	73,656
Total number of PRPs	674
Policy-Based Statistics	
Total number of Pre FIRM structures (policy holders only)	352
Total number of Post FIRM structures (policy holders only)	1,666
Total number of primary residences (policy holders only)	1,732
Total number of non-primary residences (policy holders only)	286
Estimated Losses	
Average Estimated Building Losses in SFHA ($)	132,000

Appendix C: Target Area Data Summary

A full summary of statistics relevant to this flood insurance coverage assessment for each target area identified for Maricopa County is provided in the tables below.

MC_1

General Statistics	
Total number of insurable structures	86
Total number of insurable structures in the SFHA	86
SFHA-Based Statistics	
Total number of structural policies in SFHA	37
Average structural coverage per building ($) in SFHA	167,138
Total number of contents policies in SFHA	14
Average contents coverage per building ($) in SFHA	23,607
Claims	
Total number of claims	145
Total number of paid claims (Structural)	119
Average Claim Paid $ (Structural)	10,570
Total number of paid claims (Contents)	112
Average Claim Paid $ (Contents)	1,313
Total Value of Claims Paid $ (Structural)	1,257,833
Total Value of Claims Paid $ (Contents)	147,026
Total number of Repetitive Loss Properties	55
Policy Information (for Entire Target Area)	
Total number of structural flood insurance policies	37
Average structural coverage per building ($)	167,138
Total number of contents flood insurance policies	14
Average contents coverage per building ($)	23,607
Total number of PRPs	0
Policy-Based Statistics	
Total number of Pre FIRM structures (policy holders only)	31
Total number of Post FIRM structures (policy holders only)	2
Total number of primary residences (policy holders only)	30
Total number of non-primary residences (policy holders only)	3
Estimated Losses	
Average Estimated Building Losses in SFHA ($)	62,000

MC_2

General Statistics	
Total number of insurable structures	1,493
Total number of insurable structures in the SFHA	113
SFHA-Based Statistics	
Total number of structural policies in SFHA	69
Average structural coverage per building ($) in SFHA	219,464
Total number of contents policies in SFHA	27
Average contents coverage per building ($) in SFHA	49,711

Claims	
Total number of claims	1
Total number of paid claims (Structural)	1
Average Claim Paid $ (Structural)	19,443
Total number of paid claims (Contents)	0
Average Claim Paid $ (Contents)	0
Total Value of Claims Paid $ (Structural)	19,443
Total Value of Claims Paid $ (Contents)	0
Total number of Repetitive Loss Properties	0
Policy Information (for Entire Target Area)	
Total number of structural flood insurance policies	105
Average structural coverage per building ($)	216,566
Total number of contents flood insurance policies	50
Average contents coverage per building ($)	63,038
Total number of PRPs	17
Policy-Based Statistics	
Total number of Pre FIRM structures (policy holders only)	3
Total number of Post FIRM structures (policy holders only)	100
Total number of primary residences (policy holders only)	94
Total number of non-primary residences (policy holders only)	9
Estimated Losses	
Average Estimated Building Losses in SFHA ($)	158,000

Combined_1 (Maricopa County – Unincorporated Areas)

General Statistics	
Total number of insurable structures	1,212
Total number of insurable structures in the SFHA	791
SFHA-Based Statistics	
Total number of structural policies in SFHA	596
Average structural coverage per building ($) in SFHA	238,167
Total number of contents policies in SFHA	177
Average contents coverage per building ($) in SFHA	70,879
Claims	
Total number of claims	15
Total number of paid claims (Structural)	15
Average Claim Paid (Structural) ($)	21,914.00
Total number of paid claims (Contents)	1
Average Claim Paid (Contents) ($)	692.00
Total Value of Claims Paid $ (Structural)	328,710
Total Value of Claims Paid $ (Contents)	692
Total number of Repetitive Loss Properties	1

Policy Information (for Entire Target Area)	
Total number of structural flood insurance policies	627
Average structural coverage per building ($)	237,900
Total number of contents flood insurance policies	192
Average contents coverage per building ($)	71,900
Total number of PRPs	8
Policy-Based Statistics	
Total number of Pre FIRM structures (policy holders only)	63
Total number of Post FIRM structures (policy holders only)	560
Total number of primary residences (policy holders only)	557
Total number of non-primary residences (policy holders only)	66
Estimated Losses	
Average Estimated Building Losses in SFHA ($)	$235,000

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Appendix E

Potential Floodplain Management Plan Activities

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10-Sep-20

Draft Committee Feedback: 2020 Floodplain Management Action Plan
FCD2019C019

Work Assignment #1

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ID	Action Item	Transportation and Low Water Crossings	Funding Evaluation Community Investments	Education and Technical Resources	Managed Open Space	Regional Leadership	Preventative	Property Protection	Natural Resource Protection	Emergency Services	Structural Projects	Public Information	Responsible Party	Deadline (Timeframe)	Priority	Funding Source
		1	2	3	4	5										
		2020 FMP Goals					CRS' Action Item Categories									
1	Identify and categorize transportation and low water crossing locations that have flood risks and concerns	X	X	X	X	X	X	X	X	X	X	X	Engineering Division, MCDOT	June 2022	High	FCDMC Operating Budget
2	Develop a matrix to prioritize transportation and low water crossing flood risks	X	X		X	X	X	X	X	X	X	X	Engineering Division, MCDOT	August 2021	High	Staff time mostly (minimal funding required)
3	Develop design approaches and funding options to reduce transportation and low water crossing flood risks	X	X		X		X	X	X	X	X	X	Engineering Division, MCDOT	June 2023	Medium	FCDMC Operating and CIP Budgets, also potential for grants
4	Establish triggers or warning methods to let public know how to avoid flooded transportation areas	X	X			X	X			X		X	Engineering Division, MCDOT	June 2023	Medium	FCDMC Operating Budget, partner with other agencies
5	Identify and pursue additional cost sharing partnerships to lower transportation related flood risks	X	X		X	X	X	X	X	X	X	X	Engineering Division, MCDOT	Annually	Low	FCDMC Operating Budget, Staff time, potential for grants

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ID	Action Item	Transportation and Low Water Crossings (1)	Funding Evaluation Community Investments (2)	Education and Technical Resources (3)	Managed Open Space (4)	Regional Leadership (5)	Preventative	Property Protection	Natural Resource Protection	Emergency Services	Structural Projects	Public Information	Responsible Party	Deadline (Timeframe)	Priority	Funding Source
		2020 FMP Goals					CRS' Action Item Categories									
6	Develop partnership with emergency services on flood and transportation issues	X				X	X			X		X	Engineering Division	Annually	Medium	Staff time (minimal funding required)
7	Coordinate with transportation agencies along with other agencies and communities on ways to notify public of ongoing flood risks at crossings	X			X	X	X			X		X	Engineering Division, Partner cities and agencies	June 2022	Medium	Staff time mostly (minimal funding required)
8	Develop regular review cycle of funding status and evaluation of FCDMC CIP, SPAP, FPAP programs, and provide to communities and other agencies	X	X			X	X					X	PPM Division	Annually	Medium	Staff time mostly (minimal funding required)
9	Communicate availability of Federal funding to communities and other agencies, and maybe help prepare applications	X	X		X	X	X		X	X	X	X	Executive Division	Annually	Medium	Staff time mostly (minimal funding required)
10	Conduct funding based communication to the communities on FCDMC CIP, SPAP, and FPAP programs	X	X			X	X					X	PPM Division	Annually	Medium	Staff time mostly (minimal funding required)

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ID	Action Item	Transportation and Low Water Crossings	Funding Evaluation Community Investments	Education and Technical Resources	Managed Open Space	Regional Leadership	Preventative	Property Protection	Natural Resource Protection	Emergency Services	Structural Projects	Public Information	Responsible Party	Deadline (Timeframe)	Priority	Funding Source
		1	2	3	4	5										
		2020 FMP Goals					CRS' Action Item Categories									
11	Develop definition of process and evaluation on FCDMC CIP, SPAP, FPAP programs and help agencies succeed, especially smaller communities	x	x			x	x					x	PPM Division	Annually	Medium	Staff time mostly (minimal funding required)
12	Support developing/increasing IGAs with fiscal partners	x	x		x	x	x		x	x	x	x	PPM Division	Annually	Medium	Staff time mostly (minimal funding required)
13	Identifying additional physical locations where FCDMC documents can be available			x		x	x			x		x	Executive Division	Aug-21	Low	FCDMC Operating Budget
14	Combine technical resource materials with emergency service information	x	x	x		x	x			x		x	Engineering Division, partner cities and agencies	Annually	Medium	FCDMC Operating Budget
15	Develop information on utilities points of contact for emergency response (city and service area specific)	m		x		x	x			x		x	Engineering Division, partner cities and agencies	Annually	Medium	Staff time mostly (minimal funding required)
16	Outreach to HOA's for flood preparedness and wash management		x	x		x	x	x				x	PIO, Floodplain Permitting Division	Annually	Medium	FCDMC Operating Budget

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ID	Action Item	Transportation and Low Water Crossings	Funding Evaluation Community Investments	Education and Technical Resources	Managed Open Space	Regional Leadership	Preventative	Property Protection	Natural Resource Protection	Emergency Services	Structural Projects	Public Information	Responsible Party	Deadline (Timeframe)	Priority	Funding Source
		1	2	3	4	5										
		2020 FMP Goals					CRS' Action Item Categories									
17	Characterization of acceptable vegetation within wash corridors to share with HOA's		X	X	X	X	X	X				X	PIO, Floodplain Permitting Division	August 2021	Medium	FCDMC Operating Budget
18	Develop How to Manual for HOA's on maintaining drainage infrastructure after it is built	X	X	X	X	X	X	X	X	X	X	X	PIO, Floodplain Permitting Division	August 2022	High	FCDMC Operating Budget
19	Develop illustrative literature and "how to" maintenance videos for HOA's	X		X		X	X	X	X	X	X	X	PIO, Floodplain Permitting Division	August 2022	High	FCDMC Operating Budget
20	Home and Garden show booth to present and educate public and others on risks of floods	X		X		X	X	X	X	m		X	PIO	Annually	Medium	FCDMC Operating Budget
21	Develop ways to support and encourage check dams and water retention for recharge	X	X	X	X	X	X	X	X	X	X	X	PPM Division	August 2022	Low	Staff time (minimal funding required)
22	Distribute Green Infrastructure and Low Impact Development literature			X	X	X	X				X	X	PPM Division, P&D	Annually	Low	FCDMC Operating Budget
23	Communicate / educate property owners, HOA's and others on adverse impacts of walls	X	X	X	X	X	X	X	X	X	X	m	Floodplain Permitting Division, P&D	Annually	Medium	FCDMC Operating Budget

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ID	Action Item	Transportation and Low Water Crossings	Funding Evaluation Community Investments	Education and Technical Resources	Managed Open Space	Regional Leadership	Preventative	Property Protection	Natural Resource Protection	Emergency Services	Structural Projects	Public Information	Responsible Party	Deadline (Timeframe)	Priority	Funding Source
		1	2	3	4	5										
		2020 FMP Goals					CRS' Action Item Categories									
24	Educate and inform public of various citizen rain gage program		x	x		x	x					x	Engineering Division	Annually	Low	FCDMC Operating Budget
25	Coordinate and cooperate with Communities and Stakeholders on their need for drainage infrastructure	x	x		x	x	x	x		x		x	PPM Division	Annually	Medium	FCDMC Operating Budget
26	Prioritization of (drainage infrastructure) for areas poised for development with flood risk	x	x		x	x	x	x	x	x	x	x	PPM Division, P&D	Ongoing, with each new ADMS/ADMP study	Medium	FCDMC Operating Budget
27	Prioritize locations where floodplain delineations and re-delineations are needed	x	x	x	x	x	x	x	x	x	x	x	Floodplain Permitting Division, P&D	Annually	High	Staff time (minimal funding required)
28	Identify additional areas with flood risks that don't need to be delineated floodplains	x	x		x	x	x	x	x	x	x	x	PPM Division, P&D	Ongoing, with each new ADMS/ADMP study	Medium	FCDMC Operating Budget
29	Develop best practices for identifying locations where recharge locations are best suited	x	x	x	x	x	x	x	x	x	m	x	PPM Division	Ongoing, with each new ADMS/ADMP study	Low	Staff time (minimal funding required)

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ID	Action Item	Transportation and Low Water Crossings	Funding Evaluation Community Investments	Education and Technical Resources	Managed Open Space	Regional Leadership	Preventative	Property Protection	Natural Resource Protection	Emergency Services	Structural Projects	Public Information	Responsible Party	Deadline (Timeframe)	Priority	Funding Source
		1	2	3	4	5										
		2020 FMP Goals					CRS' Action Item Categories									
30	Identify locations and means for connectivity of open space on District Projects that could be wildlife corridors and habitat	x	x	x	x	x	m		x	x	x	x	PPM Division	Ongoing, with each new ADMS/ADMP study	Low	Staff time (minimal funding required)
31	Conduct an annual meeting and include communication of changes in regulations and policies	x	x	x	x	x	x	x	x	x	x	x	Executive Division, P&D	Annually	High	FCDMC Operating Budget
32	Review current flood related information and guidelines available FCDMC and others					x						x	Floodplain Permitting Division, P&D	Annually	Low	Staff time (minimal funding required)
33	Define a review cycle for FCDMC literature			x		x						x	Executive Division	June 2021	Low	Staff time (minimal funding required)
34	Identify regulatory authority and need for legislative changes, or higher standards			x		x						x	Executive Division	June 2021	Low	Staff time (minimal funding required)
35	Incorporate FCDMC and other agency best practices and communicate these to communities and others	x	x	x	x	x	x	x	x	x	x	x	Executive Division	June 2021	High	FCDMC Operating Budget

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ID	Action Item	Transportation and Low Water Crossings (1)	Funding Evaluation Community Investments (2)	Education and Technical Resources (3)	Managed Open Space (4)	Regional Leadership (5)	Preventative	Property Protection	Natural Resource Protection	Emergency Services	Structural Projects	Public Information	Responsible Party	Deadline (Timeframe)	Priority	Funding Source
		2020 FMP Goals					CRS' Action Item Categories									
36	Inform developers and communities on permitting enforcement and regulation issues	X	X	X	X	X	X	X	X	X	X	X	Floodplain Permitting Division, P&D	Annually	High	FCDMC Operating Budget
37	Communicate changes to USACE Section 404 permits and 408 permissions, and protection of open space to communities and other agencies	X		X	X	X	X	X	X	X	X	X	PPM Division	Annually	Medium	Staff time (minimal funding required)
38	Coordinate with sand & gravel industry representatives to identify mutually beneficial activities in river corridors, and how specific activities might be implemented.				X	X			X		X		Executive	Annually	Medium	Staff time (minimal funding required)

Legend: "X" denotes a majority vote by FMP Committee Members. "m" denotes a vote offered by an individual member of FMP Committee Member.
The FMP Committee tasked FCDMC with identifying the responsible parties.