



City of Phoenix



2025 FLOODPLAIN MANAGEMENT PLAN





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EXECUTIVE SUMMARY

FLOODPLAIN MANAGEMENT PLANNING OVERVIEW

The City of Phoenix (City) has experienced numerous flooding events that demonstrate how the City can be significantly impacted by flooding. Even though the City has adopted multiple mitigation and flood control projects and plans, it is constantly seeking additional ways to reduce flood impacts in the community.

The responsibility for floodplain management lies with many, including private property owners, business, industry, and the local, state, and federal government. Recognizing no one solution exists for reducing all flood hazards, planning provides a mechanism to identify the best alternatives within the capabilities of a jurisdiction. A floodplain management plan achieves the following in order to set the course for reducing the risk associated with flooding:

- Ensuring that all possible floodplain management activities are reviewed and evaluated so that local problems are addressed by the most appropriate and efficient solutions.
- Ensuring that floodplain management activities are coordinated with one another and with other community goals and activities, preventing conflicts and reducing the cost of implementing each individual activity.
- Coordinating local floodplain management activities with federal, state, and regional programs.
- Educating residents on the flooding hazard, loss reduction measures, and the natural and beneficial functions of floodplains.
- Building public and political support for mitigation projects.
- Fulfilling planning requirements for obtaining state or federal assistance.
- Facilitating the implementation of floodplain management and mitigation activities through an action plan that has specific tasks, staff assignments, and deadlines.

The City of Phoenix Floodplain Management Plan (FMP) will create an overall strategy of programs, projects, and mitigation measures that will help the City reduce the adverse impacts of flooding. As a participant in the National Flood Insurance Program's (NFIP) Community Rating System (CRS), the City can use the FMP update as a key step toward significant reductions in flood insurance premiums.

THE COMMUNITY RATING SYSTEM

Federal Emergency Management Agency (FEMA's) CRS program is a voluntary program within the NFIP that encourages floodplain management activities that exceed the minimum requirements of the NFIP. The CRS outlines 19 creditable activities that fulfill the program goals of reducing flood losses, facilitating accurate insurance rating, and promoting awareness of flood insurance. The activities are in four categories:



- Public information;
- Mapping and regulations;
- Flood damage reduction; and
- Warning and response

Flood insurance premiums in participating communities are discounted to reflect the reduced flood risk resulting from community actions to meet the CRS goals. A Class 1 community receives a 45-percent premium discount for properties within and outside of a 100-year floodplain, and a Class 9 community receives a 5-percent discount. Discounts for classifications between those two vary in 5-percent increments. Class 10 communities do not participate in the CRS; they receive no discount.

The City has participated in the CRS program since 1992 and currently has a Class 5 rating. Eligible NFIP policyholders are eligible for a 25-percent discount on their flood insurance. To maintain or improve its rating, the City goes through an annual recertification and a re-verification every three years. The FMP will help the City maximize its credit potential under the CRS.

PLAN DEVELOPMENT METHODOLOGY

The City's 2025 Floodplain Management Plan was developed to follow the 10-step process identified by the CRS Coordinators Manual:

- **Step 1: Organize:** This step involved the organization of the planning process. A 17-member Floodplain Management Plan Committee (FMP Committee), consisting of City staff (7 City departments represented), citizens (5), and other stakeholders (5), was assembled to oversee the development of the plan. Additional City departments and other stakeholders participated in less than 50% of the meetings and were not considered full participants within the FMP Committee. This committee met five times over a four-month period to provide guidance and oversight to a Core Planning Team consisting of City Floodplain Management staff and a technical consultant (Black & Veatch). The Core Planning Team was responsible for the development of the plan with guidance from the FMP Committee.
- **Step 2: Involve the Public:** The planning process included the opportunity for the public to comment on the plan during its development and before its approval. The FMP Committee was open to the public, and five different residents were able to attend the meetings and provide input into the development of the plan. A public survey was posted early in the FMP Committee planning process to gather feedback and was publicized additionally with neighborhood association and public meetings, water bill inserts, and social media postings. The FMP Committee developed a public involvement strategy that was implemented by the planning team and included public meetings held to provide the public an opportunity to participate in the planning process. Additionally, a City sponsored website dedicated to the plan (<https://www.phoenix.gov/administration/departments/city-engineer/floodplain-management/floodplain-management-plan.html>) was set up, and multiple media releases were deployed under the strategy. A fact sheet (see Appendix A) was also developed in both English and Spanish to help gather additional input and feedback from the public.



- **Step 3: Coordinate:** This planning step involved incorporating other plans and other agencies' efforts into the FMP. Coordination with regional, state, and federal agencies involved in flood hazard mitigation occurred throughout the plan's development. A capability assessment was conducted to complete a comprehensive review of existing plans and programs that can support flood hazard mitigation.
- **Step 4: Assess the Hazard:** The City profiled and evaluated the flood hazard to understand the potential impacts flooding can have on the City's population, buildings, and infrastructure. The City looked at their Special Flood Hazard Areas, repetitive loss areas, historically flooded areas, and other areas of flooding identified in studies and plans.
- **Step 5: Assess the Problem:** Once the flood hazard was assessed, the City completed a vulnerability assessment for flooding to identify the impacts flooding can have on the City's population, buildings, and infrastructure. This assessment included measuring potential loss of life, personal injury, economic injury, and property damage from flood hazards.
- **Step 6: Set Goals:** The FMP Committee developed goals to set the context for the subsequent review of floodplain management activities and drafting of the action plan. These goals were developed to be consistent with other community goals.
- **Step 7: Review Possible Activities:** The FMP Committee reviewed different activities that could mitigate or reduce the severity of the problems identified in Step 5. The review included a wide range of activities to ensure that all possible measures were explored, not just the traditional approaches of flood control, acquisition, and regulation of land use.
- **Step 8: Draft an Action Plan:** The FMP Committee selected and specified the activities appropriate to the City's resources, hazards, and vulnerable properties. The FMP Committee aimed to create a balanced program, using numerous categories of potential actions.
- **Step 9: Adopt the Plan:** A pre-adoption review draft of the plan was sent for review and comment to the Insurance Services Office (ISO), the contractor for the CRS. After the ISO granted pre-adoption approval, the City Council adopted the final plan.
- **Step 10: Implement, Evaluate, Revise:** The FMP Committee developed implementation and maintenance procedures for ensuring that the plan remains an active and relevant document. The maintenance process includes a schedule for monitoring and evaluating the plan's progress annually and revising it every five years. Implementation and maintenance include continued public involvement and incorporation of the recommendations of this plan into other planning mechanisms of the City, such as the general plan, capital improvement program, and hazard mitigation plan.

BUILDING THE PLANNING TEAM

The City brought together a diverse and inclusive group of individuals to participate, develop, and implement the FMP. A Core Planning Team and FMP Committee oversaw the planning process and were responsible for coordinating, overseeing, and executing the planning process.



CORE PLANNING TEAM

The Core Planning Team was made up of key personnel from the City and the City's contract consultant (Black & Veatch).



FLOODPLAIN MANAGEMENT PLAN COMMITTEE

The FMP Committee consisted of a variety of personnel from City departments along with outside agencies, non-governmental organizations, stakeholders, and City residents that guided the City through the process of updating the FMP.

STAKEHOLDER OUTREACH STRATEGY

The outreach strategy for the FMP included a City-sponsored webpage dedicated to the FMP (<https://www.phoenix.gov/administration/departments/city-engineer/floodplain-management/floodplain-management-plan.html>), a flood preparedness/hazard mitigation survey, meetings open to the public, a variety of outreach materials including social media posts and flyers, and the involvement of the public and stakeholders throughout the planning process.

Stakeholders (* indicates a member of the FMP Committee)

Members of the Core Planning Team were able to meet with 12 different stakeholders from agencies or non-governmental organizations that operate with or within the City. This included members of the FMP Committee and others who were not participants during the planning process.

- Maricopa Department of Transportation (MCDOT)
- City of Scottsdale
- Town of Paradise Valley
- Central Arizona Conservation Alliance (CAZCA)
- Arizona Forward
- AZ Stormwater Outreach for Regional Municipalities (AZSTORM)
- Arizona Department of Transportation (ADOT)*
- Arizona Department of Water Resources (ADWR)*
- Arizona State Land Department (ASLD)*
- Flood Control District of Maricopa County (FCDMC)*
- Maricopa County Department of Emergency Management (MCDEM)*
- National Weather Service (NWS)*

Details of the meetings that were held to gather additional information are provided within Section 3 and within **Appendix C**.



RISK ASSESSMENT

The risk assessment is the process of measuring the potential loss of life, personal injury, economic impacts, and property damage resulting from natural hazards, like flooding. It allows emergency management personnel to establish early response priorities by identifying potential hazards and vulnerable assets. The risk assessment for this plan was developed using information from the following plans:

- State of Arizona Hazard Mitigation Plan, 2023.
- Maricopa County Multi-Jurisdictional Hazard Mitigation Plan, 2021.
 - Used by the City during most recent CRS verification visit for Activity 510 credit.
- 2020 Floodplain Management Plan for Unincorporated Maricopa County.

Some key findings from the risk assessment of this plan are as follows:

- Between 1966 and 2024, Maricopa County, including the City of Phoenix, was included in 11 flood-related federal disaster declarations. This equates to a significant flood event, resulting in a federal disaster declaration, every 5.36 years over a period of 58 years for Maricopa County.
- 34,577 people (2.21% of the City population) are located in high hazard flood zones in the City of Phoenix.
- 11,833 residential structures (2.0% of the City's residential building stock) are located in high hazard flood zones. These structures account for \$3.4 billion in replacement cost value.
- 90,618 of the City of Phoenix's residential buildings structures (15.35% of the City's residential building stock) are exposed to flood control dam emergency spillway inundation.
- Levees in the City of Phoenix protect 12,528 buildings and 14 critical facilities.
- There are 3,352 NFIP policies in the City of Phoenix. There have been 1,283 flood claims, resulting in \$8.9 million in payments.
- Of the 3,352 NFIP policies within the City, 53 of those are identified as repetitive loss properties and 5 are identified as severe repetitive loss properties.
- An estimated 58 percent of Phoenix residents live in the census blocks that intersect the 1% Special Flood Hazard Area

CAPABILITY ASSESSMENT

Floodplain management in the City of Phoenix is supported by a variety of capabilities. The 2025 FMP identified capabilities at the City, county, state, and federal levels that support floodplain management in the City of Phoenix include planning and regulatory capabilities, administrative and technical capabilities, and fiscal capabilities.



MITIGATION STRATEGY

Set Goals

The FMP Committee identified five different goals for the 2025 FMP. Mitigation actions in the FMP update were identified that achieved multiple goals.

1. Educate the public, policy makers, and City leaders on stormwater and floodplain management and risks.
2. Coordinate with other jurisdictions and agencies to mitigate flooding hazards and improve emergency response.
3. Reduce the danger of flood hazards to people, property, critical infrastructure/facilities, and natural resources.
4. Establish proactive maintenance and preventative measures for stormwater infrastructure.
5. Utilize public funding in the most effective manner for stormwater and floodplain management.

Mitigation Action Plan

The action plan is a key element of the floodplain management plan. It is through the implementation of the action plan that the City of Phoenix can strive to improve flood resiliency. The action plan includes an assessment of the capabilities of the City to implement hazard mitigation actions, a review of alternatives, and a mitigation strategy matrix and prioritization matrix that identify the following:

- Description of the action
- Prioritization
- Lead implementation department (or departments)
- Funding sources
- Timeline for implementation

For the purposes of this document, mitigation actions are defined as activities designed to reduce or eliminate losses resulting from flooding impacts.

Although one of the driving influences for preparing this plan was the CRS, this plan does not focus solely on CRS credits. It was essential to the City and the FMP Committee to examine actions that would work through all phases of emergency management. Some of the actions outlined in this plan fall outside the CRS credit criteria, and CRS creditability was not the focus of their selection. Rather, the focus was on the actions' effectiveness in achieving the goals of the plan and whether they are within the City's capabilities. Table ES-1 presents a summary of the hazard mitigation actions identified in the action plan.



Table ES-0-1. Recommended Flood Mitigation Actions

Action #	Description	Priority
1	Create an annual stormwater and floodplain management workshop for City leaders, Councilmembers, and Neighborhood Services to help with stormwater and floodplain education and outreach hold prior to presentation at the Council Meeting.	Medium
2	Present annually at a City of Phoenix Council Meeting on state of City's stormwater and floodplain program.	Low
3	Develop flyers, CRS Annual Outreach Letter, and ongoing updates to the City's Floodplain webpage for use by the public, City leaders, policy makers, and the City's Neighborhood Services department.	Low
4	Post at least five times per year on stormwater, floodplain, or flood insurance related topics on the City's social media platforms.	Low
5	Provide stormwater section bi-annually within the City's water bill for stormwater and floodplain outreach and education purposes.	Low
6	Attend/Present at four neighborhood associations meetings, festivals, or home & garden shows per year to provide information to the public on recent, current, and future stormwater and floodplain projects and the importance of flood insurance if property in floodplain.	Low
7	Place signage at City dams to educate the public of the presence of the structure, the need for the structure, and risks.	Low
8	Provide annual outreach to repetitive loss areas.	High
9	Continue to participate in local or independent annual dam safety and flood response exercises and invite other agencies to participate.	High
10	Continue to coordinate with other local and regional agencies for flood warnings and emergency response.	Medium
11	Have at least one City staff attend a FEMA training/workshop annually for emergency response or floodplain management.	Medium
12	Coordinate with Arizona Department of Water Resources to establish a network of Continuously Operating Reference Stations (CORS) throughout the City to provide overlapping coverage to support increased detail in surveys for development and public infrastructure projects.	Low
13	Hold an annual in person meeting, and record for a webcast, to provide recommendations for proper vegetation maintenance and flood preparedness.	High
14	Evaluate the requirement for new developments to preserve natural drainage corridors and implement Green Stormwater Infrastructure and Low Impact Development.	Low
15	Complete major projects within the current Capital Improvement Program – Paradise Ridge Drainage Improvements; Drainage Improvements: 20th Street between Winchcomb Drive and 19th Way; Storm Drain Replacement Study; Laveen Flood Mitigation; Hohokam Drainage Program; 3rd Street and Thomas; 12 ARPA Projects; and Storm Drain Asset Management and Replacement Program	Medium
16	Identify and map critical infrastructure and facilities within the City of Phoenix (for Internal City Use Only).	High
17	Evaluate flood risks for critical infrastructure and facilities (for Internal City Use Only).	Medium
18	Provide flood fight materials (sand and bags) at/near critical infrastructure and facilities based on flood risk (for Internal City Use Only).	Medium
19	Annually update database of critical infrastructure and facilities (for Internal City Use Only).	Medium
20	Establish or Update Emergency Action Plans to address flood response scenarios for City-owned critical infrastructure and facilities (for Internal City Use Only).	Medium
21	Update Emergency Action Plans notification charts annually for the City's flood control dams.	High
22	Documentation of maintenance occurring at problematic areas throughout the year, including cost to complete each occurrence.	Medium



Action #	Description	Priority
23	Continue monitoring of self-audit maintenance for drywells installed after 2022 when guidance was established.	Medium
24	Publicize City's 311 App and Webpage for reporting maintenance issues.	Medium
25	Publicize a summary of the City's stormwater maintenance work completed each year (webpage, social media post, and/or water bill).	Low
26	Continue to evaluate on an annual basis the current stormwater and floodplain requirements, zoning and subdivision ordinances, guidelines, regulations, codes, design manuals, and land use plan for updates.	Medium
27	Evaluate and update Building Codes on a routine basis (at least every 5 years).	Medium
28	Develop a publicly facing vegetation maintenance guide for private use for wash corridors, storm drain inlets and outlets, and stormwater storage basins and provide at outreach events and on City's website.	Low
29	Evaluate City-owned storm drain infrastructure for maintenance and rehabilitation needs.	High
30	Utilize General Obligation Bond funding to mitigate flooding risks.	High
31	Seek opportunity to apply for grants through state and federal agencies to reduce the burden on the City for stormwater and floodplain management projects.	High
32	Continue partnership with the Flood Control District of Maricopa County and the Small Projects Assistance Program.	Medium

IMPLEMENTATION, EVALUATION, AND REVISION

Full implementation of the recommendations of this plan will require time and resources. This plan reflects an adaptive management approach in that specific recommendations and plan review protocols are provided to evaluate changes in vulnerability and action plan prioritization after the plan's adoption. The true measure of the plan's success will be its ability to adapt to the ever-changing needs of hazard mitigation. Funding resources are always evolving, as are programs based on state or federal mandates.

The City of Phoenix's commitment to proactive floodplain management is evidenced by its participation in the CRS program and the development of this plan. Its well-established programs and policies have strived to maintain the flood risk at a steady level without increase. The framework established by this plan will help maintain this tradition in that it identifies a strategy that maximizes the potential for implementation based on available and potential resources. It commits the City to pursue actions when the benefits of a project exceed its costs. These techniques will set the stage for successful implementation of the recommendations in this plan. The Phoenix City Council assumes responsibility for adopting the recommendations of this plan and committing City resources toward its implementation as the City's budget permits.

The City will commit to an annual review and evaluation of the FMP for progress and revision with the FMP Committee.



1 INTRODUCTION AND STEP 1 ORGANIZE

The City of Phoenix prepared this Floodplain Management Plan to better protect the residents, property, and assets throughout the City from the effects of flood hazards.

The City of Phoenix recognizes the strategic value of being proactive for residents at risk of flooding and is preparing this update to the FMP, previously issued in May 2016. This FMP update assesses the flood hazards within the jurisdictional boundaries of the City, while maintaining an objective outlook toward the coordination with partner cities and agencies for collaborated efforts in reducing flood risk. The FMP update summarizes the previous completed plan elements, provides a review of progress achieved to date, and sets a roadmap for future actions to reduce flood risk.

1.1 WHY PREPARE THIS PLAN?

The 2025 City of Phoenix FMP presents measures to mitigate potential flood problems in the City of Phoenix. The purpose of these measures is to reduce or alleviate the loss of life, personal injury, and property damage that can result from flooding. They involve long- and short-term strategies such as planning, policy changes, programs, projects, and other activities to mitigate the impacts of floods. The 2025 FMP identifies resources to help guide and coordinate mitigation activities.

All citizens and businesses of the City of Phoenix are the ultimate beneficiaries of the 2025 FMP. Participation in development of the 2025 FMP by key stakeholders helped ensure that outcomes will be mutually beneficial for all affected interests. The responsibility for floodplain management lies with many, including private property owners, business, industry, and local, state, and federal government. The 2025 FMP's goals and recommendations can lay groundwork for the development and implementation of local mitigation activities and partnerships.

Numerous state and federal programs and regulations promote floodplain management planning. Notable among these are two programs of the Federal Emergency Management Agency (FEMA): the National Flood Insurance Program (NFIP) and the Community Rating System (CRS). These programs provide benefits in the form of reduced flood insurance costs for communities that meet minimum requirements for floodplain management. The City of Phoenix participates in both the NFIP and the CRS. The 2025 FMP was developed to meet the following objectives:

- Comply with local, state, and federal requirements for floodplain management planning.
- Meet requirements allowing the City of Phoenix to enhance its CRS classification.
- Coordinate existing plans and programs to fund and implement high-priority floodplain management measures.
- Create a linkage between the 2025 FMP and established plans of the City of Phoenix so that they can work together in achieving successful mitigation.



1.2 PLAN UPDATES

The FMP is a living document that the City of Phoenix uses to reduce vulnerability to flood hazards. It serves as the groundwork for a jurisdiction's long-term plan to lessen flooding impacts and establishes a framework for decision-making to mitigate harm to individuals, assets, and the economy from future flood disasters. Flood mitigation projects include preventative actions, property protection, natural resource protection, emergency services, structural projects, and public information. These measures help reduce vulnerability, allowing the City to bounce back more quickly from disasters.

1.2.1 Previous Plans

The City of Phoenix joined the NFIP on December 4, 1979, and has participated in the CRS since October 1, 1992. Floodplain management planning and implementation are principal activities of the City's compliance with the CRS. In December 1992, the City Council adopted the City's first floodplain management plan. That plan identified the City's flood-prone areas and established goals, objectives, policies, and programs to reduce flood related hazards and protect the natural and beneficial functions of the City's floodplains.

The original floodplain management plan was updated in May 2016. The original FMP identified 18 citywide activities to be implemented. The 2021 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan served as the 5-year update to the 2016 FMP. The City of Phoenix included 20 mitigation actions to be implemented.

1.2.2 CRS Steps for Floodplain Management Planning

The 2025 FMP has been developed and updated to follow FEMA's guidelines for flood planning under the CRS program. Developing and maintaining a comprehensive floodplain management plan is among the activities that earn CRS credits towards increased flood insurance discounts. To earn CRS credit for a floodplain management plan, the community's process for developing the plan must include at least one item from each of 10 steps (see Appendix F for details):

- Planning process steps:
 - Step 1, Organize
 - Step 2, Involve the public
 - Step 3, Coordinate
- Risk assessment steps:
 - Step 4, Assess the hazard
 - Step 5, Assess the problem
- Mitigation strategy steps:
 - Step 6, Set goals
 - Step 7, Review possible activities
 - Step 8, Draft an action plan
- Plan maintenance steps:
 - Step 9, Adopt the plan
 - Step 10, Implement, evaluate and revise.



1.2.3 The Updated Plan - What Has Changed?

The overall planning process and plan have been improved and revised for the 2025 FMP. Key changes are outlined as follows:

- Best available data, recent flood event occurrences, and updated capabilities have been incorporated.
- Proposed mitigation strategies have been updated to reflect new actions or updated details on previously identified actions.
- Climate change considerations have been incorporated into the flood profiles instead of as a stand-alone section.

1.3 COMMUNITY PROFILE

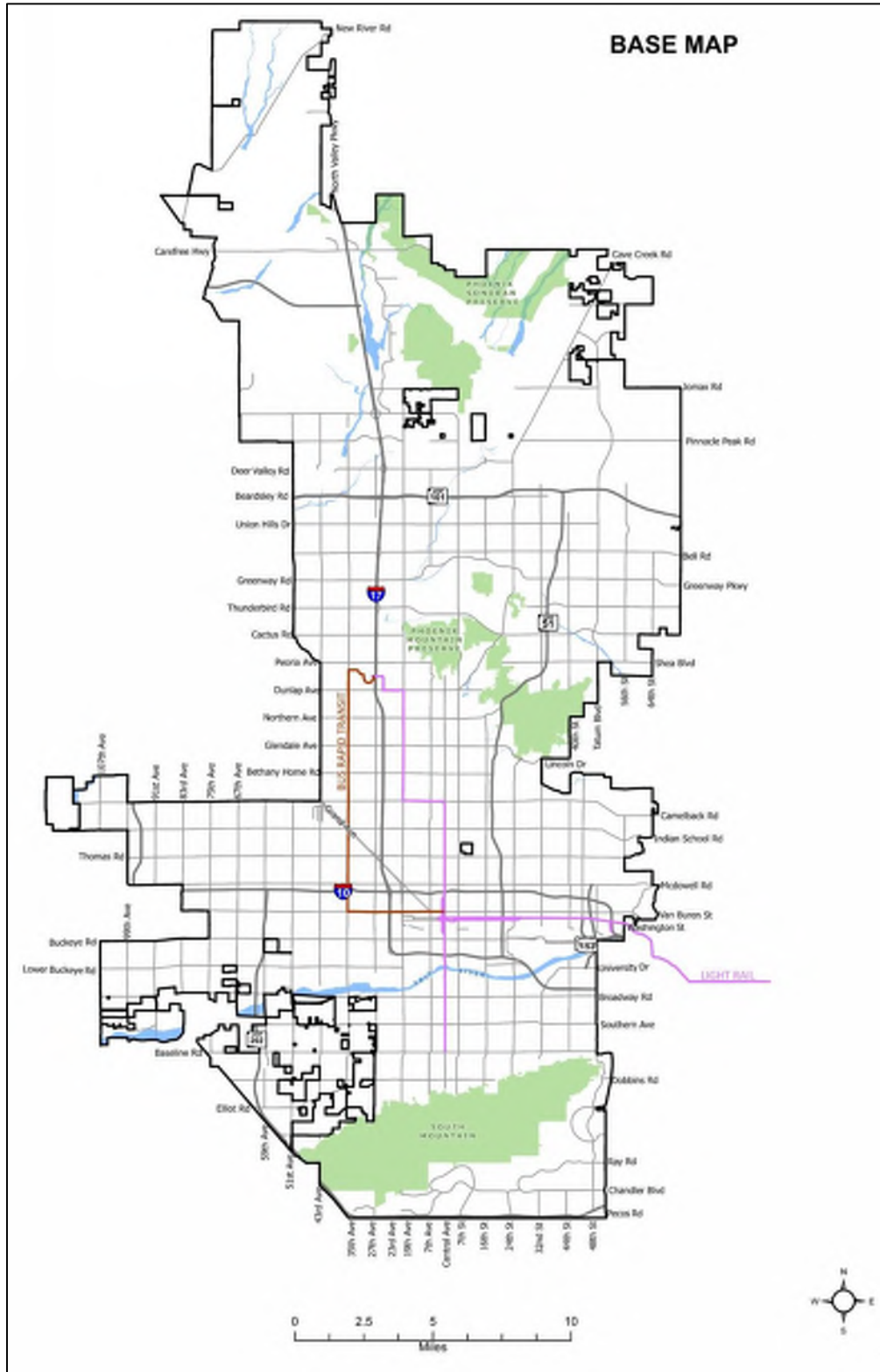
1.3.1 Overview

The City of Phoenix, located in the heart of the greater metropolitan area, dominates the political, economic, and cultural landscape not only of Maricopa County but also much of Arizona. In 1867, Phoenix founder Jack Swilling formed a canal company and diverted water from the Salt River, helping to capitalize on the region's agricultural value. In 1911, the Roosevelt Dam was completed, and water supplies—vital to growth in the region—were stabilized. Strong growth in the region began during World War II when several military airfields were constructed in Maricopa County, and various defense industries followed. Formally incorporated in 1881, today the City of Phoenix includes over 500 square miles and is the nation's fifth most populous city. Phoenix is Arizona's capitol and is located in the County Seat (Maricopa County 2021).

The City of Phoenix is a pioneer in environmental stewardship. Flagship projects, including the Tres Rios Wetlands, Energize Phoenix program, the Rio Salado riparian restoration project, and numerous water conservation efforts, have won the city many awards (City of Phoenix 2015).



Figure 1-1. City of Phoenix Planning Area



Source: (Phoenix 2024)



1.3.1.1 Historical Overview

Hundreds of years before any of the cities in the eastern part of the country were so much as clearings in the wilderness, a well-established, civilized community occupied the land we know as Phoenix between 700 A.D. and 1400 A.D. Those former residents were industrious, enterprising, and imaginative. They built an irrigation system, consisting mostly of some 135 miles of canals, and the land became fertile. The ultimate fate of this ancient society, however, is a mystery. The accepted belief is that it was destroyed by a prolonged drought. Roving Indians, observing the S'edav Va'aki ruins and the vast canal system these people left behind, gave them the name "Ho Ho Kam" -- the people who have gone (City of Phoenix n.d.).

At the turn of the twentieth century, Phoenix was an oasis with lush trees sprouting tall along wide canal banks that crisscrossed Phoenix and its suburbs. In fact, Phoenix was once called – A city of gardens and trees. As Phoenix experienced an explosion of growth after World War II, much of the oasis was transformed into subdivisions, retail stores and employment opportunities. Some of the early components, like the Murphy Bridle Path in north central Phoenix, serve as a reminder of Phoenix's beginnings (City of Phoenix 2015).

While Phoenix continued to see significant growth after the 1950s, the desire to preserve and incorporate the beautiful desert setting was a priority for Phoenicians. As a result, in 1972 the City Council established the Phoenix Mountain Preserve system, which at the time included North Mountain, Shaw Butte and Dreamy Draw totaling 7,500 acres. Today, Phoenix's mountain and desert preserves total more than 35,000 acres (City of Phoenix 2015).

1.3.2 Physical Setting

This section describes the geography, land use, and land cover of the City of Phoenix.

1.3.2.1 Location

Phoenix has grown more north-south than east-west since its inception. Over the last decade, Phoenix has continued to grow outward, with its city limits now encompassing more than 519 square miles (City of Phoenix 2015). To the south, Phoenix is bounded by the Gila River Indian Community, and on the north by unincorporated Maricopa County. Many smaller communities, including Tempe, Paradise Valley, and Scottsdale, define the city to the east, and Peoria and Glendale form the city's western border. The primary roadway network includes Interstates 17 and 10, with State Highway 51 and the Loop 101 and 202 (Maricopa County 2021).

1.3.2.2 Geography and Topography

The natural environment of Phoenix is typical of the Sonoran Desert climate. Rugged urban mountain parks, including South Mountain—one of the nation's largest urban parks—and the Phoenix Mountain Preserve create a memorable skyline. The region's catalyst, the Salt River, now runs dry through the center of the city, and is complemented by various smaller watersheds (Maricopa County 2021).

The overall topography of the City is flat allowing the City's main streets to run on a precise grid with wide, open space roadways. There are mountains located within and around the City. Low mountains



surrounding the valley are comprised of Phoenix Mountains, South Mountain, McDowell Mountains, White Tank Mountains, Superstition Mountains, New River Mountains, and Sierra Estrella Mountains.

The predominant soil type in Phoenix is desert loam, a composition of sand, silt, and clay with a distinctive arid character. These soils have evolved to thrive in the desert climate, exhibiting excellent drainage properties and low water retention (Alluvial Soil Lab 2025).

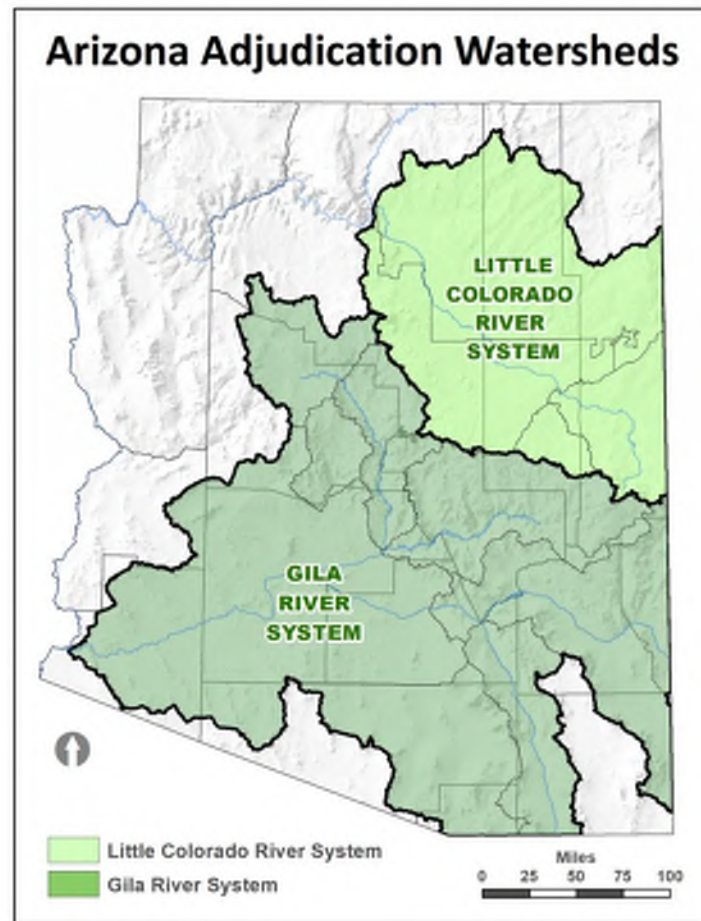
1.3.2.3 Watersheds and Surface Waters

A watershed is a geographical area that directs precipitation and snowmelt towards creeks, streams, rivers, and ultimately outflow locations such as reservoirs, bays, and the ocean. Watersheds vary in size and configuration, encompassing anything from a small body of water or county to vast regions covering thousands of square miles with numerous waterways (National Ocean Service 2024).

The City of Phoenix is located in the Gila River System watershed, which includes the Salt and Verde Rivers (See Figure 1-2 and Figure 1-4). The Gila River provides about 40% of the water supply for the Phoenix metropolitan area (Feller, J. M. 2007). The watershed of the Salt and Verde Rivers is impounded behind the dams of the Salt River Project.



Figure 1-2. Arizona Adjudication Watersheds



Source: (Arizona Department of Water Resources n.d.)

The Central Arizona Project canal which brings water from the Colorado River can supply more than a fifth of the total water for Maricopa County. In addition to this supply, the metropolitan area is situated over a prolific aquifer. To assure an adequate water supply for future generations, the state legislature adopted the Groundwater Management Act in 1980. This act requires careful water management and conservation measures to ensure water will be available for the influx of people expected in the next 20 years and beyond (Maricopa County 2021).

Rivers and washes that flow throughout Phoenix are an important part of the desert landscape. Rivers and washes provide for habitat areas, wildlife corridors and support the ecosystem through continued natural drainage and flows (City of Phoenix 2015).

Today, Phoenix is home to more than 181 miles of canals. Beyond delivering Phoenix's most precious resource, water, throughout the city, the canals have the potential to serve as a catalyst for "elevating the Phoenix metropolitan region into the ranks of one of the most livable cities." There is no other city in the world with a resource so uniquely tied to its past that provides such possibilities for its future. Second only

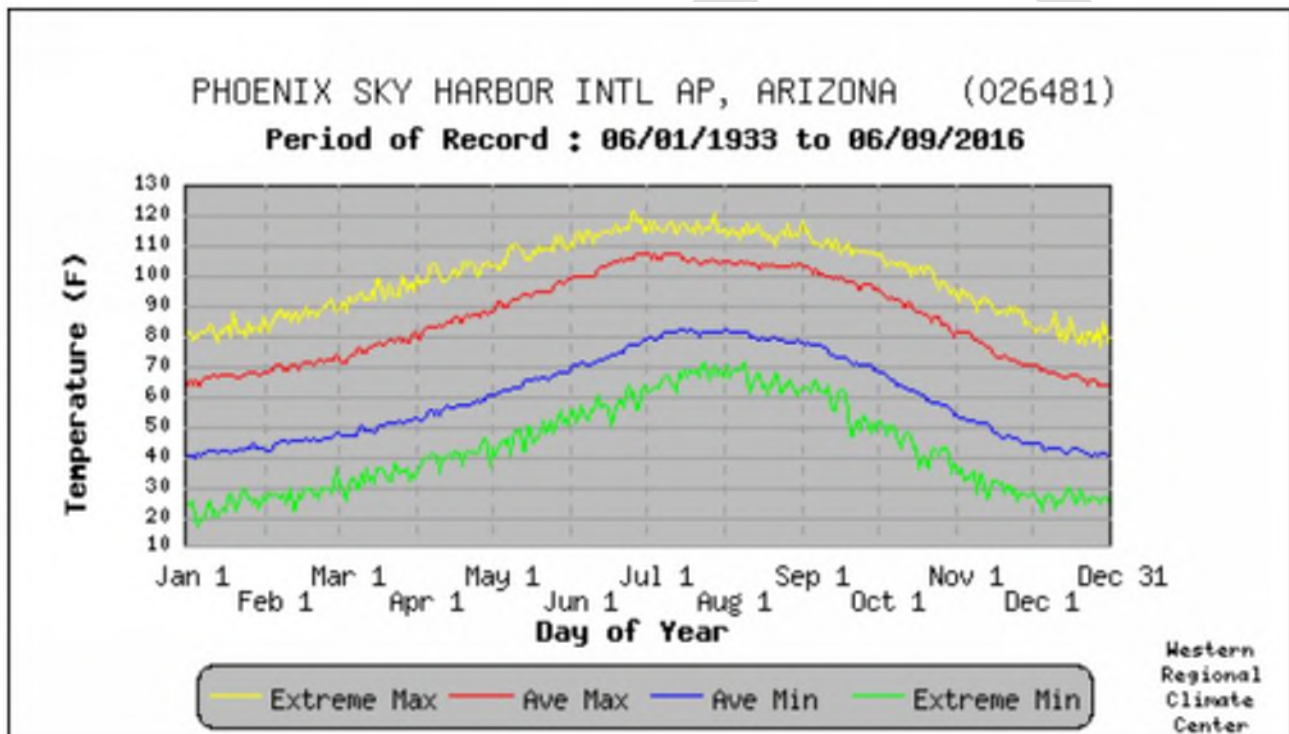


to the City's street network, the hundreds of miles of canal banks provide a tremendous service in giving the opportunity for residents to cut across Phoenix's vast urban and desert landscape without the use of an automobile. The canals represent a multimodal infrastructure that no other city in the world can lay claim to (City of Phoenix 2015).

1.3.2.4 Climate

The climate in City of Phoenix is characterized by the mild winters and hot summers typical of the upper Sonoran Desert regions. Temperatures and precipitation across Maricopa County vary somewhat due to the changes in elevation and orographic influences of local mountains and valleys. The average annual temperature for the City of Phoenix is 74.2 degrees Fahrenheit (°F) (Maricopa County 2021) and has approximately 334 days of sunshine each year (City of Phoenix 2015).

Figure 1-3. Daily Temperatures and Extremes for Phoenix WSFO AP Station, Arizona



Source: (Western Regional Climate Center 2013)

The City averages over 330 days of sunshine per year and receives little rainfall. The average annual rainfall total at Phoenix Sky Harbor International Airport is around 7 inches. Precipitation is sparse during most of the year, but the monsoon brings an influx of moisture. Historically, the monsoon officially starts when the average dew point is 55 degrees Fahrenheit for three days in a row; on average this event occurs around July 7. However, in 2008, the National Weather Service decreed that from that point forward, June 15 would be the official first day of the monsoon, and it would end on September 30. The monsoon raises humidity levels and can cause heavy localized precipitation, occasional flooding, large hail, strong winds, the rare tornado, and dust storms which can rise to the level of a "haboob" in some years.

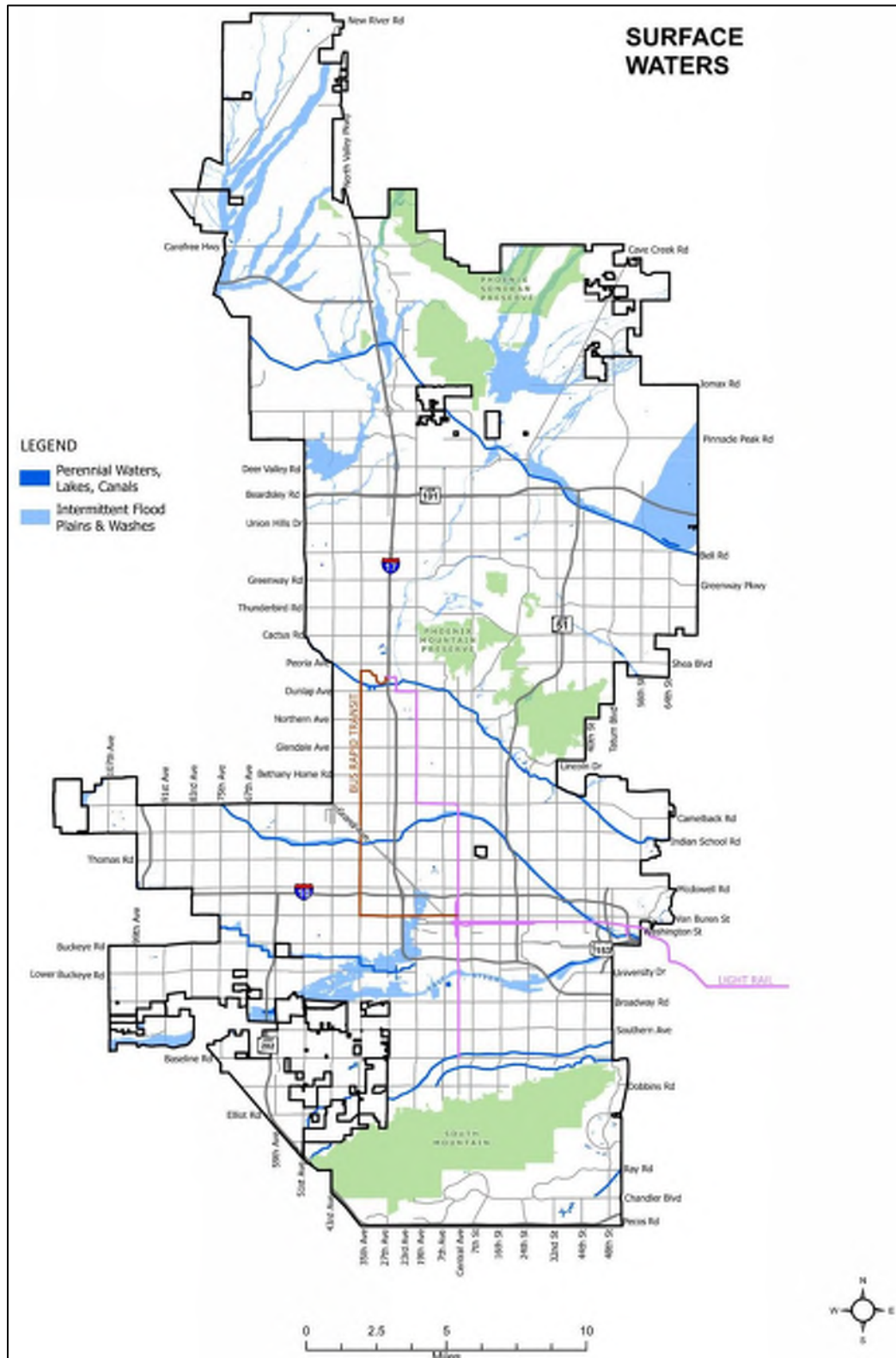


July is the wettest month of the year (1.05 inches), while June is the driest (0.02 inches). On September 8, 2014, the City recorded its single highest rainfall total by the National Weather Service with a total of 3.30 inches. The total rainfall on this day broke the 75-year-old previous record of 2.91 inches, set back on September 4, 1939. This storm was created from the remnants of Hurricane Norbert that had moved up from the Gulf of California and turned the City's major interstates and low-lying roadways into ponds, stranding hundreds of motorists.

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Figure 1-4. City of Phoenix Surface Waters



Source: (Phoenix 2024)



1.3.3 Population and Demographics

Those that live in the City are one of the most important assets and this FMP will assess risk to people and identify mitigation strategies to protect them, including underserved and socially vulnerable populations.

1.3.3.1 General Population

Population totals from the previous 2020 U.S. Census, the 2024 American Community Survey, and projections for 2030 are summarized in Table 1-1 (Maricopa County 2021).

Table 1-1. City of Phoenix Population Growth by Decade

1970	1980	1990	2000	2010	2020	2024	2030
584,303	789,704	983,392	1,321,045	1,445,632	1,608,139	1,650,070	1,816,200

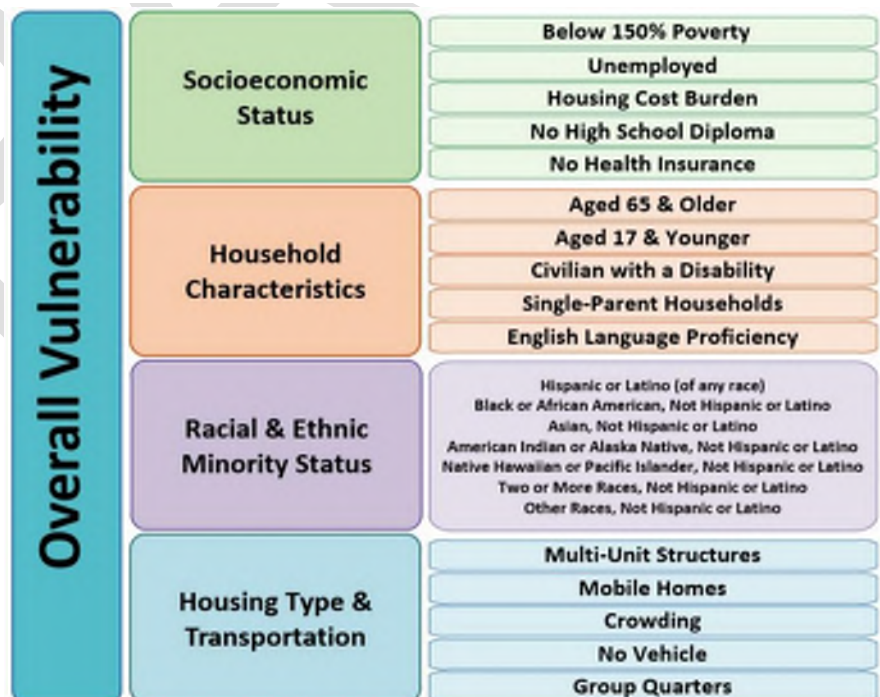
Source: (Maricopa County 2021); (U.S. Census 2025)

1.3.3.2 Vulnerable Populations

Underserved communities are populations sharing a particular characteristic, as well as geographic communities, which have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life. Social vulnerability is the potential for loss within an individual or social group. The term recognizes that some traits influence an individual's or group's resilience. This is their ability to prepare, respond, cope, or recover from an event (FEMA 2023).

Although efforts continue to address underserved and socially vulnerable populations, disparities continue to exist within the City. These demographics may be more at-risk during flood events due to a variety of factors, such as their physical and financial capacity to react or respond effectively, as well as the location and quality of their housing. Those with greater vulnerability may experience more severe impacts during emergencies or disasters. It is essential for public officials to consider the distinct needs of vulnerable populations in order to ensure their safety.

Figure 1-5. CDC/ARSDR Social Vulnerability Index



Source: (CDC/ATSDR 2024)

1.3.3.3 Social Vulnerability Index

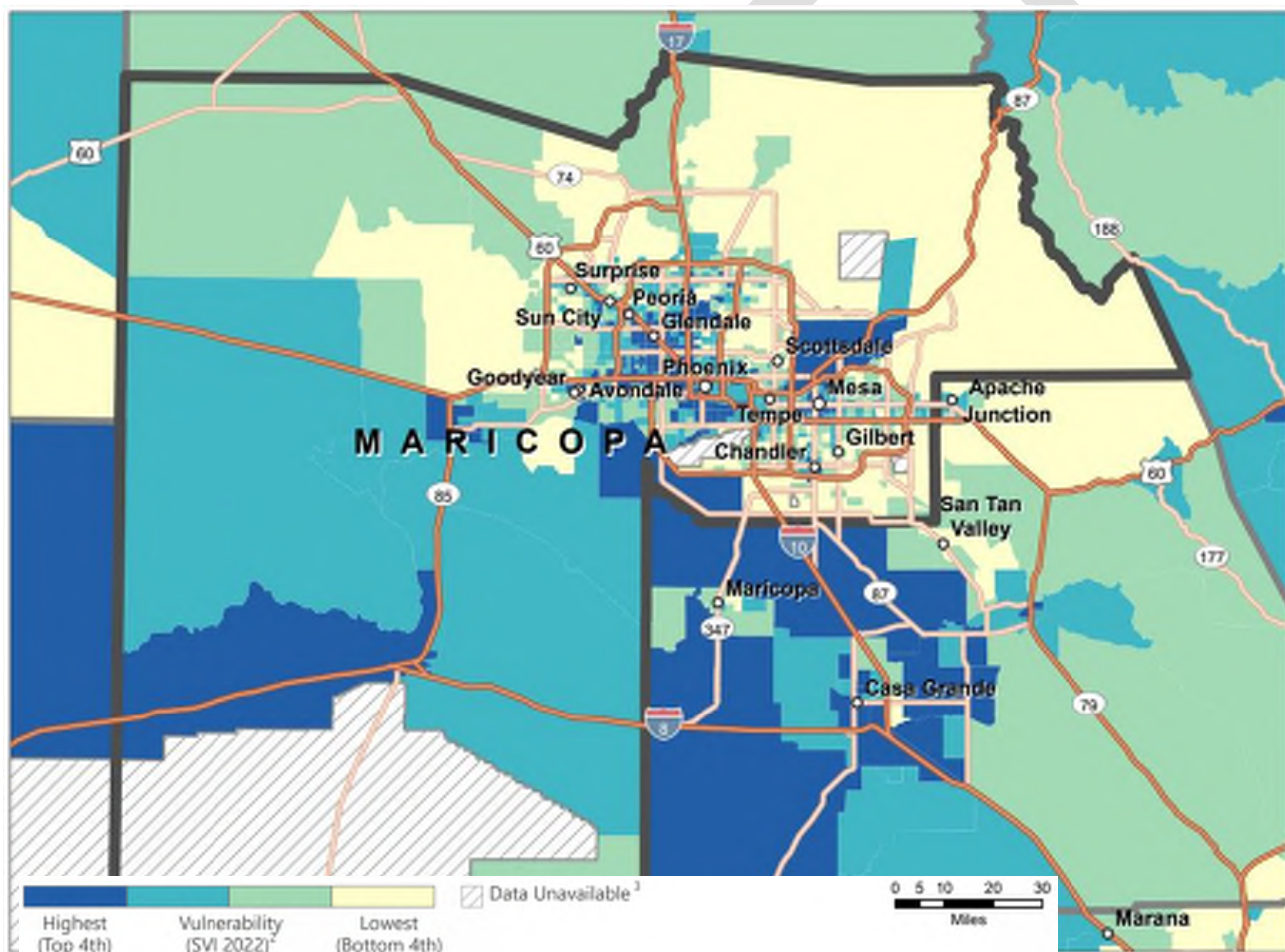
The Centers for Disease Control and Prevention (CDC) and Agency for Toxic Substances and Disease Registry (ATSDR) Social Vulnerability Index (SVI) is a place-based index, database, and mapping application designed to identify



and quantify communities experiencing social vulnerability. The current CDC/ATSDR Social Vulnerability Index uses 16 U.S. census variables from the 5-year American Community Survey (ACS) to identify communities that may need support before, during, or after disasters. The factors include economic data as well as data regarding education, family characteristics, housing, language ability, ethnicity, and vehicle access. These variables are combined into a single measure of overall social vulnerability (CDC/ATSDR 2024). FEMA integrates the CDC/ATSDR Social Vulnerability Index into its National Risk Index (NRI) dataset.

The CDC/ATSDR Social Vulnerability Index 2022 for Maricopa County indicates a high degree of overall social vulnerability can be found in numerous locations in the City of Phoenix (CDC/ATSDR 2022). The Maricopa County data is used since the CDC data does not go to a municipal level.

Figure 1-6. CDC/ARSDR Social Vulnerability Index 2022, Maricopa County, Arizona



Source: (CDC/ATSDR 2022)

Notes: ³One or more variables unavailable at census tract level.

Notes: ⁵Socioeconomic Status: Below 150% Poverty, Unemployed, Housing Costs Burden, No High School Diploma, No Health Insurance. ⁶Household Characteristics: Aged 65 and Older, Aged 17 and Younger, Civilian with a Disability, Single-Parent Household, English Language Proficiency. ⁷Race/Ethnicity: Hispanic or Latino (of any race); Black and African American, Not Hispanic or Latino; American Indian and Alaska Native, Not Hispanic or Latino; Asian, Not Hispanic or Latino; Native Hawaiian and Other Pacific Islander, Not Hispanic or Latino; Two or More Races, Not Hispanic or Latino; Other Races, Not Hispanic or Latino. ⁸Housing Type/Transportation: Multi-Unit Structures, Mobile Homes, Crowding, No Vehicle, Group Quarters.



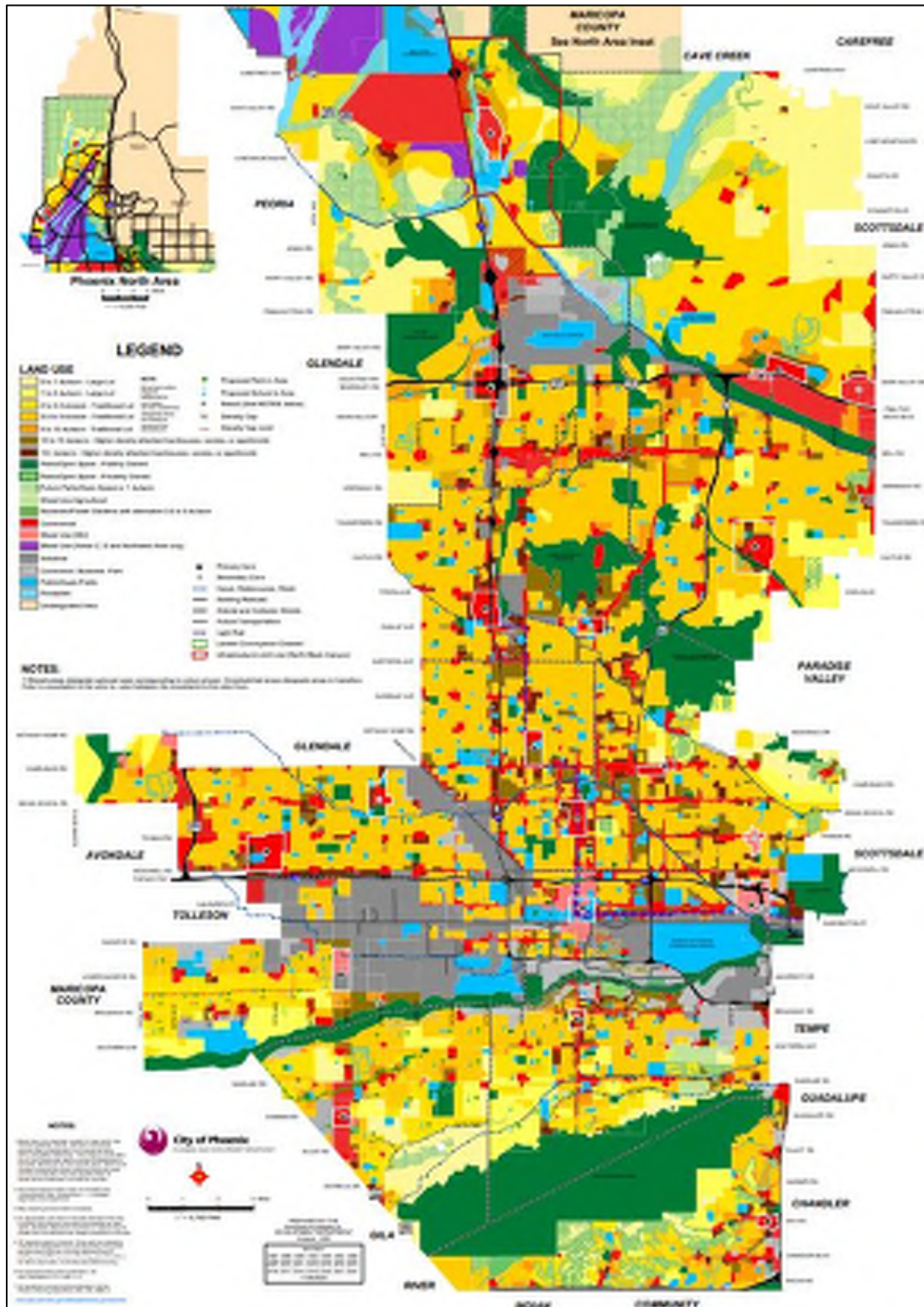
1.3.4 Land Use

Land use describes the human use of land. It represents the economic and cultural activities (e.g., agricultural, residential, industrial, mining, and recreational uses) that are practiced at a given place. Public and private lands frequently represent very different uses (U.S. EPA 2024).

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Figure 1-7. City of Phoenix Land Use and Growth Areas Map



Source: (Phoenix 2024)



There is a significant amount of land in mostly small vacant parcels and larger, underutilized parcels that could be developed or redeveloped within the central villages. Development and redevelopment of this land is hampered by high land costs, potential environmental contamination, costs to relocate utilities, surrounding blight, difficulties in assembling parcels, crime and perceptions of crime, and/or concerns about the school systems. The city has provided incentives for developing these areas, through redevelopment area programs and a broader area single-family infill housing program (City of Phoenix 2015).

The City of Phoenix Planning and Development Department tracks development trends over the past five years. The most prominent development trends include (Maricopa County 2021):

- Strong growth within the Infill Development District: The City of Phoenix's Infill Development District was created on January 1, 2014. The Infill Development District and associated policies remove some of the barriers to infill development. The goal is to promote growth and development in areas served by light rail and existing public infrastructure. In the last decade, high-rise and luxury apartment projects have fueled a construction boom in central Phoenix.
- An increasing population in the central core has led to increased investment in the service and entertainment business environment. Downtown's Roosevelt Row planning district was named one of the nation's best planning concept neighborhoods in 2015 by the American Planning Association. An abundance of nightlife, restaurants, and trendy apartment complexes turned this relatively quiet neighborhood into an entertainment destination. Similarly, the Central Ave core in Midtown and Uptown Phoenix has seen significant capital investments in retail, service establishments and housing. The Park Central mall and Uptown Plaza have undergone major renovations, greatly increasing patronage, interest, and investment.
- Bio-medical and academic expansion: The Arizona State University downtown campus has grown significantly since its creation in 2006. The downtown campus has over 11,000 students with an emphasis on Journalism & Mass Communications and Medical, Nursing & Health Innovations. As part of that medical initiative, the University of Arizona has partnered with Arizona State University for the Phoenix Biomedical Campus, taking advantage of the Phoenix Downtown Code Biomedical district zoning entitlements. A few miles away at Midtowns Park Central Mall, the Creighton University School of Medicine has been completed. The new nine-story, 180,000-square-foot campus will educate nearly 1,000 students annually. Located just a few hundred yards away from the Creighton campus, the Barrow Neurological Institute is currently in the process of a major neurology and brain study facility expansion at Dignity Health St Joseph's hospital. The new 130,050-square-foot, five story building will bring cutting edge technology research and medical innovation for the study of brain injury, stroke, and dementia.
- In northeast Phoenix, Mayo clinic is in the middle of a major campus expansion. The \$650 million expansion will double the size of the facilities and add 1.4 million square feet of building space. The HonorHealth Sonoran Crossing Medical Center is currently under construction in northwest Phoenix on Dove Valley Rd and interstate 17. This 210,00-square-foot medical center will accommodate growing health and wellness needs of north Phoenix and Anthem residents.



- In west Phoenix, Grand Canyon University is experiencing unprecedented growth in student body, land acquisition and infrastructure construction. Due to increased student enrollments, the on-campus student population is currently 19,000. Student population projections at campus buildout are estimated to be 30,000 students. Over \$1.2 billion in infrastructure projects and new programs are planned and being implemented.
- In 2020, Taiwan Semiconductor Manufacturing Company (TSMC) Arizona chose Phoenix for its first advanced U.S. semiconductor manufacturing site – a milestone investment that has expanded from \$12 billion to \$165 billion – representing the largest foreign direct investment in a greenfield project in American history. Plans include six semiconductor wafer fabs, two advanced packaging facilities and an R&D team center. High-volume production on N4 process technology started in Q4 2024. In April 2025, TSMC broke ground on the site of the third fab, slated for N2 and A16 process technologies with volume production expected by the end of the decade. It is expected that development of computing and AI technologies will continue to take place in the Phoenix metro area (TSMC 2025).

1.3.4.1 Residential

There has been moderate residential construction growth in the southwest growth region. Single family and, increasingly multifamily residential units are reacting to the opening of the Loop 202 South Mountain Freeway and this region is seeing the highest level of single-family development. Southeast Phoenix is nearing build out and has only seen modest growth activity. Northern Phoenix contains the most developable land and will likely take many decades to build out. Most of the property in that area is owned by the State Land Trust and development of land for residential and commercial purposes tends to take place at slower pace due to a complex disposition process. Those areas are also affected by several constraints associated with topography, infrastructure requirements, and the regulatory environment that have made development more challenging. However, the City is working with the State Land Department to address many of these issues, and it is possible that a significant amount of urban growth will take place in remaining vacant lands in the north in the coming decade.

Residential growth will continue in the traditional growth areas. Southwest Phoenix will continue to see the most residential development.

1.3.4.2 Vacant

The current trend of urban infill is expected to continue for the foreseeable future. A decreasing availability of vacant properties has led to the repurposing of existing, under-utilized properties. City staff continues to work with developers, investment groups, the historic preservation community and concerned citizens to strike the most appropriate balance between growth, livability, and the City's history. The continued growth of high-rise residential units is anticipated to slow down, at least in the immediate future. The majority of previous multifamily projects in the infill district in recent years have been rental units. It is anticipated that more owner-occupied units will be planned as inventory has dwindled under recent market conditions.



1.3.4.3 Transportation

Light rail expansion will continue to drive growth in the Infill incentive district and beyond. Construction of the light rail for the south-central corridor has recently been completed. Service, retail, and multi-family projects are expected now that the line has been finished. Further light rail extensions to the north and west are planned. Major redevelopment and renovations are planned to revitalize the Metro center mall district. A major transportation hub has been planned and will be implemented as the rail line is constructed.

1.3.4.4 Agriculture

The South Mountain 202 freeway has made thousands of acres of vacant farmland more readily accessible. An increase in multi-family homes is anticipated. The northern growth areas will likely see modest growth because of the limited supply of land being brought to market. However, there are a number of projects being proposed or contemplated by the State Land Department and interest on the part of the development community is strong, so there may be significantly more activity towards the end of the five-year period. For example, the Rawhide wash channelization project in northeast Phoenix was recently completed. A Letter of Map Revision is being submitted to FEMA to have over 2,000 acres of land taken out of the 100-year floodplain as a result of this project. Growth is anticipated in this area. The State Land Department is working with the City of Phoenix to release 3,500 acres in northwest Phoenix as part of a major technology and industrial hub.

There are significant infrastructure requirements to bring this project forward however all parties are focused on streamlining the critical path. Initial project and infrastructure improvements could start within the next two years.

1.3.5 Economy

In 2023, the Phoenix Metro Region had a gross metropolitan product of over \$398 million (Federal Reserve Bank of St. Louis n.d.). The largest industries in the City of Phoenix are real estate, financial services, and manufacturing. Employment by sector in the Phoenix Metro Region is described in Table 1-2. According to the February 10, 2025, Phoenix Area Economic Summary, the City of Phoenix has an unemployment rate of roughly 3.2% (Bureau of Labor Statistic 2025).

Table 1-2. Phoenix Metro Area Employment, December 2024

Sector	Total Employees
Mining and logging	4,000
Construction	169,100
Manufacturing	147,200
Trade, transportation, and utilities	499,600
Information	40,900
Financial activities	215,800
Professional and business services	398,200
Education and health services	434,700
Leisure and hospitality	251,300
Other services	78,900
Government	263,700

Source: (Bureau of Labor Statistic 2025)



STEP 1: ORGANIZE

Under Step 1, the City must describe how they organized the overall process in updating the FMP. A successful planning effort includes active participation and buy-in from the whole community – individuals and communities, all levels of government, private and non-profit sectors, faith-based organizations, non-governmental establishments, community lifelines, and members of the public. The 2025 FMP planning team was made up of a Core Planning Team and FMP Committee.

1.4 FORMATION OF THE PLANNING TEAMS

1.4.1 Core Planning Team

This planning effort was initiated and overseen by the City of Phoenix Floodplain Management Office (Office of the City Engineer). Black & Veatch Corporation (Black & Veatch) was selected as a contract consultant to assist the City of Phoenix and its Floodplain Management team through the FMP planning process. The **Core Planning Team** was made up of discipline leads from the City's contract consultant (Black & Veatch) and key personnel from the City's Floodplain Management Office. The Core Planning Team was responsible for the overall coordination of the planning process.

1.4.2 FMP Committee

The **FMP Committee** was formed to oversee the planning effort to develop the 2025 FMP. Committee members included City of Phoenix staff, citizens, and other stakeholders. The Core Planning Team assembled a list of candidates representing interests within the City that could have recommendations for the plan or be impacted by its recommendations. The Core Planning Team organized the makeup of the FMP Committee to maximize CRS credit under Step 2 (Involve the Public) of CRS Activity 510. This step credits a planning process conducted through a planning committee that includes members of the public and/or non-governmental stakeholders. The Core Planning Team confirmed a committee of 17 members made up of departments, agencies and residents, as listed in Table 1-3. The makeup of this committee was 7 City departments and 10 external stakeholders. A detailed list of participants can be found in Appendix C.



Table 1-3. 2025 FMP Committee Participants

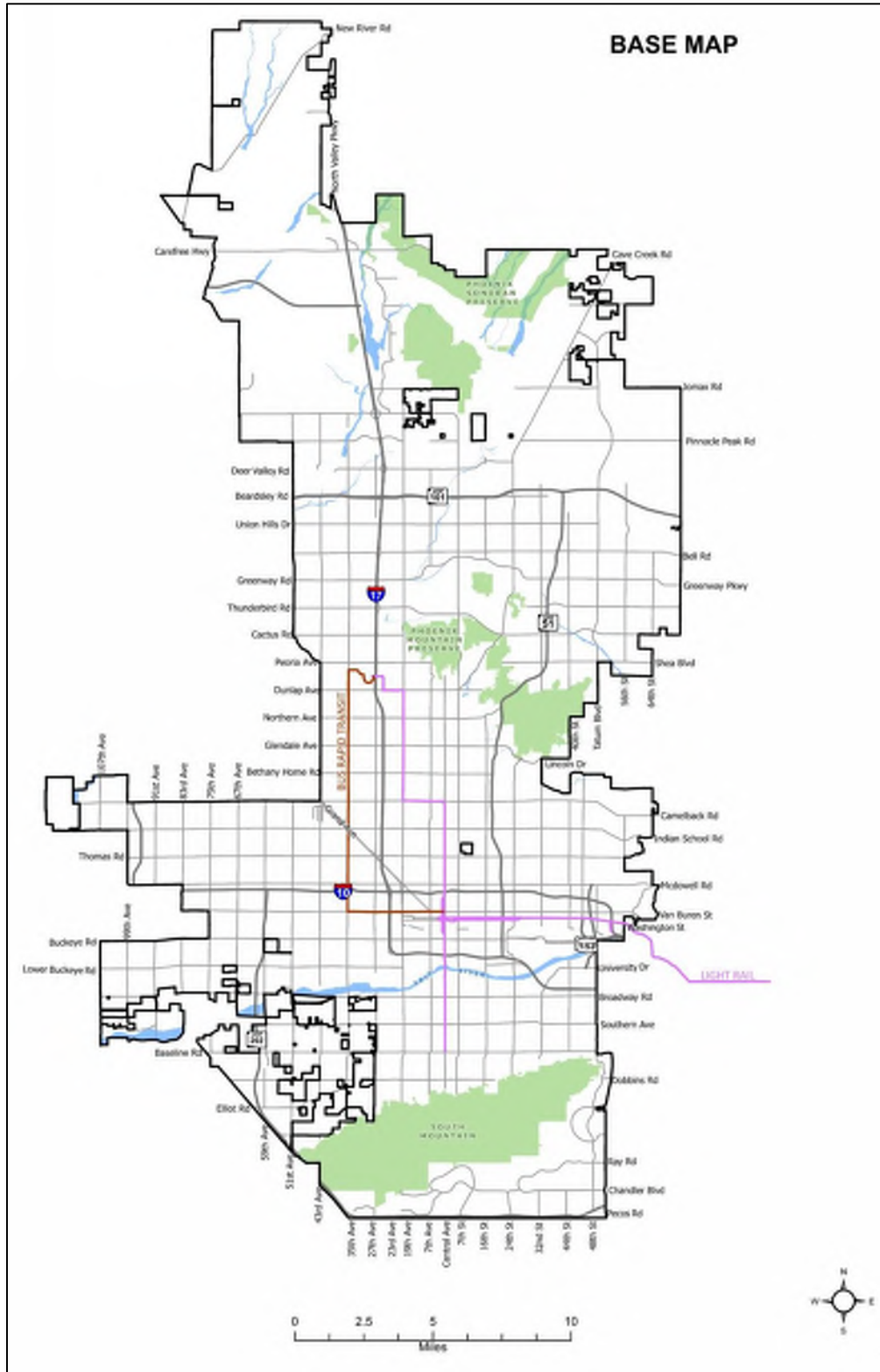
Jurisdiction / Organization	FMP Meetings Attended (5 Max)	City Department	External to City
Floodplain Management Office	5	X	
Homeland Security & Emergency Management	4	X	
Office of Environmental Programs	5	X	
Parks and Recreation	2	X	
Planning and Development Department	5	X	
Communications Office	2	X	
Public Works	1	X	
Street Transportation/Dams	5	X	
Village Planning Committees	4	X	
Water Services	5	X	
Resident 1	5		X
Resident 2	5		X
Resident 3	5		X
Resident 4	4		X
Resident 5	5		X
Arizona Department of Transportation	4		X
Arizona Department of Water Resources	4		X
Arizona State Land Department	5		X
Flood Control District of Maricopa County	5		X
Maricopa County Department of Emergency Management	2		X
National Weather Service	4		X

1.5 DEFINING THE PLANNING AREA

The planning area was defined as all areas within the City of Phoenix city limits (see Figure 1-8). This section provides general information about the City of Phoenix, including its historical information, physical setting, general building stock, land use, population, demographics, population trends, and community lifelines. Analyzing this information leads to an understanding of the study area, including economic, structural, and population assets at risk, and of concerns that could be related to flood hazards analyzed in this plan (e.g., low-lying areas prone to flooding, high percentage of vulnerable persons in an area).



Figure 1-8. City of Phoenix Planning Area



Source: (Phoenix 2024)



1.6 PLAN ADOPTION

CRS benefits can only be achieved after the Plan is adopted. This plan was submitted for a preadoption review to FEMA prior to adoption. After pre-adoption was provided, the City of Phoenix will formally adopt the Plan. Copies of the adoption resolution are provided in **Appendix G**.

1.7 INTEGRATION WITH PLANNING PROGRAMS

The assessment of capabilities identified areas where floodplain management is currently integrated into other plans and programs. The assessment looked for opportunities to integrate this FMP with the legal/regulatory capabilities identified during the capability assessment (Section 3). Capabilities were identified as integration opportunities if they can support or enhance the actions identified in this plan or be supported or enhanced by components of this plan. The FMP Committee and City departments considered actions to implement this integration as described in their jurisdictional annexes.

1.8 CONTINUED PUBLIC AND STAKEHOLDER INVOLVEMENT

The Floodplain Management Plan will be hosted online on the City website. Public and stakeholder input will be reviewed at the annual review meeting for the plan. Updates to the plan will be publicized.



2 STEP 2: INVOLVE THE PUBLIC

Public involvement in the 2025 FMP was accomplished in numerous ways, which included:

- Representation of stakeholders and the public on the FMP Committee
- Stakeholder coordination and involvement opportunities
- Public outreach and input opportunities.

Details regarding how the public was involved in the FMP update is described below.

2.1 FMP COMMITTEE

The **FMP Committee** was formed to oversee the planning effort to develop the 2025 FMP. Committee members included City of Phoenix staff, citizens, and other stakeholders. The Core Planning Team assembled a list of candidates representing interests within the City that could have recommendations for the plan or be impacted by its recommendations. The planning team organized the makeup of the FMP Committee to maximize CRS credit under Step 2 of CRS Activity 510. This step credits a planning process conducted through a planning committee that includes members of the public and/or non-governmental stakeholders. Refer to Section 1.4 and Table 1-3 for a list of representatives on the FMP Committee.

2.2 STAKEHOLDER COORDINATION AND INVOLVEMENT

Opportunities for involvement in the planning process were provided to neighboring communities, local and regional agencies involved in floodplain management, agencies with authority to regulate development, businesses, academia, and other private and nonprofit interests (CRS Step 3). The 2025 FMP incorporates feedback and information from stakeholders as deemed relevant, as referenced within. Outreach to stakeholders was conducted in a timely manner and maintained throughout the planning process. This section outlines the stakeholders who were involved in the creation of 2025 FMP and outlines their participation.

2.2.1 Stakeholder Participation

Stakeholders were invited via email on October 14th, 2025, to participate in the FMP Committee. Each organization had primary and secondary representatives to attend the five committee meetings held from January 2025 to April 2025. Those who accepted the invitation actively participated in discussions and workshops at the committee meetings to support the development of the 2025 FMP. Outside of the committee meetings, a broader stakeholder outreach was performed with some existing committee members and newly identified stakeholders to discuss local projects and activities related to stormwater, flooding and floodplains.

Below is a summary of the stakeholders' involvement in the planning process, demonstrating the extensive outreach efforts made by the City. For further details on stakeholder involvement, please refer to Appendix B (Stakeholder Outreach Materials). Key elements of stakeholder outreach include:



- Identifying local agencies, residents, and groups for participation
- Providing online survey to gain public input
- Developing a Fact Sheet to inform stakeholders

2.2.1.1 Federal Agencies

Table 2-1 describes how federal agencies and departments participated in the 2025 Phoenix FMP. Those listed in the table below were directly or indirectly involved in the process and provided crucial information to update the FMP. Refer to Appendix B (Stakeholder Outreach Materials) for further details.

Table 2-1. Federal Agencies and Departments

Agency/Department	Participation
FEMA Region 9	FEMA provided updated planning guidance; provided summary and detailed NFIP data for the planning area; presented preliminary regulatory flood products to municipalities and the public; participated in a mitigation strategy workshop; and conducted plan review
NOAA National Centers for Environmental Information (NCEI)	NCEI's online tools were accessed to obtain information regarding hazard identification, hazard details, and risk assessments to incorporate into the FMP.
NOAA National Weather Service (NWS)	Served on the FMP Committee. Participated in stakeholder outreach interview.
NOAA Storm Prediction Center (SPC)	Information accessed to support risk assessment.
U.S. Army Corps of Engineers (USACE)	Information accessed to support risk assessment including the National Inventory of Dams and the National Levee Database.
U.S. Census Bureau	Information accessed to support City profile and risk assessment.
U.S. Department of Agriculture (USDA)	Information accessed to support risk assessment.
U.S. Department of Health and Human Services (USDHSES)	Information accessed to support risk assessment.
U.S. Environmental Protection Agency (USEPA)	Information accessed to support risk assessment.
U.S. Geological Survey (USGS)	Information accessed to support risk assessment.

2.2.1.2 State Agencies

Table 2-2 describes how state agencies and departments participated in the 2025 Phoenix FMP update. Those listed in the table below were directly or indirectly involved in the process and provided crucial information to update the FMP. Refer to Appendix B (Stakeholder Outreach Materials) for further details.

Table 2-2. State Agencies and Departments

Agency/Department	Participation
Arizona Department of Emergency and Military Affairs	Invited to participate in stakeholder outreach interview. Provided information through the 2023 Arizona State Hazard Mitigation Plan.
Arizona Department of Water Resources	Served on the FMP Committee. Participated in stakeholder outreach interview.
Arizona State Land Department	Served on the FMP Committee. Participated in stakeholder outreach interview.
Arizona Department of Transportation	Served on the FMP Committee. Participated in stakeholder outreach interview.



2.2.1.3 County Agencies

Table 2-3 describes how Maricopa County agencies and departments participated in the 2025 Phoenix FMP update. Those listed in the table below were directly or indirectly involved in the process and provided crucial information to update the FMP. Refer to Appendix B (Stakeholder Outreach Materials) for further details.

Table 2-3. County Agencies and Departments

Agency/Department	Participation
Maricopa County Department of Emergency Management	Served on the FMP Committee. Participated in stakeholder outreach interview. Provided information through the 2021 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan.
Flood Control District of Maricopa County	Served on the FMP Committee. Invited to participate in stakeholder outreach interview. Provided information through the 2020 Floodplain Management Plan for Unincorporated Maricopa County.
Maricopa Association of Governments (MAG)	Invited to participate in stakeholder outreach interview.
Maricopa County Department of Transportation (MCDOT)	Invited to participate in stakeholder outreach interview.

2.2.1.4 Regional and Local Stakeholders

Five non-governmental stakeholders were invited to participate in the FMP update process and are listed in the tables below. Of those invited to participate, four stakeholders from four different agencies provided input in a variety of ways. Those that served on the FMP Committee and those that completed the stakeholder survey are noted accordingly.

Regional and local stakeholders that participated in the 2025 FMP planning process are described in Table 2-4. Refer to Appendix B (Stakeholder Outreach Materials) for further details.

Table 2-4. Regional and Local Stakeholders Involved in the Planning Process

Agency or Organization Name	Participation
Central Arizona Conservation Alliance (CAZCA)	Participated in stakeholder outreach interview.
Phoenix Mountains Preservation Council	Invited to participate in stakeholder outreach interview.
Arizona Forward	Participated in stakeholder outreach interview.
AZ STORM	Participated in stakeholder outreach interview.
Maricopa Audubon Society	Invited to participate on the FMP Committee.

2.2.1.5 Neighboring Communities

Adjacent local jurisdictions were invited to contribute to the 2025 FMP planning process. Neighboring jurisdictions were invited via email to participate in an outreach interview conducted by the contract consultant. These interviews were to identify and discuss any recent, ongoing, or future projects or activities related to stormwater, flooding, or floodplains within or adjacent to the City of Phoenix. Participants were also given the opportunity to be notified once the Draft Floodplain Management Plan for the City of Phoenix was ready for stakeholder and public review.



Table 2-5. Neighboring Communities Involved in the Planning Process

Agency or Organization Name	Participation
City of Scottsdale	Participated in stakeholder outreach interview. The Rawhide Wash Flood Hazard Mitigation Project was discussed. The City of Phoenix is a part of this project and has all the relevant data and information needed.
Town of Paradise Valley	Participated in stakeholder outreach interview. Town is currently working through updates to their Stormwater Master Plan which is anticipated to be complete June 30, 2025.

2.2.2 Pre-Adoption Review

All the agencies listed above were provided an opportunity to review and comment on this plan, primarily through the floodplain management plan website. All agencies were sent an e-mail message informing them that draft portions of the plan were available for review. In addition, the complete draft plan was sent to the Insurance Services Office, FEMA's CRS contractor, for a pre-adoption review to ensure CRS program compliance.

2.3 PUBLIC OUTREACH AND INPUT OPPORTUNITIES

Broad public participation in the planning process helps ensure that diverse points of view about local needs are considered and addressed. CRS credits are available for providing opportunities to comment on floodplain management plans during the drafting stages and prior to plan approval, as well as for optional public involvement activities (CRS Step 2). This section describes the outreach strategy the City implemented to involve the public throughout the planning process.

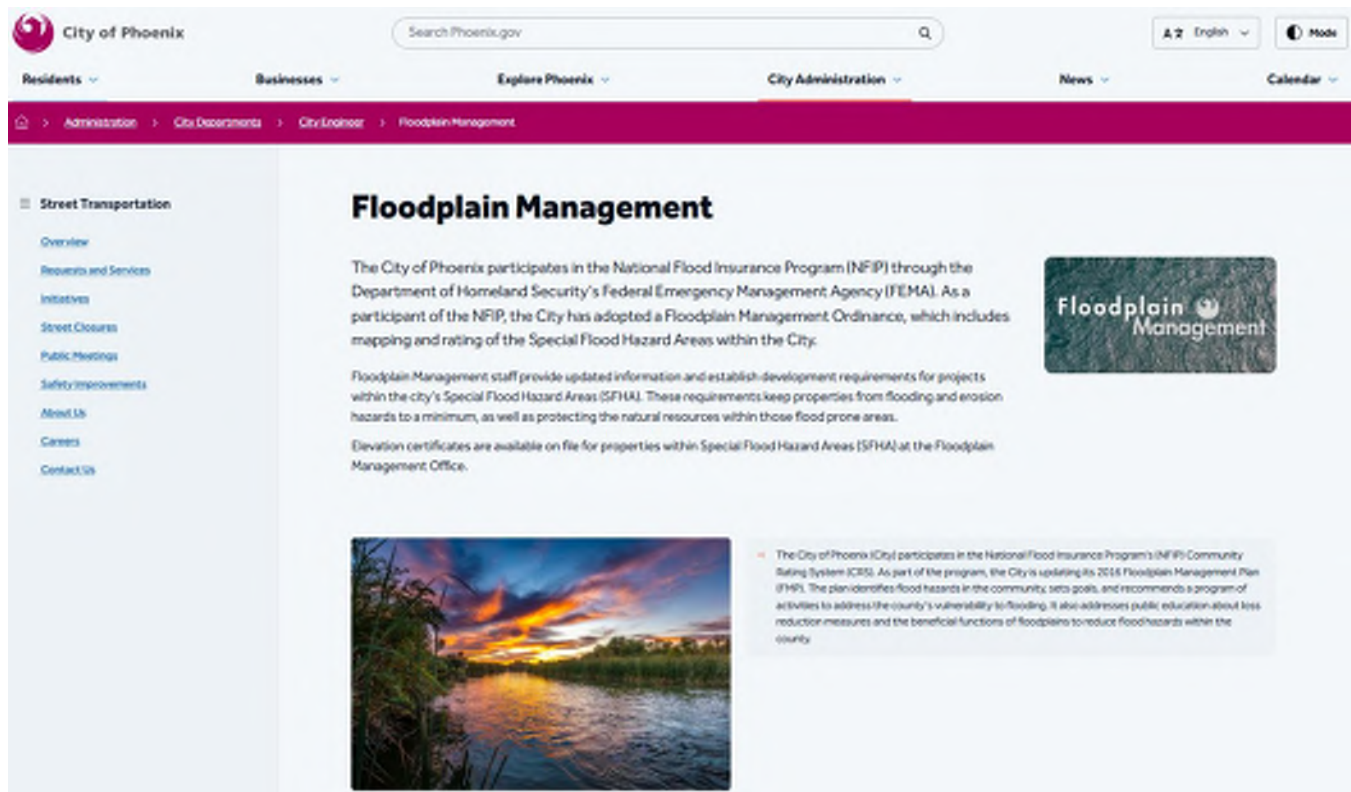
2.3.1 Floodplain Management Plan Webpage

The City of Phoenix maintains a Floodplain Management Plan website that was used to keep the public informed about milestones, public participation opportunities, and to solicit input.

(<https://www.phoenix.gov/administration/departments/city-engineer/floodplain-management.html>)



Figure 2-1 City of Phoenix Floodplain Management Website



2.3.2 Social Media

The City used Facebook, NextDoor, Instagram, and X (formerly Twitter) to promote the planning effort, including the public survey, public comment period, and public meeting. Example posts for the FMP are provided within Appendix A.

2.3.3 Print Media

A fact sheet has been prepared for public distribution to provide clear and condensed information on the 2025 FMP. It outlines what an FMP is, why it is needed, highlights of the benefits of the plan and the CRS classification. It also includes a public survey to gather community input and a link directly to the City's FMP webpage to provide residents more information on the plan. The FMP Fact Sheet is provided within Appendix A.

2.3.4 Public Meeting

A public meeting was held virtually to announce the availability of the draft FMP for public review on May 22, 2025. This meeting was advertised on the City's FMP webpage, fact sheet, social media posts, and inserts within the water bill. 3,757 postcards were mailed (with English and Spanish translations) and various social media posts (posted on May 11, May 16, and May 20, 2025) were made to promote the meeting. 44 members of the public registered to attend the meeting.



Documentation for the public meetings, including the presentation and sign-in sheets, is provided within Appendix D.

Figure 2-2 Postcard Mailer Advertising Public Meeting



STREET TRANSPORTATION DEPARTMENT

VIRTUAL PUBLIC MEETING NOTICE
Floodplain Management Plan
Thursday, May 22 at 6:00 PM
Virtual (join by computer or phone)

This property address is located in or near a location that could be affected by flooding activity. The City of Phoenix is hosting an educational virtual meeting on May 22, 2025 at 6:00 p.m. to invite your input as the city updates its Floodplain Management Plan. Community input is key to providing a well-rounded plan to mitigate against flooding and protect people, property, and the natural environment. Learn more and register to attend the May 22, 2025 meeting by scanning the QR code.

AVISO DE REUNIÓN PÚBLICA VIRTUAL
Plan de Gestión de Llanuras Inundables
Jueves 22 de mayo a las 6:00 PM
Virtual (úñase por computadora o teléfono)

La dirección de esta propiedad se encuentra en o cerca de una zona con riesgo de inundación. La Ciudad de Phoenix organizará una reunión virtual el 22 de mayo de 2025 a las 6:00 p.m. para solicitar su opinión mientras la ciudad actualiza su Plan de Gestión de Llanuras Inundables. La opinión de la comunidad es fundamental para desarrollar un plan integral para mitigar las inundaciones y proteger a las personas, las propiedades y el medio ambiente. Obtenga más información e inscribase para asistir a la reunión del 22 de mayo de 2025 escaneando el código QR.

WEBSITE/SITIO WEB: [Phoenix.gov/Streets/Meetings](https://phoenix.gov/streets/meetings)

If you require reasonable accommodations for this process, please contact the project hotline. This notice can be made available in an alternate format upon request by calling 602-262-6284.

Si necesita adaptaciones razonables para este proceso, comuníquese con la línea del proyecto. Este aviso puede estar disponible en un formato alternativo a pedido llamando al 602-262-6284.





Figure 2-3 Facebook Post Announcing Public Meeting

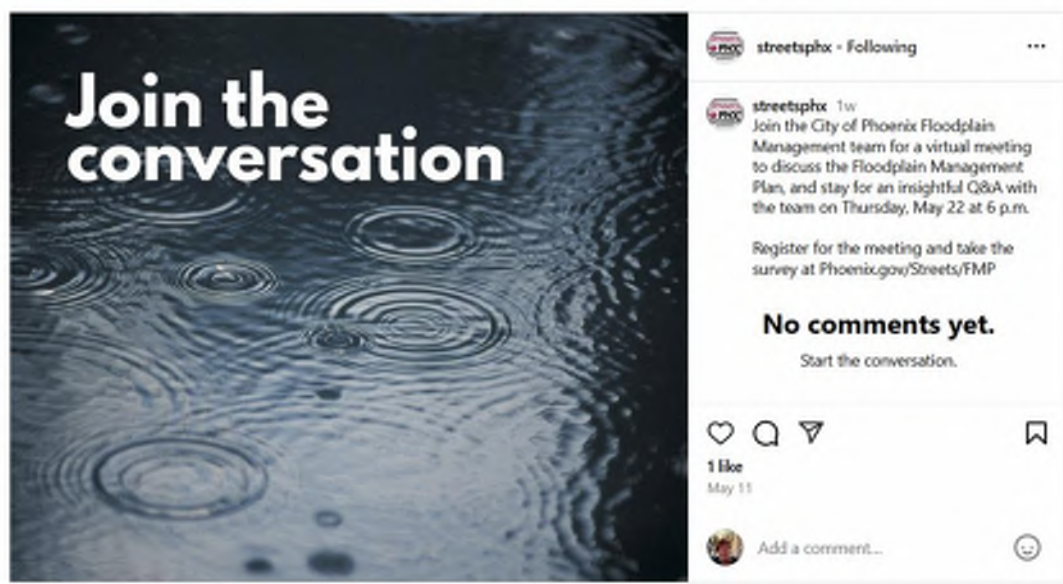
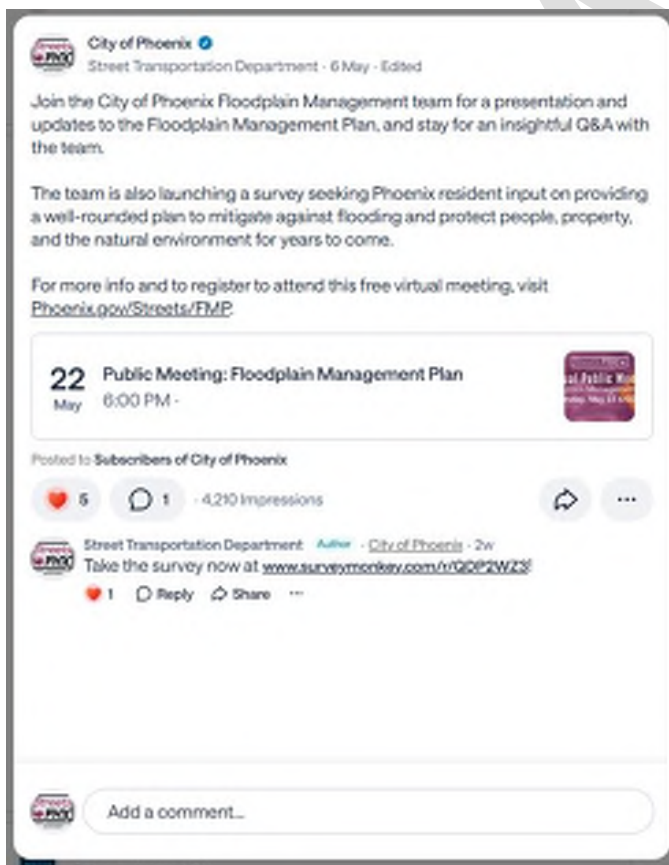


Figure 2-4 Nextdoor Post Announcing Public Meeting





2.3.5 Neighborhood Association Meeting

A public presentation was completed at the South Mountain-Laveen Chamber of Commerce Meeting on April 23, 2025, to present the FMP planning process and collect information on flood hazards, problems, and action items to address these hazards and problems. The fact sheet was passed out at the meeting and attendees were requested to provide feedback through the public survey. 29 members of the public attended the meeting. The presentation provided during the meeting can be found within Appendix A.

2.3.6 Public Survey

The Core Planning Team developed and posted a public survey at the onset of the planning process. The survey was designed to capture data and information from members of the public, especially those who might not be able to attend public meetings or participate through other means in the planning process. The survey was posted early in the FMP Committee meeting process and was opened through the public review period. The City posted the survey on the planning website and multiple social media platforms (Facebook, Instagram, and X), and it was announced at a Phoenix Council meeting, which was also televised. A link to the electronic public survey was also shared with FMP Committee members and stakeholders. The City posted on social media platforms on May 21, June 23, June 25, and July 2, 2025 to gather feedback on the public survey.

Figure 2-5 Facebook Post Promoting Public Survey



2.3.6.1 Summary of Survey Results

A total of 18 survey responses were gathered for the public survey. A total of 10 questions were provided to gather additional input from the public on floodplains impacts and management within the City. Table 2-5 provides a summary of the questions and responses. Refer to Appendix A for the full output of responses.



Table 2-5. Summary of Federal Planning and Regulatory Capabilities

Question	Top Responses (Votes)
What floodplain issues are important to you? (Select all that apply)	Knowing where flood risk exists (15) Reducing flood risks (13)
How do you receive information about flooding? (Select all that apply)	TV/News Station (10) Website or online sources (6)
What flooding situations have you experienced? (Select all that apply)	Flooding while driving (11) & Altered route due to street flooding (11) Driven through flooded washes to get to destination (5)
Do you have flood insurance?	I don't know (3) No, mortgage does not require it (6)
Have you taken steps to reduce the impacts of flooding on your property and/or prepared for flooding?	Yes, I have taken steps to reduce damages to my property (8) No, it doesn't concern me (3) & No, I don't know what to do (3)
What steps have been taken in your area or neighborhood to reduce flood risk? (Select all that apply)	I don't know (9) Constructed improvements (3); Education (3); & Preventative maintenance (3)
Which of the following activities have you participated in? (Select all that apply)	Using the Floodplain Viewer to check if your home is in a FEMA designated floodplain (8) Education & outreach (5)



3 STEP 3: COORDINATE

3.1 REVIEW AND INCORPORATION OF EXISTING PROGRAMS

The CRS 10-step planning process provides credit for a planning process that includes a review of existing studies, reports, and technical information and of the community's needs, goals, and plans for the area (CRS Step 3a). The review needs to cover community needs and goals, past flood studies, disaster damage reports, natural area plans, and other documents that will provide information for the planning process.

The City of Phoenix utilized the most current technical information, plans, studies, and reports during the planning process to assist in hazard profiling, risk and vulnerability assessment, reviewing mitigation capabilities, and identifying, developing, and prioritizing mitigation strategies.

This chapter identifies existing laws, ordinances, and plans at the federal, state, county/region, and local level that can support or impact mitigation actions identified in this plan. Each program identified in this chapter represents a capability that the City has to implement actions identified in Step 8: Draft an Action Plan

These are ongoing programs leveraged by the City to promote flood resiliency within the planning area.

3.1.1 Planning and Regulatory Capability

Planning and regulatory capabilities are based on the implementation of ordinances, policies, local laws, state statutes, plans, and programs that relate to guiding and management growth and development. Planning and regulatory capabilities refer not only to current plans and regulations, but also to the City's ability to change and improve those plans and regulations as needed.

Federal Planning and Regulatory Capabilities

Table 3-1 summarizes the planning and regulatory capabilities available to the City of Phoenix at the federal level.



Table 3-1. Summary of Federal Planning and Regulatory Capabilities

Capability	Details
Americans with Disabilities Act	The Americans with Disabilities Act (ADA) seeks to prevent discrimination against people with disabilities in employment, transportation, public accommodation, communications, and government activities. Title II of the ADA deals with compliance with the Act in emergency management and disaster-related programs, services, and activities. It applies to state and local governments as well as third parties, including religious entities and private nonprofit organizations. The ADA has implications for sheltering requirements and public notifications. During an emergency alert, officials must use a combination of warning methods to ensure that all residents have all necessary information. Those with hearing impairments may not hear radio, television, sirens, or other audible alerts, while those with visual impairments may not see flashing lights or other visual alerts. Two technical documents for shelter operators address the physical accessibility needs of people with disabilities, as well as medical needs and service animals. The ADA intersects with disaster preparedness programs in regard to transportation, social services, temporary housing, and rebuilding. Persons with disabilities may require additional assistance in evacuation and transit (e.g., vehicles with wheelchair lifts or paratransit buses). Evacuation and other response plans should address the unique needs of residents. Local governments may be interested in implementing a special-needs registry to identify the home addresses, contact information, and needs for residents who may require more assistance. FEMA floodplain management project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements.
Civil Rights Act of 1964	The Civil Rights Act of 1964 prohibits discrimination based on race, color, religion, sex, or national origin and requires equal access to public places and employment. The Act is relevant to floodplain management in that it prohibits local governments from favoring the needs of one population group over another. Local government and emergency response must ensure the continued safety and well-being of all residents equally, to the extent possible. FEMA floodplain management project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements.



Capability	Details
Clean Water Act	The federal Clean Water Act (CWA) employs regulatory and non-regulatory tools to reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation’s surface waters so that they can support “the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water.” The evolution of CWA programs over the last decade has included a shift from a program-by-program, source-by-source, and pollutant-by-pollutant approach to more holistic watershed-based strategies. Under the watershed approach, equal emphasis is placed on protecting healthy waters and restoring impaired ones. Numerous issues are addressed, not just those subject to CWA regulatory authority. Involvement of stakeholder groups in the development and implementation of strategies for achieving and maintaining water quality and other environmental goals is a hallmark of this approach. Section 404 of the Clean Water Act regulates the discharge of dredged and fill material into waters of the United States, including wetlands. Responsibility for administering and enforcing Section 404 is shared by the U.S. Army Corps of Engineers and the EPA. The Corps administers the day-to-day program, including individual permit decisions and jurisdictional determinations, develops policy and guidance, and enforces Section 404 provisions. The EPA develops and interprets environmental criteria used in evaluating permit applications, identifies activities that are exempt from permitting, reviews/comments on individual permit applications, enforces Section 404 provisions, and has the authority to veto Corps permit decisions. With EPA approval and oversight, states and tribes can assume administration of the Section 404 permit program for certain non-navigable waters, but only two states—Michigan and New Jersey—have done so. The CWA is critical to floodplain management in several ways. There are often permitting requirements for any construction within 200 feet of water of the United States, which may have implications for implementing floodplain management projects. Additionally, CWA requirements apply to wetlands, which serve essential functions related to preserving and protecting the natural and beneficial functions of floodplains and are linked with a community’s floodplain management program. Finally, the National Pollutant Discharge Elimination System is part of the CWA and addresses local stormwater management programs. Stormwater management plays a critical role in floodplain management by addressing urban drainage or localized flooding issues within jurisdictions. FEMA floodplain management project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements.



Capability	Details
Disaster Mitigation Act of 2000 (DMA 2000) P.L. 106-390	The DMA is the current federal legislation addressing hazard mitigation planning. DMA 2000 provides an opportunity for states, tribes, and local governments to take a new and revitalized approach to mitigation planning. DMA 2000 amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act (the Act) by repealing the previous mitigation planning provisions (Section 409) and replacing them with a new set of mitigation plan requirements (Section 322). This new section emphasizes the need for state, tribal, and local entities to closely coordinate mitigation planning and implementation efforts. It emphasizes planning for disasters before they occur. It specifically addresses planning at the local level, requiring plans to be in place before Hazard Mitigation Assistance grant funds are available to communities. HMPs designed to meet the requirements of DMA will remain eligible for future FEMA Hazard Mitigation Assistance funds. This plan is designed to be integrated with the City's Hazard Mitigation Plan which meets the requirements of DMA, improving eligibility for future hazard mitigation funds.
Endangered Species Act	The federal Endangered Species Act (ESA) was enacted in 1973 to conserve species facing depletion or extinction and the ecosystems that support them. The act sets forth a process for determining which species are threatened and endangered and requires the conservation of the critical habitat in which those species live. The ESA provides broad protection for species of fish, wildlife and plants that are listed as threatened or endangered. Provisions are made for listing species, as well as for recovery plans and the designation of critical habitat for listed species. The ESA outlines procedures for federal agencies to follow when taking actions that may jeopardize listed species and contains exceptions and exemptions. It is the enabling legislation for the Convention on International Trade in Endangered Species of Wild Fauna and Flora. Criminal and civil penalties are provided for violations of the ESA and the Convention. Federal agencies must seek to conserve endangered and threatened species and use their authorities in furtherance of the ESA's purposes. The ESA defines three fundamental terms: • Endangered means that a species of fish, animal, or plant is "in danger of extinction throughout all or a significant portion of its range." (For salmon and other vertebrate species, this may include subspecies and distinct population segments.) • Threatened means that a species "is likely to become endangered within the foreseeable future." • Regulations may be less restrictive for threatened species than for endangered species. • Critical habitat means "specific geographical areas that are...essential for the conservation and management of a listed species, whether occupied by the species or not." Five sections of the ESA are of critical importance to understanding it: • Section 4: Listing of a Species—The National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries) is responsible for listing marine species; the U.S. Fish and Wildlife Service (USFWS) is responsible for listing terrestrial and freshwater aquatic species. The agencies may initiate reviews for listings, or citizens may petition for them. A listing must be made "solely on the basis of the best scientific and commercial data available." After a listing has been proposed, agencies receive comments and conduct further scientific reviews for 12 to 18 months, after which they must decide if the listing is warranted. Economic impacts cannot be considered in this decision, but it may include an evaluation of



Capability	Details
	the adequacy of local and state protections. Critical habitat for the species may be designated at the time of listing. • Section 7: Consultation—Federal agencies must ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed or proposed species or adversely modify its critical habitat. This includes private and public actions that require a federal permit. Once a final listing is made, non-federal actions are subject to the same review, termed a “consultation.” If the listing agency finds that an action will “take” a species, it must propose mitigations or “reasonable and prudent” alternatives to the action; if the proponent rejects these, the action cannot proceed. • Section 9: Prohibition of Take—It is unlawful to “take” an endangered species, including killing or injuring it or modifying its habitat in a way that interferes with essential behavioral patterns, including breeding, feeding, or sheltering. • Section 10: Permitted Take—Through voluntary agreements with the federal government that provide protections to an endangered species, a non-federal applicant may commit a take that would otherwise be prohibited as long as it is incidental to an otherwise lawful activity (such as developing land or building a road). These agreements often take the form of a “Habitat Conservation Plan.” • Section 11: Citizen Lawsuits—Civil actions initiated by any citizen can require the listing agency to enforce the ESA’s prohibition of taking or to meet the requirements of the consultation process. FEMA floodplain management project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements.
Floodplain Management and Protection of Wetlands (44 CFR Part 9)	This federal code requires federal agencies to avoid long-term and short-term adverse impacts associated with the occupancy and modification of floodplains.
Code of Federal Regulations, Standard State Mitigation Plans (44 CFR PART 201.4)	FEMA has prepared policies and procedures for FEMA’s review and approval of state and local emergency all-hazard mitigation plans.
Robert T. Stafford Disaster Relief and Emergency Assistance Act	The Act provides an orderly and continuing means of assistance by the federal government to state and local governments in carrying out their responsibilities to alleviate the suffering and damage that results from disasters. The provisions of the Act include (1) revising and broadening the scope of existing disaster relief programs; (2) encouraging the development of comprehensive disaster preparedness and assistance plans, programs, capabilities, and organizations by state and local governments; (3) achieving greater coordination and responsiveness of disaster preparedness and relief programs; (4) encouraging individuals, and state and local governments to protect themselves by obtaining insurance coverage to supplement or replace governmental assistance; (5) encouraging hazard mitigation measures to reduce losses from disasters, including development of land-use and construction regulations; and (6) providing federal assistance programs for both public and private losses sustained in disasters. From a mitigation perspective of the Act, the Arizona Department of Emergency and Military Affairs is the lead agency that reviews, submits, and administers federal funding to programs that mitigate hazards. These programs help find projects that are cost beneficial to help reduce damages from hazards.



Capability	Details
National Dam Safety Act	Potential for catastrophic flooding due to dam failures led to passage of the National Dam Inspection Act in 1972, creation of the National Dam Safety Program in 1996, and reauthorization of the program through the Dam Safety Act in 2006. In November 2019, FEMA published the Emergency Operations Planning: Dam Incident Planning Guide supporting state, local, tribal, and territorial emergency managers in planning for dam incidents and failures. National Dam Safety Program, administered by FEMA requires a periodic engineering analysis of the majority of dams in the country; exceptions include the following: • Dams under the jurisdiction of the Bureau of Reclamation, Tennessee Valley Authority, or International Boundary and Water Commission • Dams constructed pursuant to licenses issued under the Federal Power Act • Dams that the Secretary of the Army determines do not pose any threat to human life or property. The goal of this FEMA-monitored effort is to identify and mitigate the risk of dam failure so as to protect lives and property of the public. The National Dam Safety Program is a partnership among the states, federal agencies, and other stakeholders that encourages individual and community responsibility for dam safety. Under FEMA's leadership, state assistance funds have allowed all participating states to improve their programs through increased inspections, emergency action planning, and purchases of needed equipment. FEMA has also expanded existing and initiated new training programs. Grant assistance from FEMA provides support for improvement of dam safety programs that regulate most of the dams in the United States.
National Environmental Policy Act	The National Environmental Policy Act requires federal agencies to consider the environmental impacts of proposed actions and reasonable alternatives to those actions, alongside technical and economic considerations. The National Environmental Policy Act established the Council on Environmental Quality, whose regulations (40 CFR Parts 1500-1508) set standards for compliance. Consideration and decision-making regarding environmental impacts must be documented in an environmental impact statement or environmental assessment. Environmental impact assessment requires the evaluation of reasonable alternatives to a proposed action, solicitation of input from organizations and individuals that could be affected, and an unbiased presentation of direct, indirect, and cumulative environmental impacts. FEMA floodplain management project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements.



Capability	Details
National Flood Insurance Program (NFIP)	The National Flood Insurance Program (NFIP) makes federally backed flood insurance available to homeowners, renters, and business owners in participating communities that enact floodplain regulations. Participation and good standing under NFIP are prerequisites to grant funding eligibility under the Robert T. Stafford Act. For most participating communities, FEMA has prepared a detailed Flood Insurance Study. The study presents water surface elevations for floods of various magnitudes, including the 100-year flood and the 500-year flood. Base flood elevations and the boundaries of the flood hazard areas are shown on Flood Insurance Rate Maps, which are the principal tools for identifying the extent and location of the flood hazard. Flood Insurance Rate Maps are the most detailed and consistent data source available, and for many communities, they represent the minimum area of oversight under the local floodplain management program. In recent years, Flood Insurance Rate Maps have been digitized as Digital Flood Insurance Rate Maps, which are more accessible to residents, local governments, and stakeholders. Participants in the NFIP must, at a minimum, regulate development in floodplain areas in accordance with NFIP criteria. Before issuing a permit to build in a floodplain, participating jurisdictions must ensure that three criteria are met: • New buildings and those undergoing substantial improvements must, at a minimum, be elevated to protect against damage by the 100-year flood. • New floodplain development must not aggravate existing flood problems or increase damage to other properties. • New floodplain development must exercise a reasonable and prudent effort to reduce its adverse impacts on threatened salmonid species.
NFIP Community Rating System (CRS)	As an additional component of the NFIP, CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS: (1) reduce flood losses, (2) facilitate accurate insurance rating, and (3) promote awareness of flood insurance. Municipalities could expect significant cost savings on premiums if enrolled in the CRS program. CRS premium discounts on flood insurance range from 5 percent for Class 9 communities up to 45 percent for Class 1 communities.



Capability	Details
National Incident Management System (NIMS)	NIMS is a systematic approach for government, nongovernmental organizations, and the private sector to work together to manage incidents involving hazards. The NIMS provides a flexible but standardized set of incident management practices. Incidents typically begin and end locally, and they are managed at the lowest possible geographical, organizational, and jurisdictional level. In some cases, success depends on the involvement of multiple jurisdictions, levels of government, functional agencies, and emergency responder disciplines. These cases necessitate coordination across a spectrum of organizations. Communities using NIMS follow a comprehensive national approach that improves the effectiveness of emergency management and response personnel across the full spectrum of potential hazards (including natural hazards, technological hazards, and human-caused hazards) regardless of size or complexity. Although participation is voluntary, federal departments and agencies are required to make adoption of NIMS by local and state jurisdictions a condition to receive federal preparedness grants and awards. The content of this plan is considered to be a viable support tool for any phase of emergency management. The NIMS program is considered a response function, and information in this floodplain management plan can support the implementation and update of all NIMS-compliant plans within the planning area.
Presidential Executive Order 11988, Floodplain Management	Executive Order 11988 requires federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. It requires federal agencies to provide leadership and take action to reduce the risk of flood loss, minimize the impact of floods on human safety, health, and welfare, and restore and preserve the natural and beneficial values of floodplains. The requirements apply to the following activities: • Acquiring, managing, and disposing of federal lands and facilities • Providing federally undertaken, financed, or assisted construction and improvements • Conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing
Presidential Executive Order 11990, Protection of Wetlands	Executive Order 11990 requires federal agencies to provide leadership and take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. The requirements apply to the following activities: • Acquiring, managing, and disposing of federal lands and facilities • Conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing. All actions identified in this plan will seek full compliance with all applicable presidential executive orders.

National Flood Insurance Program

The National Flood Insurance Program (NFIP) makes federally backed flood insurance available to homeowners, renters, and business owners in participating communities that enact floodplain regulations. For most participating communities, FEMA has prepared a detailed Flood Insurance Study. The study presents water surface elevations for floods of various magnitudes, including the 1-percent-annual-chance flood (called the 100-year flood or base flood) and the 0.2-percent-annual-chance flood (the 500-year flood).



Base flood elevations and the boundaries of the 100- and 500-year floodplains are shown on Flood Insurance Rate Maps (FIRMs), which are the principle tools for identifying the extent and location of the flood hazard. FIRMs are the most detailed and consistent data source available, and for many communities they represent the minimum area of oversight under their floodplain management program.

Participants in the NFIP must, at a minimum, regulate development in floodplain areas in accordance with NFIP criteria. Before issuing a permit to build in a floodplain, participating jurisdictions must ensure that three criteria are met:

- New buildings and those undergoing substantial improvements must, at a minimum, be elevated to protect against damage by the 100-year flood.
- New floodplain development must not aggravate existing flood problems or increase damage to other properties.
- New floodplain development must exercise a reasonable and prudent effort to reduce its adverse impacts on threatened and endangered species.

Properties constructed after a FIRM has been adopted are eligible for reduced flood insurance rates. Such structures are less vulnerable to flooding since they were constructed after regulations and codes were adopted to decrease vulnerability. Properties built before a FIRM is adopted are more vulnerable to flooding because they do not meet code or are located in hazardous areas.

CITY OF PHOENIX PARTICIPATION IN NFIP

The City of Phoenix participates in the NFIP and has adopted regulations that meet the NFIP requirements. The City entered the NFIP when its first FIRM was issued on December 4, 1979. The effective date for the current FIRM is February 8, 2024. Phoenix is currently in good standing with the provisions of the NFIP. A detailed flood insurance study for the areas subject to flooding was originally completed on September 29, 1989, with updates in 1989, 1991, 1993, 1995, 2001, 2005, 2013, 2015, 2020, 2021, and the most recent update on February 8, 2024 (FEMA 2024a). The capability assessment at the end of this chapter includes a summary of the NFIP capabilities of the City of Phoenix.

As of March 3, 2025, 3,352 flood insurance policies in the City of Phoenix provide \$887 million in coverage at a combined annual premium of \$2.5 million. According to FEMA statistics, 1,283 flood insurance claims have been paid, for a total of \$8.9 million.

NFIP REFORM

The Biggert-Waters Flood Insurance Reform Act of 2012 changed the NFIP to make it more sustainable. It required the NFIP to raise rates to reflect true flood risk, make the program more financially stable, and change how FIRM updates impact policyholders. The law eliminated some artificially low rates and discounts, as well as subsidies to certain pre-FIRM policyholders. The law called for adjusting most flood insurance rates to reflect full risk. It identified investments that property owners and communities can make to reduce the impact of rate changes.



The Homeowner Flood Insurance Affordability Act of 2014 delayed the increases in flood insurance premiums mandated under the Biggert–Waters Flood Insurance Reform Act of 2012 for four years. During that time, FEMA was to come up with a plan to make the premiums cheaper and reassess its maps of areas that are likely to flood and therefore require flood insurance. The 2014 law also allowed those who sell their homes to pass lower flood insurance premiums on to the next homeowner.

In April 2023, FEMA implemented Risk Rating 2.0: Equity in Action to consider specific characteristics of a building to provide a more modern, individualized, and equitable flood insurance rates. The new rating methodology considers frequency of flooding, multiple flood types, proximity to flood sources, and building characteristics such as first floor heights and costs to rebuilt. It is difficult to determine what the aggregate cost increase through Risk Rating 2.0 will be on post-mitigation properties.

These laws will have profound impacts on the costs of flood insurance and implementation of the NFIP. How changes will impact local communities is not yet known.

State Planning and Regulatory Capabilities

Table 3-2 summarizes the planning and regulatory capabilities available to the City of Phoenix at the state level.

Table 3-2. Summary of State Planning and Regulatory Capabilities

<i>Capability</i>	<i>Details</i>
Arizona Department of Water Resources	The Arizona Revised Statutes (A.R.S.) § 45-1201 assigns the responsibility for supervision of the safety of non-federal dams in the State of Arizona to the Director of the Arizona Department of Water Resources (ADWR). The ADWR Engineering Division is responsible for implementing the Flood Hazard Management Programs, which include dam safety, flood warning, and floodplain management. An agency-critical mission of the Engineering Division is to protect the public against potential loss of life and property damage due to dam failure.
Arizona Revised Statute (ARS) 26-308	State law under ARS 26-308 establishes that each county and incorporated city and town is charged with establishing and providing emergency management within their jurisdictions in accordance with state emergency plans and programs. State emergency plans shall be in effect within all subdivisions and jurisdictions within the state, and the governing bodies of each subdivision and jurisdiction may develop additional emergency plans in support of state emergency plans. This includes all response and recovery efforts outlined in the State Emergency Response and Recovery Plan (SERRP)
Arizona Revised Statute (ARS) 28-910	State law under ARS 28-910 charges that a driver who drives a vehicle on a public street or highway that is barricaded due to being temporarily covered by rise in water level from groundwater or overflow, is liable for the expenses of any emergency response that is required to remove any driver or any passenger in the vehicle should the vehicle become inoperable. This statute should serve as a deterrent to prevent vehicle operators from driving through flooded areas.
ADWR Substantive Policy Statements	ADWR Substantive Policy Statements are advisory only, and do not impose additional requirements or penalties on regulated parties. This includes the policy on the Development of Flood Control Plans, which was created to provide assistance to county flood control districts in investigating flooding problems and developing plans to control such problems. Another substantive policy is the Flood Control Loan Program, which was established to enable county flood control



Capability	Details
	districts to proceed with timely implementation of flood control projects authorized for funding under the Alternative Flood Control Assistance Program.

County and Regional Planning and Regulatory Capabilities

Table 3-3 summarizes the planning and regulatory capabilities available to the City of Phoenix at the county and regional levels.

Table 3-3 Summary of County and Regional Planning and Regulatory Capabilities

Capability	Details
Maricopa County Multi-jurisdictional Hazard Mitigation Plan (MJHMP)	The MJHMP reduces the risk to people and property and reduces the cost of recovering from a disaster. A hazard mitigation plan can help communities become more sustainable and disaster-resistant by focusing efforts on the hazards, disaster-prone areas and identifying appropriate mitigation actions. Effective mitigation planning and efforts can break the cycle of disaster damage, reconstruction, and repeated damage. The MJHMP is reviewed and revised every 5 years and is available to the general public (MCDEM n.d.).
Maricopa County Emergency Operations Plan	Maricopa County has established a multi-hazard, functional plan that treats emergency management activities generally with the unique aspects of individual disasters contained in hazard specific annexes. It describes the emergency organization and the means of coordination with other entities. It assigns functional responsibilities and details tasks to be carried out as accurately as permitted by the situation. The Maricopa County EOP is reviewed and revised annually. It is for official use only and is not distributed to the general public (MCDEM n.d.).
Maricopa County Department of Emergency Management Strategic Plan 2024-2026	The Maricopa County Department of Emergency Management Strategic Plan 2024-2026 was developed to meet the vision of comprehensive county-wide emergency management efforts through a multi-year strategy in coordination with key emergency management stakeholders. This plan includes overarching missions, strategic goals, objectives, milestones, and overall methods of implementation. The Maricopa County Department of Emergency Management Strategic Plan 2024-2026 provides a framework for supporting the community before, during, and after disasters and improving the department's execution of its fundamental mission to ensure a safe and resilient community for all residents. Maricopa County Department of Emergency Management (MCDEM) is committed to developing a coordinated and cooperative program that engages the "whole community" in all efforts possible to prevent, protect, mitigate, respond to, and recover from all hazards (MCDEM n.d.).

3.1.2 Administrative and Technical Capabilities

Administrative and technical capabilities focus on the availability of personnel resources responsible for implementing all the facets of hazard mitigation. These resources include technical experts, such as engineers and scientists, as well as personnel with capabilities that may be found in multiple departments, such as grant writers.



Federal Administrative and Technical Capabilities

Numerous federal agencies have specific administrative and technical capabilities that can support floodplain management in the City of Phoenix.

Table 3-4 Summary of Federal Administrative and Technical Capabilities

Capability	Details
Federal Emergency Management Agency	FEMA is responsible for providing assistance before, during, and after disasters. FEMA is the federal reviewer of hazard mitigation plans, sets federal standards for local and state hazard mitigation plans, and funds hazard mitigation plans.
Federal Energy Regulatory Commission Dam Safety Program	The Federal Energy Regulatory Commission (FERC) cooperates with a large number of federal and state agencies to ensure and promote dam safety. The Commission regulates over 1,700 non-federal dams in the U.S. Over 1,500 regulated hydroelectric projects are in the FERC program (FERC, 2020). Two-thirds of these are more than 50 years old. As dams age, concern about their safety and integrity grows, so oversight and regular inspection are important. FERC inspects hydroelectric projects on an unscheduled basis to investigate the following: • Potential dam safety problems • Complaints about constructing and operating a project • Safety concerns related to natural disasters • Issues concerning compliance with the terms and conditions of a license. Every five years, an independent engineer approved by the FERC must inspect and evaluate projects with dams higher than 32.8 feet (10 meters), or with a total storage capacity of more than 2,000 acre-feet. FERC monitors seismic research and applies it in performing structural analyses of hydroelectric projects. FERC also evaluates the effects of potential and actual large floods on the safety of dams. During and following floods, FERC visits dams and licensed projects, determines the extent of damage, if any, and directs any necessary studies or remedial measures the licensee must undertake. The FERC publication Engineering Guidelines for the Evaluation of Hydropower Projects guides the FERC engineering staff and licensees in evaluating dam safety. The publication is frequently revised to reflect current information and methodologies. FERC requires licensees to prepare emergency action plans and conduct training sessions on how to develop and test these plans. The plans outline an early warning system if there is an actual or potential sudden release of water from a dam due to failure. The plans include operational procedures that may be used, such as reducing reservoir levels and reducing downstream flows, as well as procedures for notifying affected residents and agencies responsible for emergency management. These plans are frequently updated and tested to ensure that everyone knows what to do in emergency situations. Currently no dams are under FERC jurisdiction in the City of Phoenix.
National Dam Safety Program (NDSP)	The NDSP is a partnership of state and federal agencies, and other stakeholders that encourages individual and community responsibility for dam safety to protect people from dam failures. It is administered through the Department of Homeland Security and FEMA. The program improves safety and security around dams by providing assistance grants to state dam safety agencies to assist them in improving their regulatory programs; producing educational materials for dam owners; funding research to enhance technical expertise as dams are built and



Capability	Details
	rehabilitated; establishing training programs for dam safety inspectors; and creating a National Inventory of Dams (NID) (FEMA 2024).
National Weather Service (NWS)	The NWS monitors weather and delivers weather forecasting. Resources are deployed as early as possible to prepare for storm impacts. The NWS also offers various education and training programs on weather-related hazards (NWS n.d.) • <i>StormReady®</i>: The NWS operates the StormReady program, which encourages communities to take a new, proactive approach to improving local hazardous weather operations by providing emergency managers with clear-cut guidelines on how to improve their hazardous weather operations. To be recognized by the program, a community must establish a 24-hour warning point and emergency operations center; have more than one way to receive severe weather warnings and forecasts and to alert the public; create a system that monitors weather conditions locally; promote the importance of public readiness through community seminars; and develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises (NWS n.d.). The City of Phoenix is a recognized StormReady community.
U.S. Geological Survey (USGS)	USGS maintains a network of gauges across Arizona that continuously measure lake, reservoir, stream, and tidal levels. These data sets are transmitted to the USGS and made available over the Internet. As project needs and funding levels change, gauges may be added or deactivated, and deactivated gauges may be reactivated (USGS n.d.).
United States Army Corps of Engineers (USACE)	The USACE works to strengthen the nation's security by building and maintaining America's infrastructure and providing military facilities where servicemembers train, work, and live. Projects include dredging, storm damage reduction, and ecosystem restoration in and near waterways (USACE n.d.). The City of Phoenix is serviced by the Los Angeles district and the Arizona-Nevada Area Office. USACE has numerous initiatives to support hazard mitigation measures, which are described below. • <i>Silver Jackets</i>: Silver Jackets, developed by USACE, is the State-level implementation program for the National Flood Risk Management Program. The program's goals are to leverage information and resources from federal, state, and local agencies to improve flood risk management; improve public risk communication through a united effort; and create a mechanism to collaboratively solve issues and implement initiatives beneficial to local communities. In Arizona, the Silver Jackets program is led by the Arizona Department of Water Resources and Division of Emergency Management with the support of the USACE (USACE n.d.). • <i>Climate Preparedness and Resilience Community of Practice</i>: The Practice develops and implements practical, nationally consistent, and cost-effective approaches and policies to reduce potential vulnerabilities to the nation's water infrastructure resulting from climate change and variability (USACE n.d.). • <i>Planning Assistance to States (PAS) Program</i>: Section 22 of the 1974 Water Resources Development Act provides authority for the USACE to assist states, local governments, Native American Tribes, and other non-federal entities in the preparation of comprehensive plans for the development and conservation of water and related land resources. Types of work that can be done include Water Quality Studies, Wetland Evaluation Studies, Flood Plain Management Studies, Coastal Zone Management/Protection Studies, Harbor/Port Studies, or other water resource planning



Capability	Details
	investigations. The individual nonfederal sponsors determine the needed planning assistance (USACE n.d.). • <i>Flood Plain Management Services Program (FPMS)</i>: Section 206 of the 1960 Flood Control Act (PL 86-645), as amended, provides the authority for the USACE to provide assistance and guidance on all aspects of floodplain management planning. The program develops or interprets site-specific data on obstructions to flood flows, flood formation, and timing, and the extent, duration, and frequency of flooding. Upon request, program services are provided to the State, regional, and local governments, Native American Tribes, and other non-federal public agencies without charge (USACE n.d.). • <i>Inspection of Completed Works (ICW) Program</i>: Civil works structures whose failure or partial failure could jeopardize the operational integrity of the project, endanger the lives and safety of the public, or cause substantial property damage are periodically inspected and evaluated to ensure their structural stability, safety, and operational adequacy. For those structures constructed by the USACE and turned over to others for operation and maintenance, the operating entity is responsible for periodic inspection and evaluation. The USACE may conduct the inspection on behalf of the project sponsor, provided appropriate reimbursement to the USACE is made. However, the USACE may participate in the inspection with the operating entity at the government's expense (USACE n.d.). • <i>Rehabilitation and Inspection Program (RIP)</i>: RIP is a USACE program that provides for inspection of flood control projects, the rehabilitation of damaged flood control projects, and the rehabilitation of federally authorized and constructed hurricane or shore protection projects (USACE n.d.). • <i>Dam Safety Program</i>: The U.S. Army Corps of Engineers operates and maintains approximately 700 dams nationwide. It is also responsible for safety inspections of some federal and non-federal dams in the United States that meet the size and storage limitations specified in the National Dam Safety Act. The Corps has inventoried dams; surveyed each state and federal agency's capabilities, practices and regulations regarding design, construction, operation and maintenance of the dams; and developed guidelines for inspection and evaluation of dam safety. The Corps maintains the National Inventory of Dams, which contains information about a dam's location, size, purpose, type, last inspection and regulatory status (USACE 2020).
National Incident Management System	Adoption of this system for government, nongovernmental organizations, and the private sector to work together to manage incidents involving hazards is a prerequisite for federal preparedness grants and awards.

State Administrative and Technical Capabilities

Numerous state agencies have specific administrative and technical capabilities that can support floodplain management in the City of Phoenix.



Table 3-5 Summary of State Administrative and Technical Capabilities

Capability	Details
Arizona Department of Water Resources (ADWR)	ADWR's floodplain management program is partially funded by FEMA's Community Assistance Program (CAP). One of the main objectives of the CAP is to ensure that jurisdictions adopt and enforce floodplain management regulations in accordance with the requirements of the NFIP and the Arizona Revised Statutes (ARS). Through this program, Community Assistance Visits (CAVs) are made to the state's NFIP participating communities. It is the goal of ADWR to visit communities periodically to provide updates on state and federal floodplain management program changes, provide technical and programmatic assistance, and verify that development in flood prone areas is compliant with local floodplain management regulations (Arizona Department of Emergency and Military Affairs 2023).
Arizona Department of Emergency and Military Affairs	The Response Branch is the coordination point for the state's response and support efforts to the impacted counties and tribes through the allocation of state resources. When a disaster exceeds local capacities and capabilities, the impacted jurisdiction may ask county emergency management for assistance. If the response needs of the impacted jurisdiction exceed the capabilities of the county, they may request assistance from other counties and/or the State of Arizona. The Arizona State Emergency Operation Center (SEOC) is the support and coordination facility for state assistance and the Response Branch manages the SEOC when activated. DEMA may recall representatives of state and non-governmental organizations to staff its various Emergency Support Functions within the SEOC and to provide coordinated support to local emergency management response and recovery activities (AZ DEMA n.d.). The Logistics Branch provides high-quality logistical and communications support during the day-to-day operations of DEMA. During declared emergencies, logistics coordinates the allocation of equipment, services, and personnel to support emergency operations (AZ DEMA n.d.). The Recovery Branch is responsible for providing leadership when assisting communities, individuals, families, and businesses responding to and recovering from disaster damages. The Recovery Human Services mission is to reduce human suffering during disasters and enhance recovery after disasters. The Recovery Branch oversees the administration of the Individual Assistance Program; Mass Care (ESF-6); and Disability, Access & Functional Needs; Voluntary Agency and the Private Sector Liaison. The Recovery and Infrastructure Branch collaborate to conduct the "Recovery Road Show" briefing for local jurisdictions on the various Recovery programs, as well as providing "best practices" for the programs (AZ DEMA n.d.). The Exercise Branch focuses on preparedness, partnerships, and leadership. The focus of an exercise should always be on locating and eliminating problems before an actual emergency occurs. Corrective actions are an important part of exercise design, evaluation, and after-action reports. In planning exercises, the emphasis is on the actions or operations required in emergency response or recovery rather than on the types of disasters, because preparedness is common to all emergencies (AZ DEMA n.d.). The Planning Branch is responsible for developing and maintaining emergency plans and procedures, as well as coordinating the development of plans across different agencies and organizations. The Planning Branch also conducts risk



Capability	Details
	assessments and identifies potential hazards and vulnerabilities, as well as providing recommendations for mitigation measures. During an emergency, the Planning Branch is responsible for maintaining situational awareness and providing strategic guidance to ensure the effective and efficient use of resources. This includes tracking the progress of response operations, identifying emerging issues and concerns, and providing support to the Incident Commander and other operational personnel. Overall, the Planning Branch plays a critical role in emergency management by providing the necessary guidance and resources to ensure an effective response to emergencies and disasters (AZ DEMA n.d.). The DEMA Situation Unit supports agency initiatives and projects through all phases of emergency management, from developing web applications, administrating workflows, conducting critical data stewardship, and maintaining day-to-day operations of crisis information management systems, Geographical Information Systems (GIS), and business intelligence. During an emergency incident, the Situation Unit collects, processes, and organizes information, prepares situation summaries, and develop projections and forecasts related to the incident (AZ DEMA n.d.). The Training Branch provides a variety of courses throughout Arizona, as well as arranging for attendance at training for many out-of-state federal programs (AZ DEMA n.d.).

County and Regional Administrative and Technical Capabilities

Numerous county and regional agencies have specific administrative and technical capabilities that can support floodplain management in the City of Phoenix.

Table 3-6 Summary of County and Regional Administrative and Technical Capabilities

Capability	Details
Maricopa County Flood Control District	The Maricopa County Flood Control District mission is to reduce risk from flooding so that property damage and loss of life is minimized, economic development is supported in a safe and responsible manner and storm water is recognized as a resource for the long-term benefit of the community and environment. The District is a community partner working with citizens and stakeholders to reduce risk from flooding. This is accomplished through exceptional customer service, technical expertise, fiscally responsible actions and multi-use projects (Maricopa County n.d.).
Maricopa County Emergency Management	Emergency Management provides on-going planning to prevent and prepare for large-scale emergencies in Maricopa County. Emergency Management protects communities by coordinating and integrating all activities necessary to build, sustain, and improve the capability to mitigate against, prepare for, respond to, and recover from threatened or actual natural disasters, acts of terrorism, or other man-made disasters (MCDEM n.d.).
Maricopa County Community Organizations Active in Disaster (MCCOAD)	The MCCOAD was established in January 2020 to increase the ability of community organizations to effectively and efficiently respond to disasters. During a disaster, the Maricopa County Department of Emergency Management (MCDEM) can activate the MCCOAD to assist in response and recovery. The MCCOAD provides an essential service to our community by streamlining request fulfillment and communication. The MCCOAD serves as a liaison between government



Capability	Details
	agencies and community organizations within the existing county emergency management structure (MCDEM n.d.).
Maricopa County Local Emergency Planning Committee (MC-LEPC)	The MC-LEPC is a committee composed of community volunteers from elected positions, the emergency services field, media agencies, community groups, and industry; appointed by the Arizona State Emergency Response Commission ("AzSERC"), which also maintains oversight authority over the committee. The MC-LEPC is tasked as a community body to oversee local compliance with the Emergency Planning and Community Right to Know Act ("EPCRA"), 42 U.S.C. § 11001 – 11050. EPCRA requires all facilities that have hazardous substances at or in excess of certain amounts to provide the Arizona Department of Environmental Quality ("ADEQ") with the identity of the facility representative who must provide that facility's emergency plan and who will also participate in the emergency planning process. Among the duties of these facilities is the duty to submit a list and inventory of its hazardous substances that are present at or above certain threshold quantities and prepare and file with ADEQ and the MC-LEPC an emergency response plan as required in statute (MCDEM n.d.).

3.1.3 Fiscal Capabilities

Fiscal capabilities are the resources that a jurisdiction has access to or is eligible to use to fund mitigation actions.

Federal Fiscal Capabilities

Table 3-7 describes the federal fiscal capabilities available to support floodplain mitigation in the City of Phoenix.

Table 3-7 Summary of Federal Fiscal Capabilities

Capability	Details
Hazard Mitigation Grant Program (HMGP)	Responsible Agency: FEMA The HMGP provides funding to states, local communities, tribes, and territory governments so they can rebuild in a way that reduces or mitigates future natural disaster losses in their communities. HMGP funding is authorized with a Presidential Major Disaster Declaration. A governor or tribal chief executive may request HMGP funding throughout the state, tribe, or territory when submitting a disaster declaration. Through HMGP, states can access up to 10 percent and local governments up to 5 percent of their HMGP award for management and administration costs (FEMA 2024a).
Flood Mitigation Assistance (FMA)	Responsible Agency: FEMA FMA grants provide funding to states, local communities, tribes, and territories to reduce or eliminate the risk of repetitive flood damage to buildings insured under the NFIP. FEMA distributes funds annually to develop community or individual flood mitigation projects. In addition, funding is also used for technical assistance and management costs. All sub-applicants need to be in good standing with the NFIP (FEMA 2024a).
Public Assistance (PA) Section 406 Funds	Responsible Agency: FEMA FEMA funds cost-effective mitigation measures under the PA program for repairs, restoration, and replacement of eligible damaged facilities. This grant funding is commonly referred as "406 Mitigation" or PA Mitigation (FEMA 2024b).



Capability	Details
Legislative Pre-Disaster Mitigation (LPDM)	Responsible Agency: FEMA The Pre-Disaster Mitigation Program (PDM) was active during the performance of the 2019 SHMP but was replaced with BRIC under the Disaster Recovery Reform Act of 2018. However, LPDM awards are still funded through direct congressional appropriations (FEMA 2024b).
Safeguarding Tomorrow through Ongoing Risk Mitigation Revolving Loan Fund (STORM RLF)	Responsible Agency: FEMA The STORM RLF program complements and supplements FEMA's Hazard Mitigation Assistance grant portfolio to support mitigation projects at the local government level and increase the nation's resilience to natural hazards and climate change. These low interest loans will allow jurisdictions to reduce vulnerability to natural disasters, foster greater community resilience and reduce disaster suffering (FEMA 2024b).
Extraordinary Circumstances	Responsible Agency: FEMA For PDM and FMA project subawards, the (FEMA) Region may apply extraordinary circumstances when justification is provided and with concurrence from FEMA Headquarters (Risk Reduction and Risk Analysis Divisions) prior to granting an exception. If this exception is granted, a local mitigation plan must be approved by FEMA within 12 months of the award of the project subaward to that community. For HMGP, PDM, and FMA, extraordinary circumstances exist when a determination is made by the Applicant and FEMA that the proposed project is consistent with the priorities and strategies identified in the State (Standard or Enhanced) Mitigation Plan and that the jurisdiction meets at least one of the criteria below. If the jurisdiction does not meet at least one of these criteria, the Region must coordinate with FEMA Headquarters (Risk Reduction and Risk Analysis Divisions) for HMGP; however, for PDM and FMA the Region must coordinate and seek concurrence prior to granting an exception: • The jurisdiction meets the small, impoverished community criteria (see Part VIII, B.2). • The jurisdiction has been determined to have had insufficient capacity due to lack of available funding, staffing, or other necessary expertise to satisfy the mitigation planning requirement prior to the current disaster or application deadline. • The jurisdiction has been determined to have been at low risk from hazards because of low frequency of occurrence or minimal damage from previous occurrences as a result of sparse development. • The jurisdiction experienced significant disruption from a declared disaster or another event that impacts its ability to complete the mitigation planning process prior to award or final approval of a project award. • The jurisdiction does not have a mitigation plan for reasons beyond the control of the State, federally recognized tribe, or local community, such as Disaster Relief Fund restrictions that delay FEMA from granting a subaward prior to the expiration of the local or Tribal Mitigation Plan. For HMGP, PDM, and FMA, the Applicant must provide written justification that identifies the specific criteria or circumstance listed above, explains why there is no longer an impediment to satisfying the mitigation planning requirement, and identifies the specific actions or circumstances that eliminated the deficiency. When an HMGP project funding is awarded under extraordinary circumstances, the Recipient shall acknowledge in writing to the Regional Administrator that a plan will



Capability	Details
	be completed within 12 months of the subaward. The Recipient must provide a work plan for completing the local or Tribal Mitigation Plan, including milestones and a timetable, to ensure that the jurisdiction will complete the plan in the required time. This requirement shall be incorporated into the award (both the planning and project subaward agreements, if a planning subaward is also awarded).
Individual Assistance	Responsible Agency: FEMA Individual Assistance (IA) provides help for homeowners, renters, businesses, and some non-profit entities after disasters occur. This program is largely funded by the U.S. Small Business Administration. For homeowners and renters, those who suffered uninsured or underinsured losses could be eligible for a Home Disaster Loan to repair or replace damaged real estate or personal property. Renters are eligible for loans to cover personal property losses. Individuals are allowed to borrow up to \$200,000 to repair or replace real estate, \$40,000 to cover losses to personal property, and an additional 20 percent for mitigation. For businesses, loans could be made to repair or replace disaster damages to property owned by the business, including real estate, machinery and equipment, inventory, and supplies. Businesses of any size are eligible. Non-profit organizations, such as charities, churches, and private universities are eligible. An Economic Injury Disaster Loan provides necessary working capital until normal operations resume after a physical disaster but are restricted by law to small businesses only. IA is detailed on the FEMA website: https://www.fema.gov/individual-disaster-assistance
Department of Homeland Security Grant Program	Responsible Agency: FEMA The Homeland Security Grant Program (HSGP) plays an important role in the implementation of the National Preparedness System by supporting the building, sustainment, and delivery of core capabilities essential to achieving the National Preparedness Goal of a secure and resilient nation. In FY 2019, the total amount of funds available under HSGP was \$1.095 billion. Additional information regarding HSGP is available on the website: https://www.fema.gov/homeland-security-grant-program.
High Hazard Potential Dams Grant Program	Responsible Agency: FEMA The Rehabilitation of High Hazard Potential Dams Grant Program provides technical, planning, design, and construction assistance in the form of grants to non-Federal governmental organizations or nonprofit organizations for rehabilitation of eligible high-hazard potential dams. Information regarding this program is available on the website: https://www.grants.gov/web/grants/view-opportunity.html?oppld=316238
National Dam Safety Program (NDSP)	Responsible Agency: FEMA The NDSP, which is led by FEMA, is a partnership of the states, federal agencies, and other stakeholders to encourage individual and community responsibility for dam safety. Grant assistance is provided to states, providing vital support for the improvement of state dam safety programs that regulate most of the dams in the United States. Additional information regarding the NDSP is available on the website: https://www.fema.gov/emergency-managers/risk-management/dam-safety
Infrastructure Investment and Jobs Act (IIJA)	Responsible Agency: FEMA The IIJA, most commonly known as the Bipartisan Infrastructure Bill and originally in the House as the Investing in New Vision for the Environment and Surface Transportation (INVEST) in America Act (H.R. 3684) was signed into law by President Biden in November 2021. Various funds are expected to be made available through this Act to support hazard mitigation, including funding and programs related to carbon reduction. The bill provides around \$7 billion to FEMA



Capability	Details
Small Business Administration Loan	for assisting communities in preparing for and adapting to climate related disasters. The bill also funds the Bridge Investment Program to provide grant funding to replace, rehabilitate, preserve, or make resiliency improvements to bridges. Responsible Agency: SBA The Small Business Administration (SBA) provides low-interest disaster loans to homeowners, renters, businesses of all sizes, and most private nonprofit organizations. SBA disaster loans can be used to repair or replace the following items damaged or destroyed in a declared disaster: real estate, personal property, machinery and equipment, and inventory and business assets. Homeowners could apply for up to \$200,000 to replace or repair their primary residence. Renters and homeowners could borrow up to \$40,000 to replace or repair personal property such as clothing, furniture, cars, and appliances that were damaged or destroyed in a disaster. Physical disaster loans of up to \$2 million are available to qualified businesses or most private nonprofit organizations. Additional information regarding SBA loans is available on the SBA website: https://www.sba.gov/managing-business/running-business/emergency-preparedness/disaster-assistance.
Community Development Block Grant Program	Responsible Agency: HUD CDBG are federal funds intended to provide low and moderate-income households with viable communities, including decent housing, a suitable living environment, and expanded economic opportunities. Eligible activities include community facilities and improvements, roads and infrastructure, housing rehabilitation and preservation, development activities, public services, economic development, and planning and administration. Public improvements could include flood and drainage improvements. In limited instances and during the times of “urgent need” (e.g., post-disaster) as defined by the CDBG National Objectives, CDBG funding could be used to acquire a property located in a floodplain that was severely damaged by a recent flood, demolish a structure severely damaged by an earthquake, or repair a public facility severely damaged by a hazard event. Funding is split into two programs: <i>Community Development Block Grant Disaster Recovery (CDBG-DR) Program:</i> This program provides grant funds, which are appropriated by Congress and allocated by HUD to rebuild disaster-impacted areas and provide crucial seed money to start the long-term recovery process. These flexible grants help cities, counties, Indian tribes, and States recover from Presidentially declared disasters, especially in low-income areas, subject to availability of supplemental appropriations. Since CDBG-DR assistance may fund a broad range of recovery activities, HUD can help communities and neighborhoods that otherwise might not recover due to limited resources. <i>Community Development Block Grant Mitigation (CDBG-MIT):</i> This program funds pose a unique opportunity for eligible grantees to use this assistance in areas impacted by recent disasters to carry out strategic and high-impact activities to mitigate disaster risks and reduce future losses. CDBG-MIT defines mitigation as activities that increase resilience to disasters and reduce or eliminate the long-term risk of loss of life, injury, damage to and loss of property, and suffering and hardship by lessening the impact of future disasters. Goals of CDBG-MIT funds: • Support data-informed investments, focusing on repetitive loss of property and critical infrastructure.



Capability	Details
	- Build capacity to comprehensively analyze disaster risks and update hazard mitigation plans. - Support the adoption of policies that reflect local and regional priorities that will have long-lasting effects on community risk reduction, including risk reduction to community lifelines and decreasing future disaster costs. - Maximize the impact of funds by encouraging leverage, private/public partnerships, and coordination with other Federal dollars. Additional information regarding CDBG is available on the website: https://www.hudexchange.info/programs/cdbg-entitlement/
Federal Highway Administration- Emergency Relief	Responsible Agency: U.S. DOT The Federal Highway Administration (FHWA) Emergency Relief is a grant program through the U.S. Department of Transportation (DOT) that can be used for repair or reconstruction of federal-aid highways and roads on federal lands that have suffered serious damage as a result of a disaster. Additional information regarding the FHWA Emergency Relief Program is available on the website: https://www.fhwa.dot.gov/programadmin/erelief.cfm
Federal Transit Administration - Emergency Relief	Responsible Agency: U.S. DOT The Federal Transit Authority (FTA) Emergency Relief is a grant program that funds capital projects to protect, repair, reconstruct, or replace equipment and facilities of public transportation systems. Additional information regarding the FTA Emergency Relief Program is available on the website: https://www.transit.dot.gov/funding/grant-programs/emergency-relief-program/emergency-relief-program
Disaster Housing Program	Responsible Agency: HUD Emergency assistance for housing, including minor repair of home to establish livable conditions, mortgage, and rental assistance available through the U.S. Department of Housing and Urban Development (HUD). Information on this program is available on the website: https://www.hud.gov/program_offices/public_indian_housing/publications/dhap
HOME Investment Partnerships Program	Responsible Agency: HUD Grants to local and state government and consortia for permanent and transitional housing (including financial support for property acquisition and rehabilitation for low-income persons). Information on this program is available on the website: https://www.hud.gov/program_offices/comm_planning/affordablehousing/programs/home/
HUD Disaster Recover Assistance	Responsible Agency: HUD Grants to fund gaps in available recovery assistance after disasters (including mitigation). Information on this program is available on the website: https://www.hud.gov/info/disasterresources
Section 108 Loan Guarantee	Responsible Agency: HUD Enables states and local governments participating in the CDBG program to obtain federally guaranteed loans for disaster-distressed areas. Information on this program is available on the website: https://www.hudexchange.info/programs/section-108/
Smart Growth Implementation Assistance program	Responsible Agency: USEPA The Smart Growth Implementation Assistance (SGIA) program through the U.S. Environmental Protection Agency (USEPA) focuses on complex or cutting-edge issues, such as stormwater management, code revision, transit-oriented development, affordable housing, infill development, corridor planning, green building, and climate change. Applicants can submit proposals under four



Capability	Details
	categories: community resilience to disasters, job creation, the role of manufactured homes in sustainable neighborhood design, or medical and social service facilities siting. Information on this program is available on the website: https://www.epa.gov/smartgrowth
Partners for Fish and Wildlife	Responsible Agency: U.S. Fish and Wildlife Service Financial and technical assistance to private landowners interested in pursuing habitat restoration projects, including those affecting wetlands and riparian habitats. Information on this program is available on the website: https://www.fws.gov/partners/
National Fish Passage Program (NFPP)	Responsible Agency: U.S. Fish and Wildlife Service The National Fish Passage Program partners with local communities on a voluntary basis to remove or bypass barriers, such as dams, to restore rivers and conserve aquatic resources. The program provides both financial and technical assistance for fish passage projects, which is any activity that improves the ability of fish or other aquatic species to move by reconnecting habitat that has been fragmented by a barrier. Information on this program is available on the website: https://www.fws.gov/program/national-fish-passage
Rebuilding American Infrastructure with Sustainability and Equity (RAISE)	Responsible Agency: U.S. DOT Investing in critical road, rail, transit, and port projects across the nation. The RAISE program is previously known as Better Utilizing Investments to Leverage Development (BUILD) and Transportation Investment Generating Economic Recovery (TIGER). Information on this program is available on the website: https://www.transportation.gov/tags/tiger-grants
Community Facilities Direct Loan & Grant Program	Responsible Agency: USDA This program provides affordable funding to develop essential community facilities in rural areas. An essential community facility is defined as a facility that provides an essential service to the local community for the orderly development of the community in a primarily rural area and does not include private, commercial, or business undertakings. Information on this program is available on the website: https://www.rd.usda.gov/programs-services/community-facilities-direct-loan-grant-program
Emergency Loan Program	Responsible Agency: USDA USDA's Farm Service Agency provides emergency loans to help producers recover from production and physical losses due to drought, flooding, other natural disasters, or quarantine. Information on this program is available on the website: https://www.fsa.usda.gov/programs-and-services/farm-loan-programs/emergency-farm-loans/index
Emergency Watershed Protection Program	Responsible Agency: USDA The Emergency Watershed Protection (EWP) program provides assistance to relieve imminent hazards to life and property caused by floods, fires, drought, windstorms, and other natural occurrences through the Natural Resources Conservation Service. Information on this program is available on the website: https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/e_wpp/
Financial Assistance	Responsible Agency: NRCS The Emergency Watershed Protection (EWP) program provides assistance to relieve imminent hazards to life and property caused by floods, fires, drought, windstorms, and other natural occurrences through the Natural Resources Conservation Service. Information on this program is available on the website: https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/e_wpp/



Capability	Details
Watershed Rehabilitation Program	Responsible Agency: NRCS The Watershed Rehabilitation Program helps project sponsors rehabilitate aging dams that are reaching the end of their design lives. This rehabilitation addresses critical public health and safety concerns. NRCS selects projects based on the risks to life and property if a dam failure were to occur. Information on this program is available on the website: https://www.nrcs.usda.gov/programs-initiatives/watershed-rehabilitation
Watershed and Flood Prevention Operations (WFPO) Program	Responsible Agency: NRCS The purpose of the program is to help units of federal, state, local, and federally recognized tribal governments (project sponsors) protect and restore watersheds. The WFPO program provides technical and financial assistance to States, local governments, and Tribal organizations to help plan and implement authorized watershed projects for the purpose of: • Flood Prevention • Watershed Protection • Public Recreation • Public Fish and Wildlife • Agricultural Water Management • Municipal and Industrial Water Supply • Water Quality Management Information on this program is available on the website: https://www.nrcs.usda.gov/programs-initiatives/watershed-and-flood-prevention-operations-wfpo-program
Emergency Management Performance Grants (EMPG) Program	Responsible Agency: U.S. DHS Emergency Management Performance Grant (EMPG) funding is available to educate people and protect lives and structures from natural and technical hazards. The grant is to encourage the development of comprehensive emergency management, including terrorism consequence management, at the state and local level and to improve emergency management planning, preparedness, mitigation, response, and recovery capabilities. Information on this program is available on the website: https://www.fema.gov/emergency-management-performance-grant-program
Land & Water Conservation Fund	Responsible Agency: National Park Service Matching grants to states and local governments for the acquisition and development of public outdoor recreation areas and facilities (as well as funding for shared federal land acquisition and conservation strategies). Information on this program is available on the website: https://www.nps.gov/subjects/lwcf/index.htm
Clean Water Act Section 319(h) Grants	Responsible Agency: USEPA Clean Water Act Section 319(h) funds are provided only to designated state and tribal agencies to implement their approved nonpoint source management programs. State and tribal nonpoint source programs include a variety of components, including technical assistance, financial assistance, education, training, technology transfer, demonstration projects, and regulatory programs. Each year, USEPA awards Section 319(h) funds to states in accordance with a state-by-state allocation formula that EPA has developed in consultation with the states (USEPA 2024a). Section 319(h) funding decisions are made by the states. States submit their proposed funding plans to USEPA. If a state's funding plan is consistent with grant eligibility requirements and procedures, USEPA then awards the funds to the state



Capability	Details
	(USEPA 2024a). Information on this program is available on the website: https://www.epa.gov/nps/319-grant-program-states-and-territories
Community-Based Restoration (CBRP)	Responsible Agency: NOAA The program grants support restoration projects that use a habitat-based approach to rebuild productive and sustainable fisheries, contribute to the recovery and conservation of protected resources, and promote healthy ecosystems and resilient communities. Information on this program is available on the website: https://www.fisheries.noaa.gov/national/habitat-conservation/community-based-habitat-restoration
USACE Planning Assistance to States (PAS) Program	Responsible Agency: USACE Section 22 of the 1974 Water Resources Development Act provides authority for the US Army Corps of Engineers Planning Assistance to the States (PAS) and Indian Nations. Under this program, the USACE assists the States, local governments, Native American Tribes, and other non-federal entities in the preparation of comprehensive plans for the development and conservation of water and related land resources. Types of work that can be done include Water Quality Studies, Wetland Evaluation Studies, Flood Plain Management Studies, Coastal Zone Management/Protection Studies, Harbor/Port Studies, or other water resource planning investigations. The needed planning assistance is determined by the individual non-federal sponsors.
USACE Continuing Authorities Program (CAP)	Responsible Agency: USACE Congress has provided USACE with a number of standing authorities to study and build water resource projects for various purposes without additional project-specific congressional authorization. The types of projects addressed by the CAP include emergency streambank and shoreline erosion, flood control projects, snagging and clearing for flood control, and small beach erosion control projects. Cost-share varies based on subprograms.
USACE General Investigation (GI)	Responsible Agency: USACE These are congressionally authorized studies under USACE's Civil Works program. Congress can authorize USACE to study, design, and construct major flood risk management projects. The feasibility study is cost-shared 50/50 and construction is cost-shared 65/35 between the federal government and non-federal sponsor. These are generally large-scale projects that cost more than \$10 million. Congress can also authorize USACE to conduct other water-related studies/projects such as watershed assessments, ecosystem restoration, and navigation improvements.
Section 206 Aquatic Ecosystem Restoration Projects	Responsible Agency: USACE The purpose of the USACE ecosystem restoration activities is to restore significant ecosystem function, structure, and dynamic processes that have been degraded. Ecosystem restoration efforts involve examining the problems contributing to the system degradation and developing alternative means to solve these problems. This program has previously been used to fund dam removal and provide for fish passage. Cost shares vary by project type.
Planning Assistance to the States	Responsible Agency: USACE The USACE is authorized to provide planning assistance, usually for a specific technical item rather than detailed designs for construction. Dam safety/failure studies have been conducted in recent years. To request assistance, state, local, or tribal entities should submit a letter to the Chief of the Planning Division in their USACE district detailing the location and nature of the problem to be investigated. For more information and to review a sample request letter, visit the USACE webpage.
	Responsible Agency: USACE



Capability	Details
Small Flood Control Program	Under the Small Flood Control Program, the USACE works with communities to plan, design, and construct certain small flood control projects that have not already been specifically authorized by Congress. Studies are required to evaluate potential projects. Each project selected must be: • Economically justified, meaning the benefits of the project outweigh the cost of construction • Environmentally acceptable • Complete within itself

State and Local Fiscal Capabilities

Table 3-8 describes the state fiscal capabilities available to support floodplain mitigation in the City of Phoenix.

Table 3-8 Summary of State Fiscal Capabilities

Capability	Details
Governor's Emergency Fund (GEF)	Responsible Agency: Governor's Office This fund receives four million dollars annually from the State's General Fund to assist government agencies respond to and recover from emergency and disaster events. Unused funds at the end of the state's fiscal year may be used as a funding source for the implementation of mitigation projects. The Governor's Emergency Fund may be utilized for mitigation projects statewide (Arizona Department of Emergency and Military Affairs 2023).
State Dam Repair Fund	Responsible Agency: Arizona Department of Water Resources (ADWR) In accordance with State statutes, ADWR has established, and maintains and manages a Dam Repair Fund. Monies from this fund have been used to address deficiencies at unsafe High Hazard Potential Dams (HHPDs) in the State. ADWR has also used these funds as the non-Federal cost-share for HHPD grants. Through the Dam Repair Fund, ADWR provided financial assistance to Navajo County to stabilize the breach at Millet Swale Dam. ADWR continues to actively seek out opportunities to assist local communities and dam owners mitigate risk posed by their HHPDs (Arizona Department of Emergency and Military Affairs 2023).

The Arizona Department of Emergency and Military Affairs administers FEMA's Hazard Mitigation Assistance (HMA) grant program for the State of Arizona. The grant program is delivered to state agencies and local jurisdictions (Arizona Department of Emergency and Military Affairs 2023).

County and Regional Fiscal Capabilities

The Maricopa County Flood District has several funding programs that can support floodplain management (Maricopa County Flood District n.d.):

- Capital Improvement Program: Capital improvement projects typically consist of the design and construction of flood control infrastructure.
- Small Project Assistance Program (SPAP): SPAP is directed and structured for the rapid design and construction of smaller and localized flood control projects.



- **Floodprone Property Assistance Program:** The Floodprone Property Assistance Program provides resources to mitigate flood hazards where the construction of flood control structures is impractical. Homeowners living within delineated floodplains may apply for assistance under this program. Eligible homeowners may qualify for a voluntary sale to the Maricopa County Flood District at appraised market value and for assistance with moving expenses under certain circumstances.

3.1.4 Local Capability Assessment

The City of Phoenix compiled an inventory and analysis of existing local authorities and capabilities. This assessment identifies potential gaps in the jurisdiction's capabilities. If the capability assessment identified an opportunity to add a missing capability or expand an existing one, then doing so has been selected as an action in the 2025 FMP's action plan.

Legal and Regulatory Capabilities

The table below summarizes the planning documents that contribute to flood risk reduction in the City of Phoenix.

Table 3-9. Planning Capabilities

	Capability in Place? (Yes/No)	Name and Date	Department/Agency Responsible
Master Plan	Yes	Phoenix General Plan 2025	Planning and Development
<i>Impact on Risk Reduction:</i> Comprehensive planning is a state requirement and a foundation for various planning documents and ordinances that provide for their respective jurisdiction's future growth and improvement. A comprehensive plan is a document that guides the future actions of a community by presenting a vision for the future with long-term goals and objectives for all activities that affect the local government. Comprehensive planning provides for citizens' health, safety, and general welfare through orderly development and designated land use. The Phoenix General Plan is the long-range guide for the city, and addresses issues such as energy, housing, neighborhoods, public facilities, natural resources, transportation and land use. Arizona State Statutes require that this plan be updated and/or readopted every ten years by a public vote.			
Capital Improvement Plan	Yes	Capital Improvement Program, 2023-2028	City Council
<i>Impact on Risk Reduction:</i> The Capital Improvement Program is a five-year plan for capital expenditures needed to replace, expand and improve infrastructure and systems. Other planning processes, the most significant of which are explained in this section, identify the need and provide funding for capital projects and related operating costs.			
Stormwater Management Plan	Yes	2023 Stormwater Management Plan	Phoenix Water Smart
<i>Impact on Risk Reduction:</i> The City of Phoenix (City) Stormwater Management Plan (SWMP) is a detailed plan that identifies the major programs, policies, and procedures implemented by the City to minimize the impact of urban activities on the quality of stormwater. The City is required to develop this plan as a large Municipal Separate Storm Sewer System (MS4) under the Arizona Pollutant Discharge Elimination System (AZPDES) permit program administered by the Arizona Department of Environmental Quality (ADEQ).			



	Capability in Place? (Yes/No)	Name and Date	Department/Agency Responsible
The SWMP addresses the major programmatic areas including Public Education and Outreach, Public Involvement, Illicit Discharge Detection and Elimination (IDDE), Municipal Facilities, Industrial Sites, Construction Sites, Post-Construction, and the wet weather monitoring program. The SWMP is a comprehensive document that has been written to reflect the requirements of the permit in addition to providing the details of the major programmatic areas; therefore the SWMP includes an introduction and regulatory overview, a description of how the stormwater program is managed, sections addressing the major programmatic areas, and additional sections describing the training program, the monitoring program, and the approach to evaluating program effectiveness. This plan was developed with input from multiple City departments and approved by the applicable department directors.			
Watershed Plan	Yes	Metro Phoenix Area Drainage Master Plan	Flood Control District of Maricopa County, City of Phoenix
<i>Impact on Risk Reduction:</i> The Metro Phoenix Area Drainage Master Plan Update (Metro ADMPU) is underway to develop and recommend strategies to reduce flood hazards and protect public safety in a study area located within the cities of Phoenix, Scottsdale, and Tempe. The plan will update and refine the findings of the original Metro Phoenix Area Drainage Master Plan completed in 2008. This update will use newer modeling techniques and updated mapping to capture recent land use changes and better identify the extent of drainage and flooding problems within the study area. The Cities and District will use the results of the drainage and flooding problem identification to refine the existing proposed solutions and identify potential new solutions to better define and budget future drainage improvement projects. The Metro ADMP Update will: • Create a database of known flooding and drainage problems • Develop state-of-the-art models using updated technology and new aerial mapping • Assess flooding hazard and previously proposed solutions • Restudy the metro Phoenix floodplains • Prepare a plan to provide potential solutions for flood-prone areas			
Water Management Plan	Yes	Water Resource Plan, 2021 Update	Phoenix Water Services Department
<i>Impact on Risk Reduction:</i> Phoenix is reevaluating the strategic use of its available water supplies in consideration of changing climate conditions, prolonged drought, and its own supply and demand modeling. There are many deficit mitigation strategies available to Phoenix, falling generally into three categories: system infrastructure improvements and regional collaboration to increase water use efficiency; demand management with additional water conservation programs; and supply augmentation of the Phoenix water supply portfolio. It is likely that initiatives from all three categories will be utilized during the planning period.			
Open Space Plan	Yes	Open Space Element of the General Plan	Planning and Development
<i>Impact on Risk Reduction:</i> The Open Space element includes a description of the areas of Phoenix that provide public open space. These areas provide space for recreation, environmental preservation, and natural hydrologic systems. It also includes analysis of need; policies for management; and designated access points, protection, and acquisition strategies.			
Community Forest Management Plan	Yes	Shade Phoenix Plan	Parks and Recreation
<i>Impact on Risk Reduction:</i> The Shade Phoenix Plan outlines the actions the City and its partners will take over the next five years to accelerate the creation and enhance the maintenance of shade in Phoenix. The vision of the Shade Phoenix Plan			



	Capability in Place? (Yes/No)	Name and Date	Department/Agency Responsible
is that all community members experience the benefits of trees and built shade throughout the city. Actions in the plan prioritize places in Phoenix where people are outside the most and populations most vulnerable to extreme heat			
Climate Change / Sustainability Plan	Yes	2021 Climate Action Plan	Office of Environmental Programs
<i>Impact on Risk Reduction:</i> The City's Climate Action Plan sets goals for emissions reductions and resiliency. The Plan is currently being updated.			
Transportation Plan	Yes	Transportation 2050	Street Transportation Department, Public Transit Department
<i>Impact on Risk Reduction:</i> The Transportation 2050 plan was developed by a citizen-led committee of transportation experts and community advocates and addresses a wide array of concerns expressed by residents who drive, bike, walk and ride transit service. The 35-year citywide street and transit improvement plan, which became effective Jan. 1, 2016, will triple the number of light rail miles in Phoenix by adding 42 miles of across the city, provide late night bus and Dial-a-Ride service citywide, and will directly and indirectly benefit every street in Phoenix.			

The table below summarizes the emergency response and recovery plans that guide the City of Phoenix to prepare for, respond to, and recover from flood hazard events.

Table 3-10. Emergency Response and Recovery Planning Capabilities

Plan Name	Capability in Place? (Yes/No)	Name and Date	Department/Agency Responsible
Emergency Operations Plan	Yes	City of Phoenix Major Emergency Response and Recovery Plan	Emergency Management Department
<i>Impact on Risk Reduction:</i> The objective of the Emergency Operations Plan is to mobilize the resources of the entire Phoenix Fire Department to an elevated level when circumstances require a commitment beyond normal capabilities. The activation of this plan will cause the Fire Department Tactical Operations Center (TOC) to go into operation. Identified Command Officers will respond to that location.			
Threat & Hazard Identification & Risk Assessment (THIRA)	Yes	2015 City of Phoenix Threat and Hazard Identification and Risk Assessment	Emergency Management
<i>Impact on Risk Reduction:</i> The THIRA identifies various threats, their impacts, and the City's capabilities to address the risks from the threats.			
Dam Emergency Action Plans (EAP)	Yes	Emergency Action Plans-	Street Transportation (Dams) and Emergency Management-
<i>Impact on Risk Reduction:</i> The EAPs for the different City and County dams in the area have been developed to support rapid response in the event of an emergency. The EAPs provide different levels of response depending on the level of impounded and/or risk to the structure. The documents are not publicly available due to the risk profile of each structure.			



The table below summarizes the codes, ordinances, and regulations that contribute to flood risk reduction in the City of Phoenix.

Table 3-11. Codes, Ordinances, and Regulations Capabilities

Plan Name	Capability in Place? (Yes/No)	Code Citation (code chapter, date)	Department/Agency Responsible
Building Code	Yes	2024 Phoenix Building Construction Code	Planning & Development
<i>Impact on Risk Reduction:</i> Building codes ensure that the design and construction of buildings meet optimal safety requirements and standards.			
Zoning Code	Yes	Chapter 41 Zoning	Planning & Development
<i>Impact on Risk Reduction:</i> The state requires counties to adopt ordinances identifying zones for a particular purpose or residential area. Zoning practices divide the county into land use zones as delineated on the official zoning maps and set regulations for promoting citizens' health, safety, morals, convenience, and welfare. The purpose of this Zoning Ordinance is to establish standards and regulations to govern the use of land and structures in the City and for review and approval of all proposed development of property in the City, and to provide a development review process that will be comprehensive, consistent, and efficient in the implementation of the General Plan and other adopted goals, policies and standards of the City. In order to conserve and promote the public health, safety and general welfare, and to aid in the harmonious, orderly, and progressive development of the City, it is the intent of this ordinance that the development process in the City of Phoenix be efficient, in terms of time and expense, effective, in proposed development and equitable, in terms of consistency with established regulations and procedures, respect for the rights of property owners, and the consideration of the interests of the citizens of the City. It is also the intent of this ordinance to preserve and enhance aesthetic values, to encourage the most appropriate use of land, and to facilitate the adequate provision of transportation, water, sewage treatment systems, schools, parks, and other public requirements throughout the City.			
Subdivision Regulations	Yes	Chapter 32 Subdivisions	Planning & Development
<i>Impact on Risk Reduction:</i> Subdivisions provide for orderly growth and development that secures adequate provisions for water supply, drainage, stormwater detention, sanitary sewerage, health and safety requirements, and protection from floods, ensuring the identification of sufficient sites for schools, recreational areas, and public facilities. The purpose of this chapter is to provide for the orderly growth and harmonious development of the City of Phoenix; to ensure adequate traffic circulation through coordinated street systems with relation to major thoroughfares, adjoining subdivisions, and public facilities; to achieve individual property lots of reasonable utility and livability; to secure adequate provisions for water supply, drainage, sanitary sewerage, and other health requirements; to ensure consideration for adequate sites for schools, recreation areas, and other public facilities; to promote the conveyance of land by accurate legal description, and to provide logical procedures for the achievement of this purpose.			
Site Plan Review	Yes	Chapter 32 Subdivisions, Article II Platting Procedures	Planning & Development
<i>Impact on Risk Reduction:</i> The pre-application conference stage of subdivision planning comprises an investigatory period which precedes actual preparation of preliminary plans by the subdivider. During this stage, the subdivider makes known his intentions to the Planning and Development Department and is advised of specific public objectives related to the subject tract and other details regarding platting procedures and requirements.			



Plan Name	Capability in Place? (Yes/No)	Code Citation (code chapter, date)	Department/Agency Responsible
During this stage, it also may be determined that a change in zoning would be required for the subject tract or a part thereof, and in such case the subdivider shall initiate the necessary rezoning application.			
Stormwater Regulations	Yes	Chapter 32C Stormwater Quality Protection	City Manager
<i>Impact on Risk Reduction:</i> The City Manager will regulate the use, grading, paving, maintenance, and operation of public rights-of-way and public storm drain systems so as to reduce the discharge of pollutants, to the maximum extent practicable, that may cause or contribute to either a violation of any applicable surface water quality standard or any condition of a NPDES/AZPDES permit issued to the City, or any other act that causes or contributes to obstruction of or damage to a public storm drain system. The City Manager may regulate the use of the public storm drain system through administrative rules, permits, and other written forms of approval for activities that could release pollutants or stormwater to a public storm drain system.			
Floodplain Regulations	Yes	Chapter 32B Floodplains	Floodplain Administrator
<i>Impact on Risk Reduction:</i> It is the purpose of this chapter to promote the public health, safety, and general welfare, and to minimize public and private losses due to flooding in specific areas by provisions designed to: A. Protect human life and health; B. Minimize expenditure of public money for costly flood control projects; C. Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public; D. Minimize prolonged business interruptions; E. Minimize damage to public facilities and utilities such as water and gas mains; electric, telephone and sewer lines; and streets and bridges located in special flood hazard areas; F. Help maintain a stable tax base by providing for the sound use and development of special flood hazard areas so as to minimize blight areas caused by flooding; G. Participate in and maintain eligibility for flood insurance and disaster relief. Any new buildings constructed in the SFHA must be elevated a minimum of one (1) foot above the Base Flood Elevation (BFE) and must meet other stipulations in state and local ordinances.			

Development and Permitting Capabilities

Identifying previous and future development trends is achieved through a comprehensive review of permitting since completion of the previous plan and in anticipation of future development. Tracking previous and future growth in potential hazard areas provides an overview of increased exposure to a hazard within a community.

Table 3-12 summarizes development and permitting capabilities of the City of Phoenix.



Table 3-12. Development and Permitting Capabilities

Development and Permitting Procedure	Comment
What department or outside agency is responsible for issuing development permits?	Planning & Development. A permit is required for all development within the SFHA, not just the construction of buildings.
Is floodplain tracked in development permits?	Yes, Floodplain Clearance Form
How does your jurisdiction inventory land available for new development?	The City develops growth projections and land use assumptions.
What percentage of your jurisdiction is available for new development?	Approximately 2/3 of the City has been developed, leaving 1/3 available for future development.

Administrative and Technical Capabilities

Administrative and technical capabilities focus on the availability of personnel resources responsible for implementing all the facets of hazard mitigation. These resources include technical experts, such as engineers and scientists, as well as personnel with capabilities that may be found in multiple departments, such as grant writers. The table below summarizes the City of Phoenix departments, boards, and committees that contribute to flood risk reduction.

Table 3-13. Departments, Boards, and Committees that Contribute to Flood Risk Reduction

Department / Board / Committee	Description and Role in Risk Reduction
Land Use Boards (Planning Board and Zoning Board of Adjustment)	The Planning Commission makes recommendations to the City Council on all matters that might be referred to it by the City Council concerning or relating to a comprehensive plan of City building and improvement and recommends to the City Council, from time to time, amendments to the City Charter, ordinances providing for the purchase of sites for City buildings; opening, widening or other changes in streets and other public ways, and the ornamentation of such sites, streets, grounds and other public places; and such other ordinances as it may deem necessary and proper in the premises and that may tend in connection with such comprehensive plan to promote the public health, comfort, safety, convenience, utility and welfare. The Planning Commission is also authorized to confer and advise with other similar City planning commissions or county planning commissions. The Board of Adjustment hears and decides appeals of decisions made by the Zoning Administrator in enforcement of the Zoning Ordinance; hears and decides appeals from the action of the Zoning Administrator in the granting or denying of variances, the issuance of use permits, or in the interpretation of the provisions of this ordinance; and hears and decides all matters referred to the Board by the Zoning Administrator.
Planning Department	The Planning and Development Department guides the physical development of the city by preserving our historic sites, planning what can be built where, and ensuring safe construction of buildings and infrastructure. A host of advisory and governing



Department / Board / Committee	Description and Role in Risk Reduction
	bodies of residents as well as elected officials provide oversight as the city grows and needs arise. The process is governed through the development and enforcement of city codes and ordinances.
Public Works	Public Works Department, Street Transportation
Construction / Building / Code Enforcement Department	The Development Division of the Planning and Development Department oversees plan review and inspections for all components and phases of development and construction.
Engineering Department	Office of the City Engineer
Parks and Recreation Department	Parks and Recreation
Open Space Board / Committee	Parks and Recreation Board
Environmental Board / Commission	The purpose of the Environmental Quality and Sustainability Commission is to identify environmental issues and problems affecting the City of Phoenix and recommend to the City Council appropriate roles for the City in addressing those issues or problems in a manner which protects, restores, or enhances the natural and urban environments.
Emergency Management / Public Safety Department	The staff of the City of Phoenix Office of Homeland Security and Emergency Management (OHSEM) protects communities by coordinating and integrating all activities necessary before, during and after any natural disasters, acts of terrorism, or other man-made disasters.
Fire Department	The Phoenix Fire Department is committed to providing the highest level of customer service and resources to our community and members. The Department saves lives and protects property through fire suppression, emergency medical and transportation services, all-hazards incident management, and community risk reduction efforts.
Additional departments, boards, and committees	Office of Environmental Program's (OEP) mission is to advance environmental protection, regulatory compliance, and sustainability by promoting sound environmental policies and practices through leadership, training, and education. OEP is responsible for coordinating environmental programs and issues, developing City environmental policies and regulations, and providing technical and regulatory assistance to all City departments, offices, and functions. This includes climate change and surface water.

The table below summarizes the City of Phoenix's staff with skills and expertise that contribute to flood risk reduction.

Table 3-14. Technical/Staffing Capabilities

Staff	Description and Role in Flood Risk Reduction
Planners	Street Transportation Dept. – Deputy Director, Special Projects Administrator, Principal Planner, Civil Engineers, Project Manager, Principal Engineering Technicians, Chief Engineering Technicians; Public Works Dept
Engineers	Street Transportation Dept. – Deputy Director, Special Projects Administrator; Public Works Dept. – Assistant Director, Civil Engineer III; Planning & Development Department – Deputy Directors, Building Official, Plans Engineers



Staff	Description and Role in Flood Risk Reduction
Emergency Manager	City Manager's Office - Emergency Management Director
Stormwater Officer	- The Stormwater Management Section (SWM) works in cooperation with other City departments to coordinate the City's stormwater management program and maintain compliance with the Municipal Separate Storm Sewer System (MS4) permit. SWM inspects industrial and commercial facilities for compliance with Phoenix City Code Chapter 32C, investigates illicit discharges to the storm drain system, conducts wet-weather monitoring, and conducts public outreach. - The Street Transportation Department is responsible for maintenance of storm drains and washes, cleaning the streets and catch basins, as well as creating maps of the City's storm drain system. - The Planning and Development Department monitors construction sites for stormwater compliance. - Public Works implements the Household Hazardous Waste Collection Program and works with Keep Phoenix Beautiful to conduct environmental education and outreach programs. - The Office of Environmental Programs coordinates city employee training and evaluates City facilities and construction activities for compliance with stormwater requirements.
Resilience / Sustainability Officer	Chief Sustainability Officer
Grant Writer	Aviation Department – Planner II Fire Dept. – Volunteer Coordinator and Fire Captains Planning Development Dept. – Principal Planner, Planner III, Village Planner & Planner II Police Dept. – Police Research Analysts Public Transit Dept Office of Emergency Management – Management Assistant, Fire Dept. – Management Assistant II, Street Transportation Dept. – Management Services, Public Works Dept.
Staff with benefit / cost analysis expertise	Staff have undergone training.
Staff trained in conducting substantial damage determinations	No
Staff trained in GIS	Information Technology Services – Info Tech Analyst/Programmers and Info Tech Specialists Fire Dept. – Fire Protection Engineer Planning Development Dept. – Senior GIS Technician Police Dept. – Senior User Technology Specialist Street Transportation Dept. - Info Tech Analyst/ Programmer II and Senior GIS Technician Water Services Dept. – GIS and Senior GIS Technicians
Scientist familiar with local natural hazards	City Manager's Office, Office of Environmental Programs – Environmental Programs Coordinators and Environmental Quality Specialists
Surveyors	Street Transportation Department – Survey Teams

NFIP Compliance and Floodplain Management Capabilities

Flooding is the costliest natural hazard in the United States and, with the promulgation of recent federal regulation, homeowners throughout the country are experiencing increasingly high flood insurance



premiums. Community participation in the NFIP opens up the opportunity for additional grant funding associated specifically with flooding issues. Assessment of the jurisdiction's current NFIP status and compliance provides planners with a greater understanding of the local flood management program, opportunities for improvement, and available grant funding opportunities.

The table below summarizes the floodplain administration capabilities of the City of Phoenix.

Table 3-15. NFIP Floodplain Administration Capabilities

Floodplain Administration	Comments
Provide an explanation of the jurisdiction's NFIP administration services (e.g. permit review, GIS, education/outreach, inspections, engineering capability)	Permit review, education/outreach, engineering
What local department is responsible for floodplain management?	Floodplain Management, Office of the City Engineer
Are any staff certified floodplain managers (CFMs)?	Yes, several staff have CFM certification.
Does the jurisdiction maintain a list of properties that have been damaged by flooding?	The City maintains the repetitive loss list and conducts regular mailings to these properties.
Does the jurisdiction maintain a list of property owners interested in flood mitigation?	No
How many properties have been mitigated (elevation or acquisition)?	395 buildings have previously been mitigated according to CRS record keeping.
Summarize the jurisdiction's Substantial Damage determination procedures.	Substantially damaged buildings (e.g., a residence damaged so that the cost of repairs equals or exceeds 50% of the building's value before it was damaged must be elevated to or above the base flood elevation) must meet the same construction requirements as a new building.
Summarize the jurisdiction's Substantial Improvement procedures.	If the cost of reconstruction, rehabilitation, addition, or other improvements to a building equals or exceeds 50% of the building's market value, then the building must meet the same construction requirements as a new building.
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?	2018
Does the jurisdiction's administration of the floodplain exceed NFIP requirements? (freeboard, mapping, etc.)	Yes, the City requires one foot of freeboard above the BFE.

Public Education and Outreach Capabilities

Regular engagement with the public on issues regarding flood mitigation provides an opportunity to directly interface with community members. Assessing this outreach and education capability illustrates the connection between the government and community members, which opens a two-way dialogue that can result in a more flood resilient community based on education and public engagement.

The table below summarizes the flood education and outreach capabilities of the City of Phoenix.



Table 3-16. Education and Outreach Capabilities

Outreach Capability	Description and Role in Risk Reduction
Public warning system	Emergency warnings are delivered through the Community Emergency Notification System (CENS), Wireless Emergency Alerts (WEA), the Emergency Alert System (EAS) via radio and TV, and the Outdoor Warning Siren System.
Public Information Officer	The City Communications Office provides residents and employees with dynamic and interesting information about city programs and services.
Website	The City website is phoenix.gov. Each City department has a website page with personnel dedicated to its development and maintenance. The City has established a floodplain management website within the Street Transportation website at: Floodplain Management City of Phoenix
Social media	The City has extensive social media capability that includes Facebook, X (Twitter), YouTube, Instagram, Next Door, and Linked In.
Newsletters	The City Communications Office produces a monthly residential newsletter called PHX At Your Service, and a weekly employee newsletter called PHX Connect.
Outreach campaigns	Water safety brochures and videos
Resident boards or commissions that could address flood issues	The City has identified 15 Village Planning Committees.
Other outreach capabilities	PHX Newsroom, PHXTV

Fiscal Capabilities

Assessing a jurisdiction's fiscal capability provides an understanding of the ability to fulfill the financial needs associated with hazard mitigation projects. This assessment identifies both outside resources, such as grant-funding eligibility, and local jurisdictional authority to generate internal financial capability, such as through impact fees.

Table 3-17 summarizes the flood mitigation fiscal capabilities of the City of Phoenix.



Table 3-17. Fiscal Capabilities

Financial Resource	Accessible (Yes/No)	Comment and History of Use for Hazard Mitigation
FEMA Pre-Disaster Mitigation Funding (FMA, PDM)	Yes	The City's Hazard Mitigation Plan was updated in 2024 and provides access to these grant programs.
FEMA Post-Disaster Mitigation Funding (HMGP)	Yes	The City's Hazard Mitigation Plan was updated in 2024 and provides access to these grant programs.
Community Development Block Grants (CDBG, CDBG-DR)	Yes	Eligible
Capital improvements funding	Yes	The Capital Improvement Program for the City of Phoenix represents a significant investment by the city in infrastructure. Challenges exist in ensuring that this investment and resulting infrastructure are deployed and maintained as efficiently as possible given the vast area they are required to cover. For example, the Street Transportation Department has to maintain more than 4,800 miles of road every year. That's the distance from Phoenix to New York City and back (City of Phoenix 2015).
Open space acquisition programs	Yes	Phoenix residents have continually demonstrated a commitment to preserving and expanding the city's open space network. In 2008, 83 percent of voters renewed the Phoenix Parks and Preserve Initiative for 30 more years. The initiative sets aside one cent of sales tax for every \$10 of purchases to improve and renovate existing parks, and to expand and improve the city's desert preserve system. Phoenician's historic and continued efforts to preserve and expand the city's natural and manmade open space networks speaks to the importance the concept of creating an "oasis" has had in shaping what Phoenix is today. As such, continuing to create and strengthen this oasis should be an integral part of the city's future (City of Phoenix 2015).
Impact fees for developers of new homes	Yes	Eligible
User fees for water, sewer, gas, or electric	Yes	Eligible
Stormwater utility fees	No	Eligible
Authority to levy taxes for specific purposes	Yes	Eligible
Ability to incur debt through bonds	Yes	Eligible

Participation in Other Programs

Other programs, such as the Community Rating System, NWS StormReady® Program, and Firewise USA®, enhance a jurisdiction's ability to mitigate, prepare for, and respond to flood related hazards. These programs indicate a jurisdiction's desire to go beyond minimum requirements set forth by local, state, and federal regulations to create a more resilient community. These programs complement each other by focusing on communication, mitigation, and community preparedness to save lives and minimize the impact of flood hazards on a community.



Table 3-18 summarizes the City of Phoenix’s participation in community classification programs.

Table 3-18. Community Classifications

<i>Program</i>	<i>Participation Status / Classification</i>	<i>Date Classified</i>
FEMA Community Rating System (CRS)	Class 5	October 1, 2018
Building Code Effectiveness Grading Schedule (BCEGS)	2/2	June 6, 2018
NWS StormReady® Program	Yes	-
NFPA Firewise USA®	No	-

Source(s): (FEMA 2025); (NWS n.d.); (NFPA 2024)

3.2 COORDINATION WITH COMMUNITIES AND AGENCIES

A total of 15 communities and agencies were contacted via email to participate in stakeholder outreach interviews. During the interviews, stakeholders were asked to provide information for any recent, ongoing, or future projects/activities with or adjacent to the City of Phoenix. Stakeholders were also given the opportunity to opt in to review the Draft 2025 FMP document once it is available for stakeholder and public review. Table 3-19 shows a summary of community and agency participation, followed by detailed sections for each group.

Table 3-19: Community and Agency Participation

<i>Agency or Organization Name</i>	<i>Participation</i>
Arizona Department of Emergency and Military Affairs	Invited to participate in stakeholder outreach interview.
Arizona Department of Transportation (ADOT)	Participated in stakeholder outreach interview. Provided information on relevant transportation and stormwater projects.
Arizona Department of Water Resources (ADWR)	Participated in stakeholder outreach interview.
Arizona State Land Department (ASLD)	Participated in stakeholder outreach interview.
Flood Control District of Maricopa County (FCDMC)	Participated in stakeholder outreach interview.
Maricopa County Department of Emergency Management (MCDEM)	Participated in stakeholder outreach interview.
National Weather Service (NWS)	Participated in stakeholder outreach interview.
Maricopa Association of Governments	Invited to participate in stakeholder outreach interview.
City of Scottsdale	Participated in stakeholder outreach interview. Provided information on flood hazard mitigation project.
Town of Paradise Valley	Participated in stakeholder outreach interview.
Maricopa County Dept. of Transportation (MCDOT)	Participated in stakeholder outreach interview.
Central Arizona Conservation Alliance (CAZCA)	Participated in stakeholder outreach interview. Provided website for natural resource infrastructure.
Phoenix Mountains Preservation Council	Invited to participate in stakeholder outreach interview.
Arizona Forward	Participated in stakeholder outreach interview.
AZ Stormwater Outreach for Regional Municipalities (STORM)	Participated in stakeholder outreach interview.



Arizona Department of Transportation (ADOT)

Members of the Core Planning Team met with the ADOT on April 3, 2025. ADOT is responsible for the numerous freeways (state routes and interstates) within the Phoenix area. ADOT and the City work very closely on all projects within the City as the City has staff dedicated specifically to support coordination with ADOT. Below is a list of the ongoing, recently complete, or future projects within the City, this is not an all-encompassing list:

- I-17 Storm Drain Project from Greenway Road to the Arizona Canal-Diversion Channel (ACDC)
 - Completed
- I-10 Broadway Curve
 - Completion in mid- to late-2025
- Loop 101 Widening
 - Estimate completion date of early 2027
- Scatter Wash ongoing maintenance
 - Annual frequency done prior to monsoon season
- New River and Deadman Wash Levee Inspections
 - Annual frequency for visual inspections – currently completing a more detailed 5-year inspection
- Future development coordination around Loop 101 near Desert Ridge
- Working with the City's Water Services Department for a storm drain outlet for the 23rd Avenue Wastewater Treatment Plant as it shares a headwall with ADOT.

The City works very closely with ADOT and will continue to do so in the future. With this close coordination, all data is shared.

The ADOT requested and was provided with the Draft FMP for review prior to adoption.

Arizona Department of Water Resources (ADWR)

Members of the Core Planning Team met with the ADWR on April 8, 2025. ADWR does not have any ongoing, recently complete, or future projects that impact the City with relation to stormwater, flooding, or floodplains.

The ADWR requested and was provided with the Draft FMP for review prior to adoption.

Arizona State Land Department (ASLD)

Members of the Core Planning Team met with the ASLD on April 11, 2025. ASLD is working closely with the City, FCDMC, and City of Scottsdale on the Rawhide Wash Channelization (Scottsdale) and Paradise Ridge (Phoenix) flood control projects. The two projects are on either side of the municipal boundaries of Phoenix and Scottsdale.

The ASLD is working directly with the City on Paradise Ridge and, therefore, all data has been shared between parties. The project is estimated to be completed by the end of 2027.



The ASLD requested and was provided with the Draft FMP for review prior to adoption.

Flood Control District of Maricopa County

Members of the Core Planning Team met with the FCDMC on March 19, 2025. The City and FCDMC work very closely on different stormwater and flood control projects within the City. The FCDMC has done several Area Drainage Master Studies and Plans (ADMS/P) that cover the City in the past and are currently working on the Metro Phoenix ADMS/P which is estimated to be complete within the next two years.

Additionally, the FCDMC has completed hydrology and hydraulic modeling of South Mountain in the Laveen, Hohokam, and Ahwatukee areas. Several stormwater projects have been completed in these areas to mitigate flood hazards, such as the Laveen Area Conveyance Channel, storm drain projects along Dobbins Road, and support for the development within the area.

The FCDMC requested and was provided with the Draft FMP for review prior to adoption.

Maricopa County Department of Emergency Management (MCDEM)

Members of the Core Planning Team met with the MCDEM on April 29, 2025. No recent, ongoing, or future projects are planned with the City.

The MCDEM requested and was provided with the Draft FMP for review prior to adoption.

National Weather Service

Members of the Core Planning Team met with the National Weather Service on March 28, 2025. The National Weather Service does not work directly with the City but is continuously working to improve thresholds for warnings and situational awareness for the Maricopa County and surrounding area.

All information from the National Weather Service is available publicly.

The National Weather Service requested and was provided with the Draft FMP for review prior to adoption.

City of Scottsdale

Members of the Core Planning Team met with the City of Scottsdale on April 2, 2025. The City of Scottsdale has recently completed the Rawhide Wash Flood Hazard Mitigation Project which included channelization, new levees and embankments, and floodplain delineation updates are pending. This project ties into the downstream City of Phoenix project for Paradise Ridge.

The City of Scottsdale requested and was provided with the Draft FMP for review prior to adoption.

Town of Paradise Valley

Members of the Core Planning Team met with the Town of Paradise Valley on April 10, 2025. The Town of Paradise Valley has locations that outfall into the City of Phoenix. The Town is currently working on the development of a Stormwater Master Plan and is expecting it to be complete at the end of June 2025. The Town will have information to share about the plan upon its completion.

The Town of Paradise Valley requested and was provided with the Draft FMP for review prior to adoption.



Maricopa County Department of Transportation (MCDOT)

Members of the Core Planning Team met with MCDOT on April 16, 2025. MCDOT has no ongoing projects that are stormwater or floodplain related within or adjacent to the City of Phoenix.

MCDOT requested and was provided with the Draft FMP for review prior to adoption.

Central Arizona Conservation Alliance (CAZCA)

Members of the Core Planning Team met with the CAZCA on April 2, 2025. CAZCA currently has no recent, ongoing, or future projects within the City of Phoenix. A web map of natural resource infrastructure is publicly available to support public education (https://web.tplgis.org/cazca_plan/).

CAZCA requested and was provided with the Draft FMP for review prior to adoption.

Arizona Forward

Members of the Core Planning Team met with Arizona Forward on April 14, 2025. Arizona Forward has no recent, ongoing, or future projects within the City of Phoenix. Arizona Forward requested and was provided with the Draft FMP for review prior to adoption.

AZ STORM

Members of the Core Planning Team met with AZ STORM on April 15, 2025. AZ STORM does public outreach with a focus on stormwater pollution and quality.

AZ STORM requested and was provided with the Draft FMP for review prior to adoption.



4 STEP 4: ASSESS THE HAZARD

4.1 WHAT ARE THE FLOOD HAZARDS?

Defining the flood hazards that present the greatest risk to the planning area is the first step in assessing overall risk to the community. The FMP Committee reviewed available information to determine what types of flood hazards may affect the planning area, how often they occur, and their potential severity.

4.2 FEDERAL DISASTER DECLARATIONS

Federal disaster declarations are typically issued for hazard events that cause more damage than state and local governments can handle without assistance from the federal government, although no specific dollar loss threshold has been established for these declarations. A presidential disaster declaration puts federal recovery programs into motion to help disaster victims, businesses, and public entities. Some of the programs are matched by state programs. There are two types of disaster declarations provided for in the Stafford Act: Emergency Declarations and Major Disaster Declarations. Both declaration types are declared at the county level and authorize the President to provide supplemental federal disaster assistance (FEMA 2011).

- **Emergency Declaration:** An Emergency Declaration can be declared for any occasion or instance when the President determines federal assistance is needed. Emergency Declarations supplement State and local efforts in providing emergency services, such as the protection of lives, property, public health, and safety, or to lessen or avert the threat of a catastrophe in any part of the United States.
- **Major Declaration:** The President can declare a Major Disaster Declaration for any natural event, including any hurricane, tornado, storm, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, or drought, or, regardless of cause, fire, flood, or explosion, that the President believes has caused damage of such severity that it is beyond the combined capabilities of state and local governments to respond. A major disaster declaration provides a wide range of federal assistance programs for individuals and public infrastructure, including funds for both emergency and permanent work.

Review of presidential disaster declarations helps establish the probability of reoccurrence for hazards and identify targets for risk reduction. Disaster declarations are made at the county level.

Table 4-1 summarizes the federal disaster declarations involving floods that included Maricopa County since 1954. Out of 26 total presidential declarations, 12 involved flooding, 11 involved wildfires, and 2 involved the COVID-19 pandemic. One declaration was related to national efforts to support evacuations during and after Hurricane Katrina in the Gulf region, showing that the City of Phoenix can be indirectly impacted by floods that take place well outside of its jurisdictional boundaries.



Table 4-1. Federal Disaster Declaration Involving Flood in Maricopa County

Disaster Number	Event Date(s)	Declaration Date	Title
DR-217-AZ	April 30, 1966	April 30, 1966	Arizona Flooding
DR-294-AZ	September 22, 1970	September 22, 1970	Arizona Heavy Rains, Flash Floods
DR-343-AZ	July 3, 1972	July 3, 1972	Arizona Severe Storms, Flooding
DR-551-AZ	March 4, 1978	March 4, 1978	Arizona Severe Storms, Flooding
DR-570-AZ	December 21, 1978	December 21, 1978	Arizona Severe Storms, Flooding
DR-614-AZ	February 19, 1980	February 19, 1980	Arizona Severe Storms, Flooding
DR-884-AZ	July 8 – September 14, 1990	December 6, 1990	Arizona Flooding, Severe Storm
DR-977-AZ	January 5 – March 6, 1993	January 19, 1993	Arizona Severe Storms, Tornadoes, Flooding
DR-1304-AZ	September 14 - 23, 1999	October 15, 1999	Severe Storms, High Winds and Flooding in Arizona
DR-1347-AZ	October 21 – November 8, 2000	October 27, 2000	Severe Storms and Flooding in Arizona
DR-1586-AZ	February 10-15, 2005	April 14, 2005	Arizona Severe Storms and Flooding
DR-4203-AZ	September 7-9, 2014	November 5, 2014	Arizona Severe Storms and Flooding

Source: (FEMA 2025)

4.3 NATIONAL RISK INDEX

FEMA's National Risk Index (NRI) is a dataset and online tool developed to help illustrate risk for 18 natural hazards. The NRI leverages available source data for natural hazard and community risk factors to develop a baseline risk measurement for each county in the United States. The NRI ranks riverine flooding as relatively moderate for the Maricopa County and the City of Phoenix (FEMA 2024a).

4.4 EVALUATION OF FLOOD HAZARDS

The FMP Committee evaluated the various flood hazards that the City of Phoenix is exposed to, reviewed previous disaster declarations, the NRI, the hazards of concern in the 2016 Phoenix FMP, the hazards of concern in the 2020 Floodplain Management Plan for Unincorporated Maricopa County, the hazards of concern in the 2021 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan, the hazards of concern in the 2023 State of Arizona Hazard Mitigation Plan, recent hazard events/changes in exposure, and current CRS FMP guidance before finally determining which hazards of concern should be included in the 2025 FMP.



Table 4-2. Identification of Flood Hazards of Concern for the City of Phoenix, AZ

Flood Hazard	Comments	To Be Included in 2025 Phoenix FMP update?
Alluvial Fan Flooding	The City of Phoenix is exposed to alluvial fan flooding along and near sloped areas.	Yes
Coastal Erosion	The City of Phoenix is located well inland and is not exposed to coastal erosion.	No
Dam Failure	According to the USACE National Dam Inventory, the City of Phoenix could be directly and indirectly impacted by dam failure.	Yes
Debris Flow	While debris flows are common following wildfire events in Maricopa County, debris flows typically take place outside of the City of Phoenix boundaries.	No
Flash Flooding	Flash flooding is common in the City of Phoenix and typically occurs within the Special Flood Hazard Area.	Yes, discussed with riverine flooding.
Levee Failure	According to the USACE National Levee Database, there are 14 levees located in the City of Phoenix. There are approximately 59 total levee systems in the Phoenix metro area that could impact the City directly or indirectly.	Yes
Riverine Flood	The NRI ranks riverine flooding as relatively moderate for the City of Phoenix. Riverine flooding is mapped using the Special Flood Hazard Area.	Yes
Sheet Flow	Sheet flow has been identified as a past flooding type. It is included in mapping for the Special Flood Hazard Area (AO zones).	Yes, discussed with riverine flooding.
Storm Surge	Although the City of Phoenix may be impacted by remnants of tropical cyclones, the City is located well inland and is not exposed to storm surge.	No
Tsunami	The City of Phoenix is located well inland and is not exposed to tsunamis.	No
Urban Flooding	Although urban flooding is not mapped, the City is exposed to urban flooding.	Yes

Source(s): (USACE 2025); (USACE 2025) (FEMA 2024a).

4.5 FLOOD HAZARDS OF CONCERN FOR THE 2025 FLOODPLAIN MANAGEMENT PLAN

Based on input from the FMP Committee, the following flood hazards were identified as affecting the City of Phoenix and will be addressed in the 2025 FMP:

- Riverine flooding (includes sheet flow)
- Alluvial fan flooding
- Urban flooding
- Dam and levee failure flooding



4.5.1 Changes from the 2021 Maricopa County Multi-jurisdictional Hazard Mitigation Plan

For the 2025 FMP, the City of Phoenix returned to a stand-alone Floodplain Management Plan. This resulted in establishment of a FMP Committee to guide an update of the plan focusing only on flood hazards that directly and indirectly impact the City of Phoenix.

4.6 ASSESSING RISK

In hazard mitigation planning, risk is the potential for damage or loss when natural hazards interact with people or assets, such as buildings, infrastructure, and resources. A risk assessment is a process used to identify potential hazards and analyze what could happen if a disaster or hazard occurs. It involves a data-driven analysis to identify potential hazards, what could happen if hazards occur, and determine vulnerabilities to hazards (FEMA 2023).

The risk assessment process focuses on three main elements – hazard identification, exposure identification, and vulnerability identification and loss estimation.

4.7 RISK ASSESSMENT TOOLS

For this FMP, previously developed risk assessment data from the 2021 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan and updated 2025 data from the USACE National Levee Database were used to conduct the risk assessment.

4.7.1 Mapping

Floodplain mapping from the 2021 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan was used to analyze the location of flood hazards for riverine flooding (Special Flood Hazard Area), dam failure flooding (emergency spillway and potential dam failure flood hazard areas), and levee failure flooding (potential levee failure flood hazard area)

4.7.2 Critical Facilities

For critical facilities identified by the 2021 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan, critical facilities followed the criteria set forth by the Critical Infrastructure Assurance Office (CIAO). The State of Arizona has adopted eight general categories that define critical facilities and infrastructure (Maricopa County 2021):

- *Communications Infrastructure:* Telephone, data services, and internet communications, cell and radio towers, which have become essential to continuity of business, industry, government, and military operations.
- *Electrical Power Systems:* Generation stations and transmission and distribution networks that create and supply electricity to end-users.
- *Gas and Oil Facilities:* Production and holding facilities for natural gas, crude and refined petroleum, and petroleum-derived fuels, as well as the refining and processing facilities for these fuels.



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

Other assets such as public libraries, schools, museums, parks, recreational facilities, historic buildings or sites, churches, residential and/or commercial subdivisions, apartment complexes, and so forth, were classified as non-critical facilities and infrastructure, as they are not necessarily “critical” per the definition set forth in Executive Order 13010. They were, however, still considered by the Maricopa County Multi-Jurisdictional Hazard Mitigation Plan Planning Team to be important facilities, and critical and non-critical should not be construed to equate to important and non-important. For each asset, attributes such as name, description, physical address, geospatial position, and estimated replacement cost were identified to the greatest extent possible and entered into a GIS geodatabase (Maricopa County 2021).

For levee failure, information on critical facilities was identified using the USACE National Levee Database. The National Levee Database uses the DHS Homeland Infrastructure Foundation-Level Data (HIFLD) from 2023 to determine critical facility designation and location (USACE n.d.).

4.7.3 Exposure

Potential exposures reported in this Plan represent an inherent assumption that the hazard occurs county-wide to the magnitude shown on the hazard profile map. The results are intended to present a county-wide value and number of exposures. Any single hazard event is unlikely to impact the entirety of the hazard profile map established for the City and the event specific exposure and losses would be some fraction of those estimated herein (Maricopa County 2021).

For exposure data provided by the 2021 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan, asset exposure estimates were accomplished by intersecting the asset inventory with the flood hazard areas and compiling the exposed facility count and replacement values. Similarly, human population and residential unit exposures were estimated by intersecting the same hazards with the census block population and residential unit count data sets. Structure and content replacement costs for assets were assigned to each facility by the corresponding jurisdiction. Structure and content replacement costs for the residential housing counts were geographically assigned based on zip code and average housing cost unit values data from the Zillow home value database. Content value for these buildings was assumed to equal 50% of the replacement cost (Maricopa County 2021).



Combining the exposure results from the asset inventory and census database provided a comprehensive depiction of the overall exposure of critical facilities, human population, and residential building stock and the two datasets were considered complimentary and not redundant (Maricopa County 2021).

Levee failure exposure was determined based on information provided by the USACE National Levee Database (USACE n.d.).

4.8 RISK ASSESSMENT APPROACH

This plan evaluated risks associated with each identified hazard for the City of Phoenix. Each flooding type was profiled using the following steps:

- *Description of the Hazard:* Defining the hazard and a discussion of potential impacts
- *Location:* Geographic areas most affected by the hazard
- *Extent:* Measuring the intensity of the hazard, warning time for preparations, and the reasonable worst-case scenario
- *Previous Occurrences:* Summary of past events that have impacted the planning area
- *Future Conditions:* Probability estimates, including potential frequency and intensity shifts caused by climate change and population and development trends

For each flooding type, one of the following assessment approaches was used, depending on the type of information available for the hazard:

- *Quantitative assessment*—Performed when numerical data are available to define risk. Available numerical hazard data may include the financial impact and probability
- *Qualitative assessment*—Uses words to describe and categorize the likelihood and consequences of a risk when numerical data are unavailable

Vulnerability of exposed structures and infrastructure was evaluated by estimating the probability of occurrence of flooding and assessing structures, facilities, and systems that are exposed to each flood hazard.

- Impact on Life, Health, and Safety
- Impact on General Building Stock
- Impact on Community Lifelines
- Impact on the Economy
- Impact on Historic and Cultural Resources
- Impact on Ecosystems and Natural Resources
- Change in Vulnerability Since the Previous 2021 HMP

4.9 SOURCES OF DATA USED IN RISK ASSESSMENT

The vulnerability assessment results from the 2021 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan and information from the USACE National Levee Database were used to assess the City of Phoenix's vulnerabilities to flooding.



Riverine and alluvial fan flooding impacts were collectively analyzed based on exposure to high hazard flood zones. Urban flooding was discussed qualitatively as all of the City of Phoenix could potentially experience urban flooding. Dam failure was analyzed based on exposure to emergency spillway inundation and potential inundation from medium and high hazard dams. Levee failure was analyzed based on population and assets protected by levees identified in the USACE National Levee Database.

4.10 DATA LIMITATIONS

Although the City of Phoenix and Maricopa County have a wealth of available data, data limitations did limit the assessment of risk for some hazards. Data limitations include the following:

- The 2021 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan used 2010 census residential structure statistics.
- No industrial or commercial unit estimates are made for this update due to the lack of reliable data at the time of the 2021 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan analysis.

4.11 FLOOD HAZARD PROFILE

For this 2025 Floodplain Management Plan, the flood hazard was determined to include the following sub-hazards: riverine flooding, alluvial fan flooding, urban flooding, and dam and levee failure.

4.11.1 Description of the Hazard

Defining the Hazard

Riverine Flooding

Riverine flooding, or fluvial flooding, is when streams and rivers exceed the capacity of their natural or constructed channels to accommodate water flow and water overflows the banks, spilling out into adjacent low-lying, dry land. This occurs when the flow of a river exceeds the bank sides and causes damage or obstruction to a nearby floodplain. Riverine flooding can turn into a flash flood if the river is at or above its flood stage and if the soil is saturated (FEMA 2019).

A flash flood is a rapid inundation of low-lying areas caused by heavy rain associated with severe thunderstorms, tropical systems, or melting water from ice or snow. Flash flooding also occurs far away from water bodies when a large volume of water cannot be absorbed by the soil or stormwater systems and travels overland unimpeded (NWS 2019).

Sheet flow is a type of flood hazard with flooding depths of 1 to 3 feet that occurs in areas of sloping land (FEMA 2020). Depending on the slope of the land, there can also be ponding, and the sheet flow can be slow or move fast enough to cause erosion (Arizona Department of Emergency and Military Affairs 2023).

Alluvial Fan Flooding

Active alluvial fans can develop at locations where steep mountain washes abruptly transition to flatter alluvial piedmonts located at the base of the mountain. During flood events, the steep washes carry heavy sediment loads that deposit in a fan shape, with one or more primary flow paths of concentrated flooding



that can change location across the fan face with any given flood event. The point of slope changes at the upper-most portion of the fan is known as the fan apex. Alluvial fans are active and volatile in moving the primary channel(s) and creating new flow paths (Arizona Department of Emergency and Military Affairs 2023).

Urban Flooding

Flood issues are traditionally associated with riverine and coastal areas, but increasing attention is being given to urban flooding, where flood risk is more a function of the human-built environment. Population growth and associated development in metropolitan areas, combined with aging stormwater infrastructure and changing weather patterns, have given rise to an urban-specific flood problem of national importance. In this new category of flooding, risk and impacts are no longer tied to the FEMA-defined floodplains. Instead, significant flood losses can occur miles from a delineated floodplain where these urban losses are embedded in a highly developed landscape (Center for Disaster Resilience, Center for Texas Beaches and Shores 2018).

Local (urban) drainage systems collect groundwater from heavy rainfall in developed areas. Water that does not evaporate or become absorbed by the ground is carried by conduits to waterways such as creeks, rivers, or the ocean. These systems have two purposes: 1) to control storm water runoff during periods of heavy rainfall; and 2) to minimize disruption of activity from more frequently occurring, less significant storms. Flooding occurs when runoff exceeds system capacity, or because systems are blocked from lack of maintenance. Flooding that is the result of poorly designed or blocked drainage systems is categorized as urban/stormwater flooding (NOAA 2022).

Dam and Levee Failure Flooding

A dam is an artificial barrier that has the ability to impound water, wastewater, or any liquid-borne material for the purpose of storage or control of water (FEMA 2019). They are built for the purpose of power production, agriculture, water supply, recreation, and flood protection. Dam failure is any malfunction or abnormality outside of the design that adversely affects a dam's primary function of impounding water. Dams can fail for one or a combination of the following reasons (FEMA 2018):

- Overtopping caused by floods that exceed the capacity of the dam or levee (inadequate spillway capacity);
- Prolonged periods of rainfall and flooding;
- Deliberate acts of sabotage (terrorism);
- Structural failure of materials used in dam construction;
- Movement and/or failure of the foundation supporting the dam;
- Settlement and cracking of concrete or embankment dams;
- Piping and internal erosion of soil in embankment dams;
- Inadequate or negligent operation, maintenance, and upkeep;
- Failure of upstream dams on the same waterway; or
- Earthquake (liquefaction / landslides).



Potential for catastrophic flooding caused by dam failures led to enactment of the National Dam Safety Act (Public Law 92-367), which for 30 years has protected Americans from dam failures. The National Dam Safety Program (NDSP) is a partnership among states, federal agencies, and other stakeholders that encourages individual and community responsibility for dam safety. Under FEMA's leadership, state assistance funds have allowed all participating states to improve their programs through increased inspections, emergency action planning, and purchases of needed equipment. FEMA has also expanded existing and initiated new training programs. Grant assistance from FEMA provides support for improvement of dam safety programs that regulate most dams in the United States (FEMA n.d.).

The U.S. Army Corps of Engineers (USACE) is responsible for safety inspections of some federal and nonfederal dams in the United States that meet the size and storage limitations specified in the National Dam Safety Act. USACE has inventoried dams and has surveyed each state's and federal agency's capabilities, practices, and regulations regarding design, construction, operation, and maintenance of the dams. USACE has also developed guidelines for inspection and evaluation of dam safety (USACE 2021).

Arizona's Dam Safety Program has existed since 1929. Funding for the program was minimal and sporadic until legislative approval of a consistent budget began in 1971, authorizing permanent staffing and the development of a comprehensive statewide Dam Safety Program (Arizona Department of Emergency and Military Affairs 2023).

The Arizona Revised Statutes (A.R.S.) §45-1201 assigns the responsibility for supervision of the safety of non-federal dams to the Director of the Arizona Department of Water Resources (ADWR). The mission of the ADWR Dam Safety Section is to maximize the protection of the public against loss of life and property by reducing the likelihood of catastrophic failure of dams within the state's jurisdiction. State statute defines a jurisdictional dam as an artificial barrier for the impounding or diversion of water either 25 feet or more in height or having a storage capacity of more than 50 acre-feet, with the following exceptions (Arizona Department of Emergency and Military Affairs 2023):

- Any barrier for the purpose of storing liquid-borne material (e.g., mine tailings dams);
- Any barrier that is a "release-contained barrier;"
- Any barrier that is federally owned and operated;
- Sole use of transportation structures;
- Any barrier that is:
 - Less than six feet in height, regardless of storage capacity, or
 - Between six and 25 feet in height with a storage capacity of less than 50 acre-feet, or
 - Greater than 25 feet in height with 15 acre-feet or less of storage capacity.
- For an artificial barrier and/or appurtenant works structure to be considered a "release-contained barrier," the following criteria should comply:
 - Has storage capacity that in the event of failure would be contained within the property that the release-contained barrier owner owns controls, operates, maintains, or manages.
 - The property on which the release would be contained is not open to the public.
 - The owner will maintain downstream containment structures or sites with sufficient containment throughout the useful life of the release-contained barrier.



The National Flood Insurance Program (NFIP) defines a levee in Title 44, Chapter 1, Section 59.1 of the Code of Federal Regulations (44 CFR 59.1) as “a man-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to reduce risk from temporary flooding.” The NFIP regulations define a levee system as “a flood protection system which consists of a levee, or levees, and associated structures, such as closure and drainage devices, which are constructed and operated in accordance with sound engineering practices” (FEMA 2020).

Levees are designed to reduce flood risk from flooding events; however, they do not eliminate the risk entirely. It is always possible that a flood will exceed the capacity of a levee, no matter how well the structure is built. Levees are designed to manage a certain amount of floodwater and can be overtopped or fail during flood events exceeding the level for which they were designed. Levee failures can also be caused by structural failures resulting from improper maintenance, inadequate foundations, seismic activity, erosion, seepage, or burrowing animals. When a levee fails, the result can be more catastrophic than if the levee had never been constructed (FEMA 2020).

Levees and floodwalls are typically built parallel to a waterway, most often a river, to reduce the risk of flooding on the landward side. Floodwalls, which are typically made of concrete or steel, are often constructed on a levee crown to increase the height of the levee, without increasing the base of the embankment (FEMA 2020).

In 2007, Congress established the National Committee on Levee Safety (NCLS) to develop recommendations for a National Levee Safety Program (NLSP). The NCLS, with guidance from Congress, developed the following definition for a levee: “A manmade barrier (embankment, floodwall, or structure) along a watercourse constructed for the primary purpose to provide hurricane, storm, and flood protection relating to seasonal high water, storm surges, precipitation, and other weather events; and that normally is subject to water loading for only a few days or weeks during a year. Levees also may be embankments, floodwalls and structures that provide flood protection to lands below sea level and other lowlands and that may be subject to water loading for much, if not all, portions of the year, but that do not constitute barriers across watercourses or constrain water along canals” (Arizona Department of Emergency and Military Affairs 2023).

Cause of the Hazard

Flooding can occur for a variety of reasons. Floods can happen during and after heavy rains, when snow quickly melts, or when dam or levees break (NOAA National Severe Storms Laboratory 2023).

There are three seasonal atmospheric conditions that tend to trigger significant flood events in Arizona (Arizona Department of Emergency and Military Affairs 2023):

- **Tropical Storm Remnants:** Historically, the most regionally severe flooding occurs when remnants of hurricanes and tropical storms enter the state. These events infrequently occur (i.e., approximately every ten years), mostly in early autumn, and can bring several days of prolonged, intense precipitation events covering large regions that can cause severe flooding. In general, the flood hazard imposed by tropical storm remnants tends to degrade with northern movement



through the state. The southern and central regions of the State of Arizona, including the City of Phoenix, are usually impacted the most.

- **Winter Rains:** Winter brings the threat of low-intensity, long-duration rains that cover large areas and cause extensive flooding and erosion, particularly when combined with snowmelt that increases runoff after rain falls on significant snowpack. The El Nino climate phenomenon can influence winter storms and cause severe flooding. Winter rains tend to impact the northern regions of the State of Arizona.
- **Summer Monsoons:** Monsoon winds bring humid subtropical air into the state in mid to late summer. Solar heating triggers afternoon thunderstorms that can be devastating. Flash flooding may occur as a result of local, intense rainfall in a short period (usually six hours). Many Arizona communities get half of their annual rainfall during the summer monsoon from June 15 to September 30. Summer monsoons impact areas statewide but tend to be strongest in southern and central regions of the State of Arizona, including the City of Phoenix.

Summary of Potential Impacts

Flooding can result in severe damages. Hydrostatic pressures and flowing floodwaters can easily cause structures to collapse or float away. Flooding can result in scouring and erosion of sediment in areas with flow or wave action. Floodwater can lead to drownings and the spread of contaminants and disease.

Cascading Hazard Impacts

Flooding can result in the scouring and erosion of soil, utility failures, hazardous material releases, and the spread of disease.

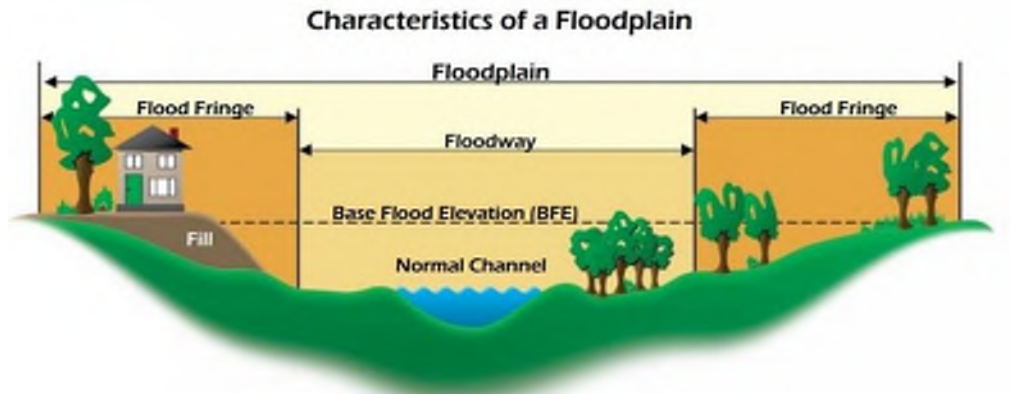
4.11.2 Location

Flooding potential is influenced by climatology, meteorology, and topography. Most floods occur within floodplains. A floodplain is defined as the land adjoining the channel of a river, stream, ocean, lake, or other watercourse or water body that becomes inundated with water during a flood. The floodplain describes the area inundated by the “100-year” flood, or a flood that has a 1-percent chance in any given year of being equaled or exceeded. A floodplain is designated when floodwater exceeds the capacity of the main channel, or water escapes the channel through bank erosion. Figure 4-1 depicts the flood hazard area, the flood fringe, and the floodway areas of a floodplain.

The boundaries of the floodplains are altered as a result of changes in land use, the amount of impervious surface, placement of obstructing structures in floodways, changes in precipitation and runoff patterns, improvements in technology for measuring topographic features, and utilization of different hydrologic modeling techniques.



Figure 4-1 Characteristics of a Floodplain



Source: (FEMA 2009)

Flood hazard areas are identified as Special Flood Hazard Area (SFHA). SFHA are defined as the area that will be inundated by the flood event having a 1-percent chance of being equaled or exceeded in any given year. The 1-percent annual chance flood is also referred to as the base flood or 100-year flood. A 100-year floodplain is not a flood that will occur once every 100 years; the designation indicates a flood that has a 1-percent chance of being equaled or exceeded each year. Thus, the 100-year flood could occur more than once in a relatively short period of time. Similarly, the moderate flood hazard area (500-year floodplain) will not occur every 500 years but is an event with a 0.2-percent chance of being equaled or exceeded each year. The 1-percent annual chance floodplain establishes the area that has flood insurance and floodplain management requirements. The following are additional definitions relating to flood maps (FEMA 2025):

- Flood hazard areas identified on the Flood Insurance Rate Map are identified as a Special Flood Hazard Area (SFHA).
- SFHA = the area that will be inundated by the flood event having a 1-percent chance of being equaled or exceeded in any given year.
- 1-percent annual chance flood = the base flood or 100-year flood.
- SFHAs are labeled as Zone A, Zone AO, Zone AH, Zones A1-A30, Zone AE, Zone A99, Zone AR, Zone AR/AE, Zone AR/AO, Zone AR/A1-A30, Zone AR/A, Zone V, Zone VE, and Zones V1-V30.
- Zone B or Zone X (shaded) = Moderate flood hazard areas and are the areas between the limits of the base flood and the 0.2-percent-annual-chance (or 500-year) flood.
- Zone C or Zone X (unshaded) = Areas of minimal flood hazard, which are the areas outside the SFHA and higher than the elevation of the 0.2-percent-annual-chance flood, are labeled.

Copies of FEMA's flood mapping for the City of Phoenix on file at City Hall. The City's floodplain management page (<https://www.phoenix.gov/administration/departments/city-engineer/floodplain-management.html>) also has links to floodplain mapping available from the Maricopa County Flood Control District and the National Flood Hazard Layer.

Figure 4-2 through Figure 4-4 display Special Flood Hazard Areas for the City of Phoenix.



Figure 4-2 City of Phoenix Special Flood Hazard Area Map - North

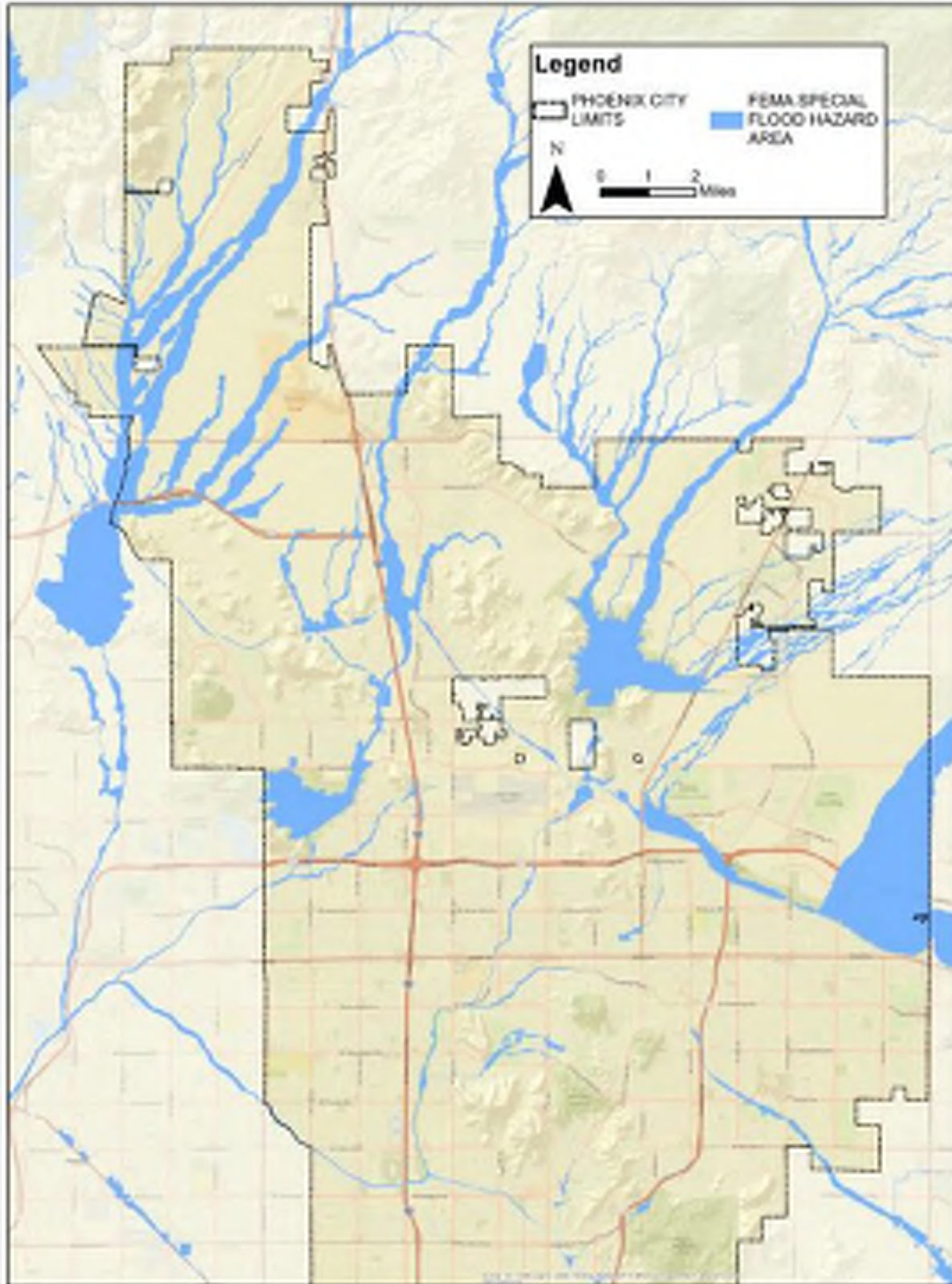




Figure 4-3 City of Phoenix Special Flood Hazard Area Map - Central

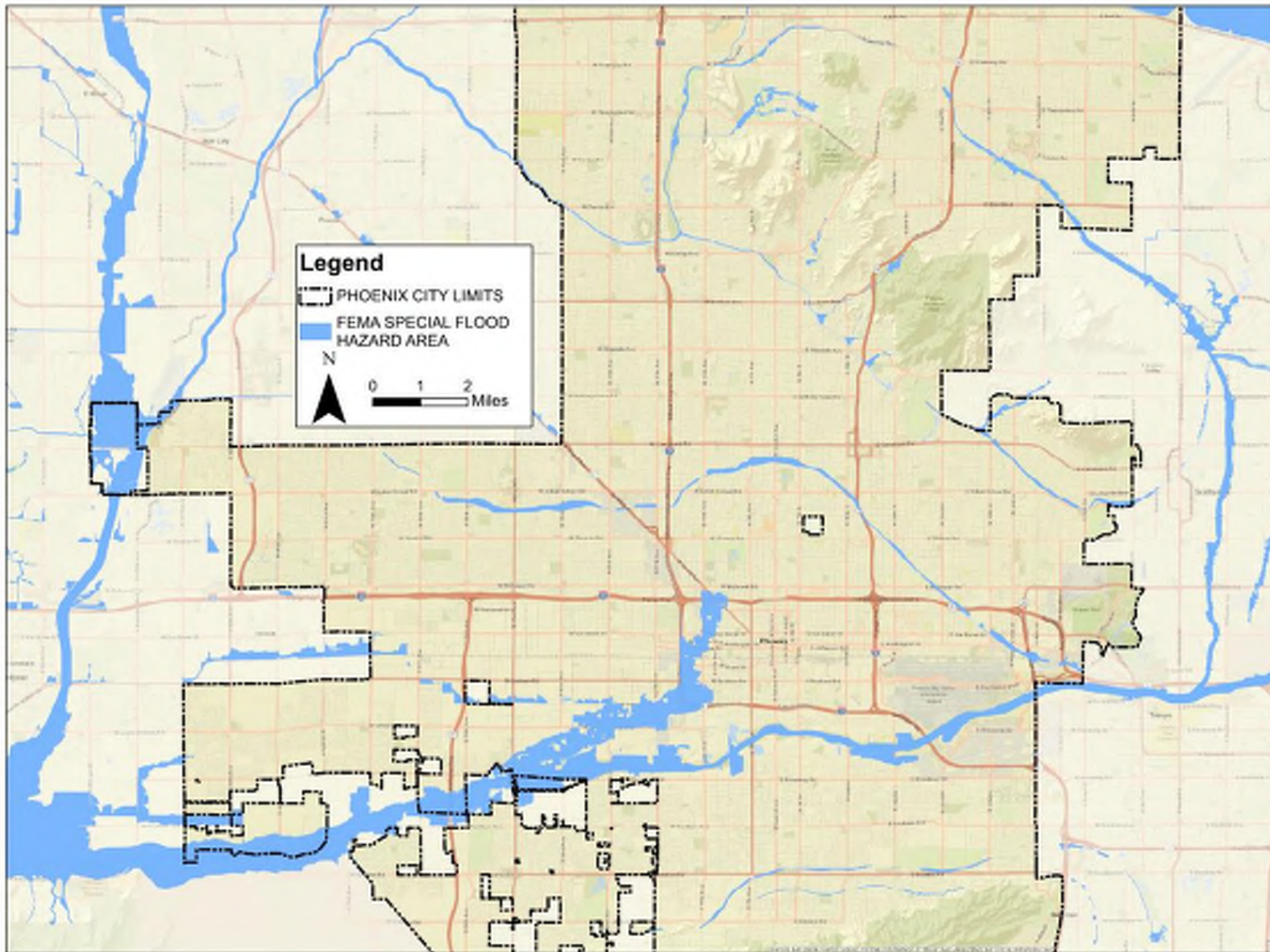
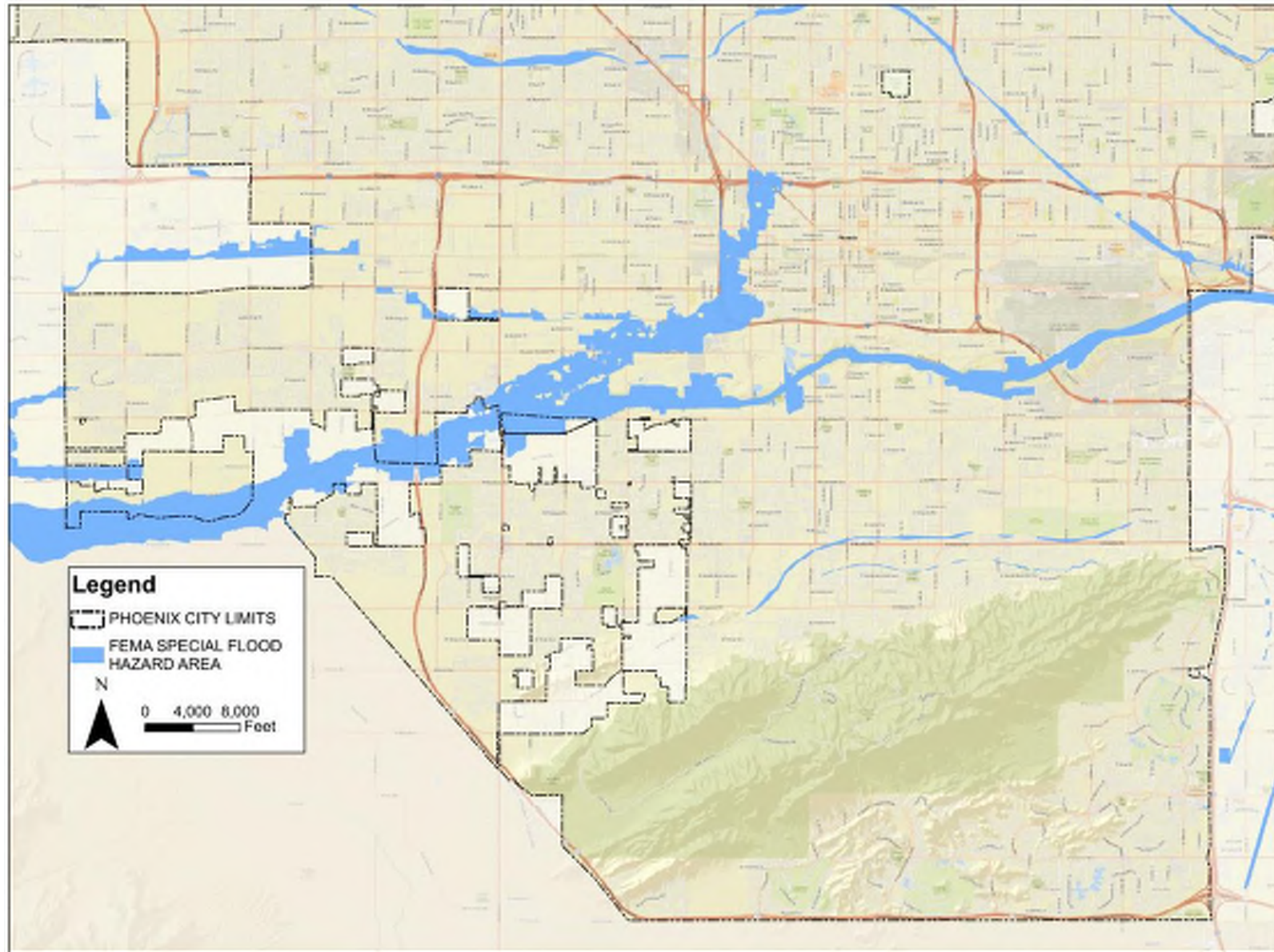




Figure 4-4 City of Phoenix Special Flood Hazard Area Map - South





Riverine Flooding

In the City of Phoenix, floodplains line the rivers, washes, and canals of the City. Canals weave through metro Phoenix and provide residents of the Valley with year-round access to water. One-hundred eighty miles of canals bring water to 2.5 million people in the region. Managed today by Salt River Project (SRP), the canals primarily serve the crucial function of managing water, but also have been a place for recreation, past and present (MPact 2023). Areas bordering the City's natural and manmade waterways are prone to riverine flooding. When the carrying capacity of these waterways are exceeded, they overflow their banks, causing riverine flooding.

High hazard flood zones throughout Phoenix are primarily located along established watercourses, conveyance corridors, canals, and flood control facilities (Maricopa County 2021).

Special Flood Hazard Areas within the City area are typically along washes or rivers or along the upstream side of an embankment. Flooding in these areas comes from significant rainfall events throughout the City and surrounding areas. Velocities and warning times would vary depending on the location and size of the storm event. In the northern part of the City, storm events may occur in the mountains to the north, and velocities would be high, but the warning time would be increased due to the location of the storm event. Within the City, flood control dams and levees have reduced the risk to people and property along Special Flood Hazard Areas.

Alluvial Fan Flooding

Alluvial fan flooding is a type of flood hazard that occurs only on alluvial fans. It is characterized by flow path uncertainty so great that this uncertainty cannot be set aside in realistic assessments of flood risk or in the reliable mitigation of the hazard. An alluvial fan flooding hazard is indicated by three related criteria: (a) flow path uncertainty below the hydrographic apex, (b) abrupt deposition and ensuing erosion of sediment as a stream or debris flow loses its competence to carry material eroded from a steeper, upstream source area, and (c) an environment where the combination of sediment availability, slope, and topography creates an ultrahazardous condition for which elevation on fill will not reliably mitigate the risk (National Academies of Science, Engineering, and Medicine 1996).

Urban Flooding

Urban flooding is not mapped by the State or FEMA, but is most likely to occur in highly developed areas with high percentages of impervious coverage that contribute to high rates of runoff. Locations that have undersized stormwater components or stormwater components that are prone to becoming clogged or failing often experience stormwater flooding.

Urban flooding is traditionally often noteworthy when it occurs outside of the Special Flood Hazard Area, where flooding is commonly anticipated. Like urban flooding, sheet flow is traditionally identified outside of the FEMA defined Special Flood Hazard Area. The sheet flow hazard is represented by the zone designation AO on the FIRM (FEMA 2020).

Repetitive loss areas within the City are subject to ponding against canal embankments. The potential depth of flooding may vary depending on the location along the embankment from 1-foot to multiple feet. Velocities would be minimal, but the warning time would likely be enough to protect property. The



increased warning time would be due to the time it would take to see water starting to pond back from the embankment to the structure which would hopefully allow time to get materials to adequately protect.

Areas within the City that area not mapped but have flooded in the past include areas along the mountain to urban transition and older areas of the City with limited or no stormwater infrastructure. Flooding sources in these areas would be from high intensity storm events that lead to flash flooding in the area with high velocities and limited warning time.

Dam and Levee Failure Flooding

The Army Corps of Engineers and the Soil Conservation Service have built a number of flood retarding structures on rivers, creeks, washes, and other flood-prone areas in Phoenix. The Flood Control District of Maricopa County maintains and operates these structures. A failure of one of these structures, while extremely unlikely, could result in a level of flooding that greatly exceeds the flood threat that existed prior to construction.

Dams that directly impact the City are provided within Table 4-3. Data was captured from the U.S. Army Corps of Engineers National Inventory of Dams and the Flood Control District of Maricopa County ALERT web map.

Table 4-3. Dams Protecting the City of Phoenix

<i>Name</i>	<i>Owner</i>	<i>Height (ft)</i>
Cave Buttes Dam	Flood Control District of Maricopa County	118
Dreamy Draw Dam	Flood Control District of Maricopa County	42
Reach 11 Detention Dikes 1 through 4	Bureau of Reclamation	40
Rio Salado Town Lake (Tempe Town Lake)	City of Tempe	40
Guadalupe Flood Retarding Structure	Flood Control District of Maricopa County	37
Dam 2A	City of Phoenix	22.5
Dam 2B	City of Phoenix	22
North Mountain Flood Detention 3 (Dam 3)	City of Phoenix	30
Dam 4 (Little Dreamy Draw Dam)	City of Phoenix	21
Detention Basin 7 (Dam 7)	City of Phoenix	29
East Park Dam	City of Phoenix	24.8
West Park Dam	City of Phoenix	30
Dam 99	City of Phoenix	24.3
Papago Park and Phoenix Zoo Dams 1 to 8	City of Phoenix	Various
Roosevelt Dam	Salt River Project	357
Horse Mesa Dam	Salt River Project	304
Mormon Flat Dam	Salt River Project	224
Stewart Mountain Dam	Salt River Project	210
Horseshoe Dam	Salt River Project	202
Bartlett Dam	Salt River Project	309
Granite Reef Diversion Dam	Salt River Project	29

Source: (USACE 2025) & (FCDMC 2025)

Figure 4-5 and Figure 4-6 display emergency spillway flood hazard areas in Maricopa County. Figure 4-7 and Figure 4-8 display dam failure hazard areas in Maricopa County.



Figure 4-5 Maricopa County Emergency Spillway Flood Hazard Map 1A

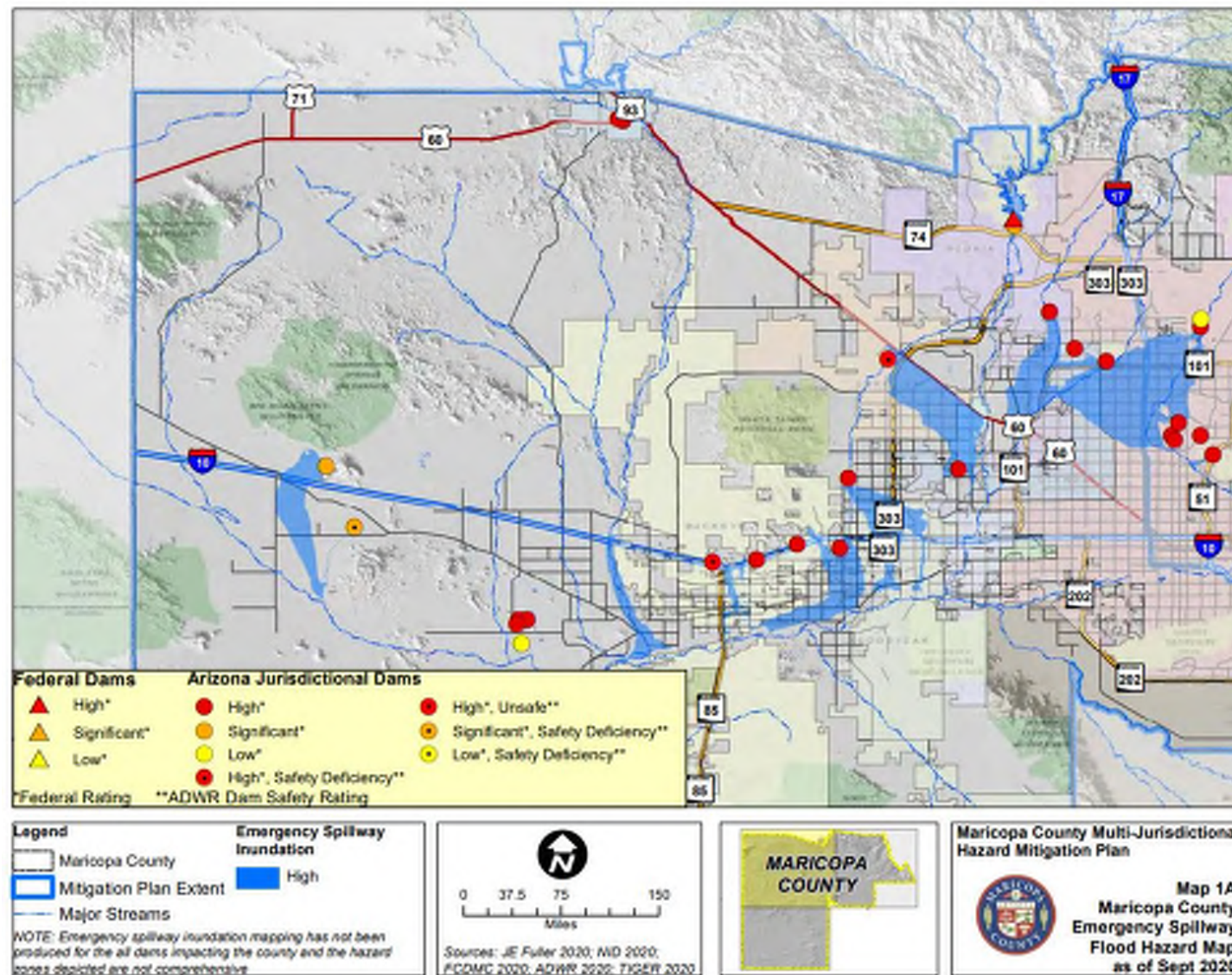




Figure 4-6 Maricopa County Emergency Spillway Flood Hazard Map 1B

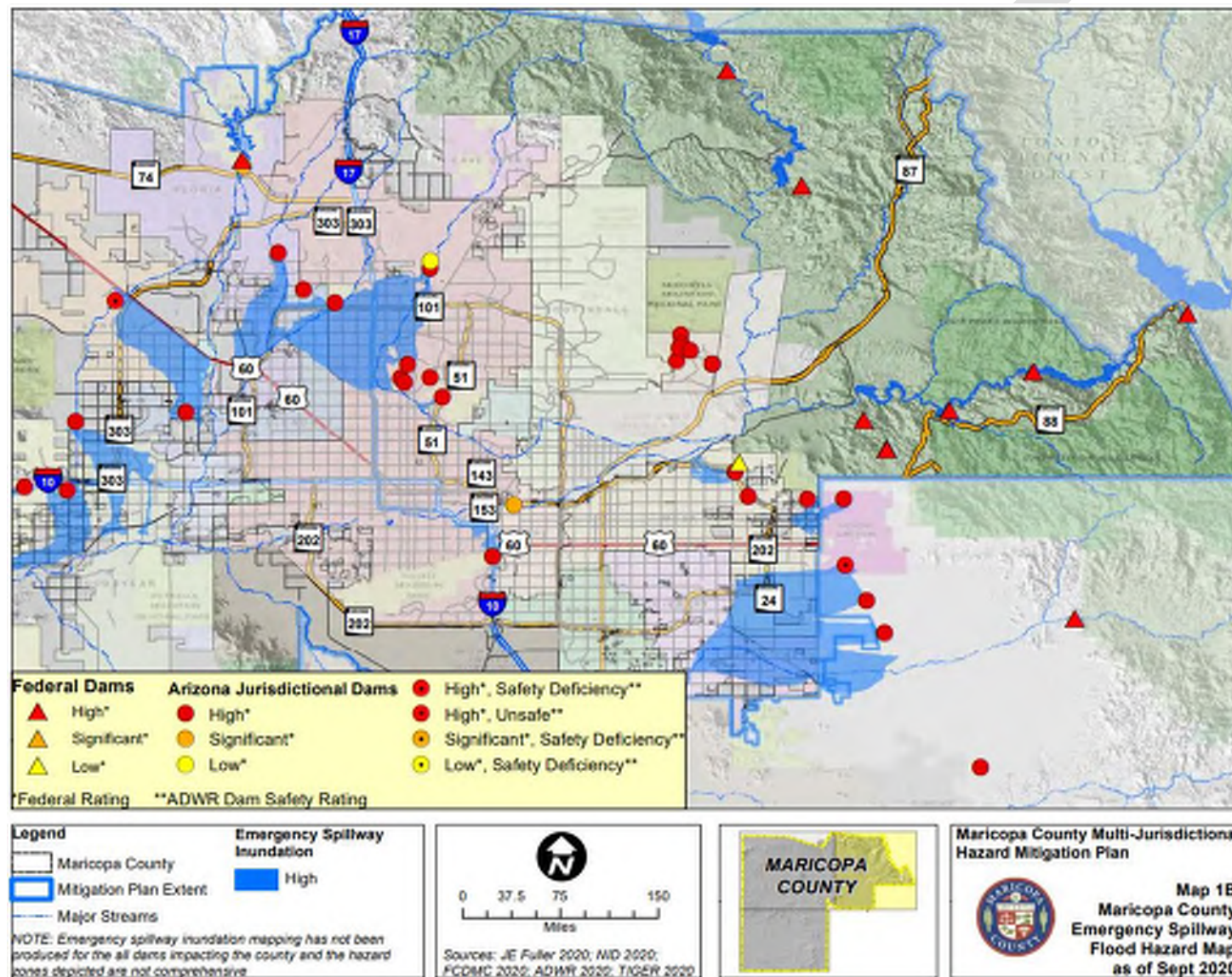




Figure 4-7 Maricopa County Potential Dam Failure Flood Hazard Map 2A

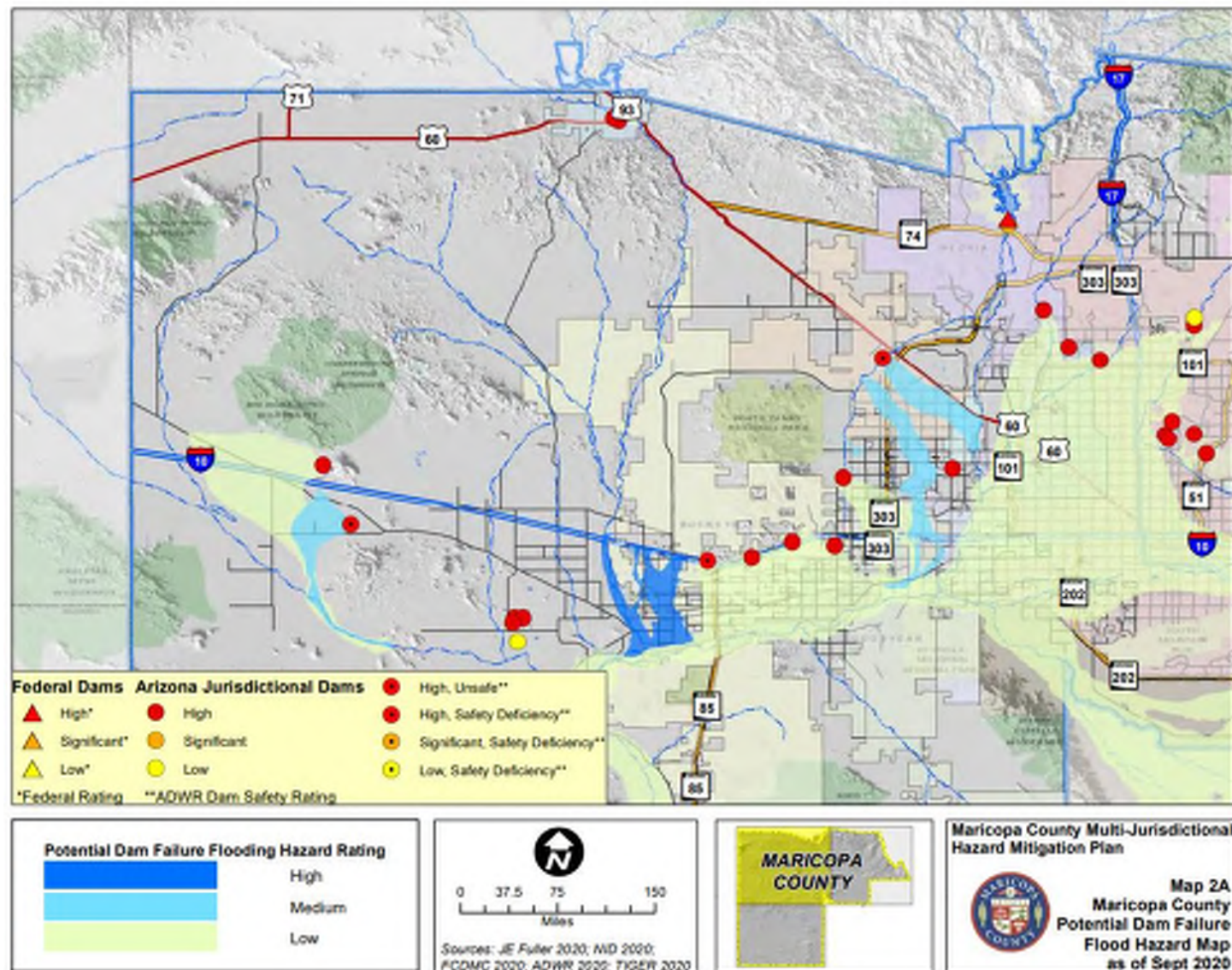


Figure 4-8 Maricopa County Potential Dam Failure Flood Hazard Map 2B



Levees that are designed to reduce the risk of flooding posed by the 1-percent-annual chance flood may be accredited by FEMA. An accredited levee system is a system that FEMA has determined to meet the design, data, and documentation requirements of 44 CFR 65.10 and therefore can be shown on a FIRM as providing a base chance or greater level of flood hazard reduction. This determination is based on a submittal, by or on behalf of a community, which includes 44 CFR 65.10 – compliant data and documentation, certified by a registered Professional Engineer. The area landward of an accredited levee system is shown on the FIRM as a moderate-risk area, labeled Zone X (shaded), except for areas of interior drainage flooding, such as ponding areas, which will be shown as high-risk areas, SFHAs. Flood insurance is not mandatory in Zone X (shaded) areas, but it is mandatory in SFHAs. FEMA strongly encourages flood insurance for all structures in floodplains and especially in areas landward of levees. FEMA accreditation of a levee does not guarantee that it will always protect nearby properties from flooding; therefore, FIRMs carry a notice that overtopping or failure of levees is possible and that flood insurance protection and adherence to evacuation procedures are strongly recommended (FEMA 2020).

The City of Phoenix contains levee failure hazard areas associated with Skunk Creek to the north, New River to the west, and the Salt River to the east. Table 4-4 describes the 14 levee systems located within the City of Phoenix. There are an additional 45 levees in the greater Phoenix metro area that could directly or indirectly impact the City in the event of failure.

Table 4-4. Levee Systems in the City of Phoenix

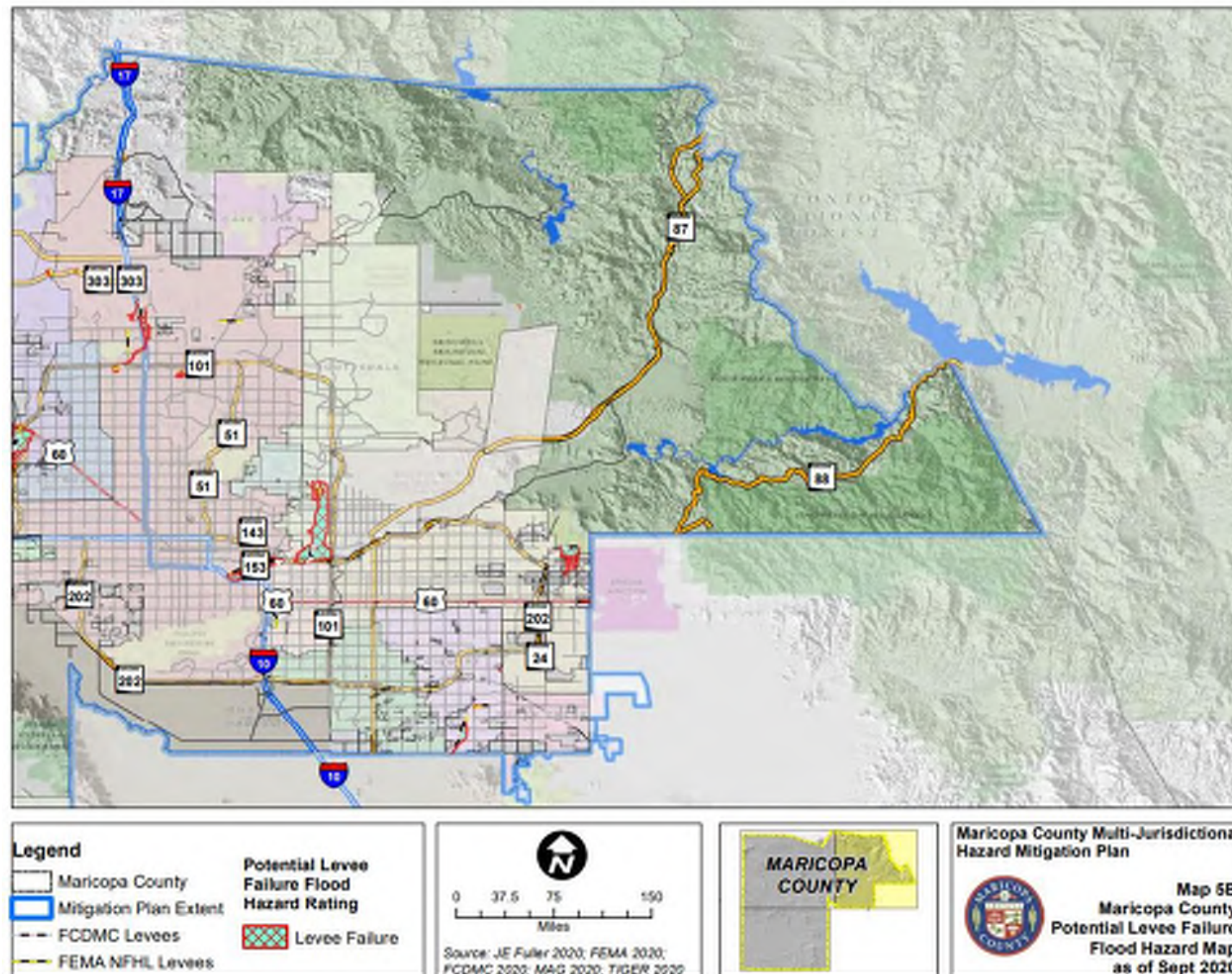
<i>Name</i>	<i>Length</i>	<i>People Protected</i>	<i>Buildings Protected</i>	<i>Property Value Protected</i>	<i>Critical Structures Protected</i>
Agua Fria Reach 1A West	1 mile	183	18	\$1 million	0
Camelback Ranch Levee North (CBRLN)	1.3 miles	505	406	\$120 million	1
Camelback Ranch South	0.5 miles	2,286	883	\$150 million	0
Maricopa County Levee 21	4.6 miles	40,261	3,024	\$4 billion	0
Maricopa County Levee 49	0.8 miles	7,036	2,369	\$880 million	2
Maricopa County Levee 5	1.8 miles	592	7	\$180 million	0
Maricopa County Levee 63	1.1 miles	2,892	189	\$710 million	1
Maricopa County Levee 79	0.3 miles	0	0	0	0
Maricopa County Levee 80	4.3 miles	51	13	\$4 million	1
Maricopa County Levee 85	1.7 miles	7,122	2,944	\$1 billion	5
Scatter Wash North	0.8 miles	557	198	\$88 million	1
Scatter Wash South	0.7 miles	5,241	1,739	\$830 million	3
Skunk Creek 1	1.9 miles	2,577	636	\$80 million	0
Skunk Creek 2	1.1 miles	279	102	\$24 million	0

Source: (USACE 2025)

Figure 4-9 display potential levee failure flood hazard maps for Maricopa County.



Figure 4-9 Maricopa County Potential Levee Failure Flood Hazard Map 5B





4.11.3 Extent

The severity of a flood depends not only on the amount of water that accumulates in a period of time, but also on the land's ability to manage this water. The size of rivers and streams in an area and infiltration rates are significant factors. When it rains, soil acts as a sponge. When the land is saturated or overly dry, infiltration rates decrease and any more water that accumulates must flow as runoff (Harris 2001).

The frequency and severity of flooding are measured using a discharge probability, which is the probability that a certain river discharge (flow) level will be equaled or exceeded in a given year. Flood studies use historical records to determine the probability of occurrence for the different discharge levels. The flood frequency equals 100 divided by the discharge probability. For example, the 100-year discharge has a 1-percent chance of being equaled or exceeded in any given year. The “annual flood” is the greatest flood event expected to occur in a typical year. These measurements reflect statistical averages only; it is possible for two or more floods with a 100-year or higher recurrence interval to occur in a short time period. The same flood can have different recurrence intervals at different points on a river.

The extent of flooding associated with a 1-percent annual probability of occurrence (the base flood or 100-year flood) is used by the NFIP as the standard for floodplain management and to determine the need for flood insurance, as well as the regulatory flood boundary by many agencies. Also referred to as the Special Flood Hazard Area (SFHA), this boundary is a convenient tool for assessing vulnerability and risk in flood-prone communities. Many communities have maps that show the extent and likely depth of flooding for the base flood. Corresponding water-surface elevations describe the water elevation resulting from a given discharge level, which is one of the most important factors used in estimating flood damage. A structure located within a SFHA shown on an NFIP map has a 26-percent chance of suffering flood damage during the term of a 30-year mortgage.

The term “500-year flood” is the flood that has a 0.2-percent chance of being equaled or exceeded each year. The 500-year flood could occur more than once in a relatively short period of time. Statistically, the 0.2-percent (500-year) flood has a 6-percent chance of occurring during a 30-year period of time, the length of many mortgages. The 500-year floodplain is referred to as Zone X500 for insurance purposes on FIRMs. Base flood elevations or depths are not shown within this zone, and insurance purchase is not required in this zone (FEMA 2022).

While most dams and levees have storage volumes small enough that failures would have little or no consequences, dams and levees with large storage amounts could cause significant flooding downstream.

Measuring Intensity

Riverine Flooding

In the case of riverine flood hazard, once a river reaches flood stage, the flood extent or severity categories used by the NWS include minor flooding, moderate flooding, and major flooding. Each category has a definition based on property damage and public threat:

- Minor Flooding - minimal or no property damage, but possibly some public threat or inconvenience.



- Moderate Flooding - some inundation of structures and roads near streams. Some evacuations of people and/or transfer of property to higher elevations are necessary.
- Major Flooding - extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations (NOAA 2021).

Alluvial Fan Flooding

Alluvial fan flooding intensity can be defined by flooding frequency, flood depths, size of the alluvial fan, volume of sediment moved, and designation of active and inactive areas. According to FEMA, the term active refers to that portion of an alluvial fan where deposition, erosion, and unstable flow paths are possible. If flooding and deposition have occurred on a part of an alluvial fan in the past 100 years, that part of the fan can be considered to be active and at higher risk than inactive areas that have not seen flooding or deposition in recent times (FEMA 2016).

Urban Flooding

Currently, there is no measurement used to further define the frequency and severity of stormwater/urban flooding.

Dam and Levee Failure Flooding

A single dam failure event can result in catastrophic losses depending on the dam's location, size, storage capacity, and the downstream population and infrastructure (Arizona Department of Emergency and Military Affairs 2023).

The 2021 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan estimates the magnitude of an emergency spillway flow and dam failure to be critical. An event could result in (Maricopa County 2021):

- Moderate property damages (greater than 25% and less than 50% of critical and non-critical facilities and infrastructure).
- Injuries or illnesses result in permanent disability and at least one death.
- Shut down of critical facilities for more than 1 week and less than 1 month.

The duration of an emergency spillway flow and dam failure is projected to be less than 1 week (Maricopa County 2021).

The extent or magnitude of a dam failure event can be measured in terms of the classification of the dam. The state classifies hazard potential for each state-regulated dam using downstream hazard and dam safety ratings.

Table 4-5 and Table 4-6 summarize the hazard classes and dam safety ratings used for Arizona-regulated dams. Federally owned dams not regulated by the state use similar hazard classes and are all high-hazard dams (Arizona Department of Emergency and Military Affairs 2023).



Table 4-5. Downstream Hazard Classes for State Regulated Dams

Hazard Potential Classification	Loss of Human Life	Economic, Environmental, Lifeline Losses	Emergency Action Plan Required?
Very Low	Not Likely	Limited to Owner or 100-year floodplain	No
Low	Not Likely	Low and generally limited to Owner	No
Significant	Not Likely	Yes	Yes
High	Likely	Yes (not necessary for this classification)	Yes

Source: (Arizona Department of Emergency and Military Affairs 2023)

Note: The hazard potential classification is an assessment of the consequences of failure, but not an evaluation of the probability of failure.

Table 4-6. State Regulatory Dam Safety Ratings

Safety Rating	Definition
Safe	The dam has sufficient structural integrity and flood routing capacity to make failure of the dam unlikely
Safety Deficiency	One or more conditions exist at the dam that impair or adversely affect the safe operation of the dam.
Unsafe	The safety deficiencies in a dam or spillway could result in failure of the dam with subsequent loss of human life or significant property damage.

Source: (Arizona Department of Emergency and Military Affairs 2023)

The magnitude and extent of a dam failure are estimated by analyzing and mapping the flood inundation limits resulting from a projected failure event. State-regulated significant or high-hazard dams are required to develop an Emergency Action Plan (EAP). Significant and high-hazard federal dams within Arizona typically have EAPs with failure inundation limits (Arizona Department of Emergency and Military Affairs 2023).

Levee failures result in an uncontrolled release of water to the leveed areas, with potentially catastrophic impacts. Failures may be attributed to a variety of modes and causes. The three most common are: 1) foundation leakage and piping, 2) overtopping, and 3) embankment erosion (Arizona Department of Emergency and Military Affairs 2023).

The Levee Safety Action Classification (LSAC) is one of the many tools the USACE uses to better inform stakeholders and residents of the residual risk in their communities. The LSAC is neither a levee rating or grade, it is a classification system designed to consider the probability of the levees being loaded (hazard), existing condition of the levee, the current and future maintenance of the levee (performance), and the consequences if a levee were to fail or be overwhelmed. A levee that reduces risk for a dense population will receive a different classification from an equally constructed levee with a smaller population because the consequences associated with failure are greater (USACE n.d.).



Table 4-7. Levee Safety Action Classification (LSAC) Table

Risk	Actions for Levee Systems and Leveed Areas in this Class	Risk Characteristics of this Class
Very High (1)	Based on risk drivers, take immediate action to implement interim risk reduction measures. Increase frequency of levee monitoring, communicate risk characteristics to the community within an expedited timeframe; verify emergency plans and flood inundation maps are current; ensure community is aware of flood warning systems and evacuation procedures; and recommend purchase of flood insurance. Support risk reduction actions as very high priority.	Likelihood of inundation due to breach and/or system component malfunction in combination with loss of life, economic, or environmental consequences results in very high risk.
High (2)	Based on risk drivers, implement interim risk reduction measures. Increase frequency of levee monitoring; communicate risk characteristics to the community within an expedited timeframe; verify emergency plans and flood inundation maps are current; ensure community is aware of flood warning and evacuation procedures; and recommend purchase of flood insurance. Support risk reduction actions as high priority	Likelihood of inundation due to breach and/or system component malfunction in combination with loss of life, economic, or environmental consequences results in high risk
Moderate (3)	Based on risk drivers, implement interim risk reduction measures as appropriate. Verify risk information is current and implement routine monitoring program; assure O&M is up to date; communicate risk characteristics to the community in a timely manner; verify emergency plans and flood inundation maps are current; ensure community is aware of flood warning and evacuation procedures; and, recommend purchase of flood insurance. Support risk reduction actions as a priority	Likelihood of inundation due to breach and/or system component malfunction in combination with loss of life, economic, or environmental consequences results in moderate risk.
Low (4)	Verify risk information is current and implement routine monitoring program and interim risk reduction measures if appropriate; assure O&M is up to date; communicate risk characteristics to the community as appropriate; verify emergency plans and flood inundation maps are current; ensure community is aware of flood warning and evacuation procedures; and, recommend purchase of flood insurance. Support risk reduction actions to further reduce risk to as low as practicable	Likelihood of inundation due to breach and/or system component malfunction in combination with loss of life, economic, or environmental consequences results in low risk
Very Low (5)	Continue to implement routine levee monitoring program, including operation and maintenance, inspections, and monitoring of risk. Communicate risk characteristics to the community as appropriate; verify emergency plans and flood inundation maps are current; ensure community is aware of flood warning and evacuation procedures; and recommend purchase of flood insurance.	Likelihood of inundation due to breach and/or system component malfunction in combination with loss of life, economic, or environmental consequences results in very low risk.
No Verdict	Not enough information is available to assign an LSAC	-

Source: (USACE 2017)

Warning Time

Most floods are preceded by a warning period that allows emergency managers to communicate the need to prepare for the event. A flood may last from minutes to days (O'Connor, Grant and Costa 2002). Warnings issued through official sources, such as the National Weather Service (NWS) and the Storm



Prediction Center, provide the most reliable and timely preparedness information, but the exact flood location and depth depends on the amount, duration, and location of rainfall. For Arizona, those times will vary depending on the type of precipitation event and the size of the watercourse and tributary watershed (Arizona Department of Emergency and Military Affairs 2023).

Typical monsoon thunderstorms develop rapidly and are relatively small in areal extent with short duration, high-intensity bursts of rainfall that result in swiftly moving flash floods. The full warning times for monsoon events are usually less than a couple of hours, and flood peak arrival times can be measured in minutes for small watersheds. Many of the fatalities associated with flood events within the state are due to thunderstorms that caused flash floods that caught people unaware (Arizona Department of Emergency and Military Affairs 2023).

Tropical storms moving into Arizona typically have more advanced meteorological notice and tracking. Rainfall areal extents and durations are typically larger and longer than monsoon storms, but intensities can still generate fairly rapid peak flows. Full warning times for tropical storm remnants are usually greater than six hours, with flood peak arrival times in a couple of hours, depending on the watercourse and watershed size (Arizona Department of Emergency and Military Affairs 2023).

General winter storms have a longer duration, low-intensity rainfall that covers large areas of the state and produces runoff that gradually accumulates to peak flood stages. Winter storms moving into Arizona typically have more advanced meteorological notice and tracking. Full warning times generally exceed 12 hours, with flood peak arrival times in several hours (Arizona Department of Emergency and Military Affairs 2023).

The NWS uses the following advisories, watch, and warnings when flooding conditions are anticipated (NWS 2025):

- **Flood Advisory:** Issued when flooding is forecast to occur, generally within the next 6 hours, but is not expected to substantially threaten life and property.
- **Flash Flood Warning:** Issued when flash flooding is imminent, generally within the next 6 hours. This is usually issued based on observed heavy rainfall (measured or radar estimated) for dangerous small stream or urban flooding but may also be issued for significant dam or levee failures that have occurred or are imminent.
- **Areal Flood Warning:** Issued when widespread general flooding is forecast to occur throughout an identifiable geographic area.
- **Flood Warning for River Forecast Point:** Issued when a river gauge is forecast to exceed a predetermined flood stage.

Once initiated, a levee failure can occur very rapidly, with a sudden, uncontrolled release of the stored or impounded water. Warning times for populations located in the leveed areas are dependent upon the speed of the flood-wave and distance from the breach. In most cases for Arizona, this is usually measured in tens of minutes. Extreme weather events with a potential to trigger or cause a failure will also have at least hours of warning if not a few days (Arizona Department of Emergency and Military Affairs 2023).



Worst Case Scenario

A worst case scenario for flooding in the City of Phoenix would be a poorly forecast, slow moving monsoon style rainfall events that lasts for numerous hours, preceded by rainfall events in the region that resulted in fully saturated soils and bring rivers and streams to bankfull stage (the water level where a waterbody reaches the tops of its banks. Any additional water volume will result in overflow). Such an event would result in near immediate riverine, alluvial fan, and urban flooding and potential for dam and levee failures.

4.11.4 Previous Occurrences

The following sections provide a review of previous flood occurrences in the City of Phoenix.

4.11.4.1 Federal Declarations

Review of presidential disaster declarations helps establish the probability of reoccurrence for hazards and identify targets for risk reduction. Disaster declarations are made at the county level. Table 4-8 summarizes the federal disaster declarations involving flood that included Maricopa County since 1954. Out of 26 total presidential declarations, 12 involved flooding.

Table 4-8. FEMA Flood Disaster Declarations

Disaster Number	Incident Period	Declaration Date	Description
DR-217-AZ	April 30, 1966	April 30, 1966	Arizona Flooding
DR-294-AZ	September 22, 1970	September 22, 1970	Arizona Heavy Rains, Flash Floods
DR-343-AZ	July 3, 1972	July 3, 1972	Arizona Severe Storms, Flooding
DR-551-AZ	March 4, 1978	March 4, 1978	Arizona Severe Storms, Flooding
DR-570-AZ	December 21, 1978	December 21, 1978	Arizona Severe Storms, Flooding
DR-614-AZ	February 19, 1980	February 19, 1980	Arizona Severe Storms, Flooding
DR-884-AZ	July 8 – September 14, 1990	December 6, 1990	Arizona Flooding, Severe Storm
DR-977-AZ	January 5 – March 6, 1993	January 19, 1993	Arizona Severe Storms, Tornadoes, Flooding
DR-1304-AZ	September 14 - 23, 1999	October 15, 1999	Severe Storms, High Winds and Flooding in Arizona
DR-1347-AZ	October 21 – November 8, 2000	October 27, 2000	Severe Storms and Flooding in Arizona
DR-1586-AZ	February 10-15, 2005	April 14, 2005	Arizona Severe Storms and Flooding
DR-4203-AZ	September 7-9, 2014	November 5, 2014	Arizona Severe Storms and Flooding

Source: (FEMA 2025)

4.11.4.2 Summary of Significant Events

The 2021 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan identified the following significant flooding events in Maricopa County. These events had direct and indirect impacts on the City of Phoenix (Maricopa County 2021):

- In March 1978, a general winter storm centered over the mountains north and east of Phoenix, 35 miles north at Rock Springs. Extrapolation of intensity-probability data for one measurement of 5.73 inches of precipitation in a 24-hour period equates to a 400-year storm. The main source of flooding was due to the Verde River runoff volume exceeding reservoir storage capacity above



Bartlett Dam. Flooding also occurred along irrigation canals on the north side of the Phoenix metro area, and along tributaries of the Gila River and Queen Creek. There was one death countywide and \$37 million in total damages. The event resulted in Presidential Disaster Declaration 550-DR.

- In December 1978, a second major storm for the year hit hard with total precipitation that ranged from less than 1 inch in the northeastern and far southwestern portions of Arizona to nearly 10 inches in the Mazatzal Mountains northeast of Phoenix. A large area of the central mountains received over 5 inches. The main stems of the Gila, Salt, Verde, Agua Fria, Bill Williams, and Little Colorado Rivers, as well as a number of major tributaries, experienced especially large discharges. There were 4 deaths, \$16.3 million-public and \$5 million in agriculture losses estimated for Maricopa County. The event resulted in Presidential Disaster Declaration 570-DR.
- In February 1980, severe flooding in central Arizona set record discharges (later broken in 1993) in the Phoenix metro area on the Salt, Verde, Agua Fria and Gila Rivers, as well as on Oak Creek in north central Arizona. The Phoenix metro area was nearly cut in half with only two bridges remaining open over the Salt River. It took hours for people to move between Phoenix and the east valley using either the Mill Avenue or Central Avenue bridges. Even the Interstate 10 bridge was closed for fear that it had been damaged. Precipitation during this period at Crown King in the Bradshaw Mountains was 16.63 inches. Three people died statewide, and damages were estimated at \$63,700,000 for the Phoenix Metro Area. The event resulted in Presidential Disaster Declaration 614-DR.
- In January and February 1993, flooding damage occurred from winter storms associated with the El Nino phenomenon. These storms flooded watersheds throughout Arizona by dumping excessive rainfall amounts that saturated soils and increased runoff. Warm temperature snowmelt exacerbated the situation over large areas. Erosion caused tremendous damage and some communities along normally dry washes were devastated. Stream flow velocities and runoff volumes exceeded historic highs. Many flood prevention channels and retention reservoirs were filled to capacity and water was either diverted to the emergency spillways or the reservoirs were breached, causing extensive damage in some cases (e.g., Painted Rock Reservoir spillway). The new Mill Avenue Bridge and a large landfill in Mesa were washed away by the raging Salt River. The Gillespie Dam west of Phoenix was damaged as high water spread throughout low-lying areas. Many roads were closed, and motorists were stranded by flooded dips and washes. Phoenix alone sustained at least \$4.2 million in damages from this prolonged period of heavy rains. County-wide, \$38 million in property and agricultural losses were estimated. The event resulted in Presidential Disaster Declaration 977-DR.
- In late July – early August 2005, one of the heaviest rainfall events of the 2005 season struck the greater Phoenix metropolitan. Almost three inches of rain fell at many locations in the metro, causing roofs to collapse and streets to flood quickly. Up to 120 residents at the Crystal Creek Apartments in Phoenix were evacuated after 83 apartment units were damaged by flood waters. Additional roof damage was reported at the Scottsdale Community College, and Osco Drug store in Mesa, and a Fry's grocery store in Tempe. In the Wickenburg area, very heavy rainfall caused flooding of low spots and washes. The peak flow in Hartman Wash was reported as 1,200 cfs.



Major damage occurred at Bear Cat Manufacturing where a large robotic welding building was destroyed by the flood. Losses were estimated at over \$4 million.

- In September 2014, heavy rainfall caused by the remnants of Hurricane Norbert resulted in extensive flooding throughout the state and especially in La Paz, Maricopa, and Pinal Counties. The Phoenix area experienced its wettest day in history, surpassing a record set in 1939. Preliminary damages assessments exceeded \$18 million. Among other impacts, major sections of freeways were closed, canals and flood control systems were overwhelmed, and two individuals perished in separate flash flood incidents. Several valley locations received rainfall that exceeded 500-year storm estimates. State search and rescue teams spent considerable resources performing numerous rescues of stranded drivers and residents, in addition to services provided during flooding from two other hurricane remnants (Hurricane Lowell and Hurricane Odile), all of which impacted Arizona within a two-month period. The state received a presidential disaster declaration (DR-4203) for Maricopa and La Paz Counties in November 2014.

4.11.4.3 Recent Events

Table 4-9 displays recent flooding events that have impacted Maricopa County since January 1, 2021. For a history of flooding events prior to January 2021, refer to the 2021 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan.

Table 4-9. Recent Flood Hazard Events

Date(s) of Event	Declaration Number	County Included	Description
July 3-4, 2021	N/A	N/A	Strong thunderstorms developed in the afternoon over the high terrain of central and southern Arizona before spreading to the lower deserts through the evening, with new development driven mostly by strong outflow boundaries. The primary outflow boundary moved southwest with widespread 30-40 mph wind gusts observed across south-central Arizona and a few stronger gusts, including a 59-mph gust in southern Gila County. The winds were strong enough to cause hundreds of power outages in the Phoenix metro area and generate dense blowing dust over the open deserts in Pinal and western Maricopa counties. With above normal moisture levels, storms also produced localized flash flooding mostly in foothill/high terrain areas, including flash flooding enhanced by recent burn scars.
July 10, 2021	N/A	N/A	Thunderstorms developed along the Mogollon Rim during the early part of the afternoon on the 9 th and propagated westward into the lower deserts. The severe thunderstorms led to damaging winds gusts upwards of 60-65 mph across southeast portions of the Phoenix metro. The severe winds ahead of the thunderstorms also produced a dust storm that led to widespread reports of dense blowing dust across central and southeastern Phoenix and as far south as Casa Grande. A few isolated instances of flash flooding occurred as well, including the recent Telegraph burn scar where over 0.75 of rain fell. There were numerous reports of damage across eastern parts of the Valley, including numerous power poles and large trees down. No injuries were reported with these thunderstorms.



Date(s) of Event	Declaration Number	County Included	Description
July 14-15, 2021	N/A	N/A	A shortwave trough moving across the state promoted the development of thunderstorms capable of producing strong winds and locally heavy rainfall, which led to some reports of flash flooding.
July 21-23, 2021	N/A	N/A	With enhanced easterlies on the south end of the monsoon high and embedded weak perturbation waves rolling west across southern Arizona, scattered strong to severe thunderstorms developed in a moist unstable environment throughout the afternoon and evening on the 21st. Most storms in the afternoon developed across southwest Arizona, between Phoenix and the Colorado River, with sporadic storm motions driven by outflows and cell mergers. In the evening of the 21st, new showers and thunderstorms developed and spread through south-central Arizona, including in the Phoenix metro area. With high moisture content and strong forcing, thunderstorms produced very heavy rain with rainfall rates around 1.5-2.0 inches per hour with briefly higher rates for short periods. Strong to severe thunderstorms developed in an unstable atmosphere in the afternoon of the 22nd. Storms initially developed over the high terrain of northern and eastern Arizona as well as near the Table Top mesa area south of Phoenix. The thunderstorms in the Phoenix metro area produced damaging winds that led to numerous downed trees, downed power poles, and other property damage. The storms were also nearly stationary, under weak steering flow, and produced very heavy rainfall with rain rates around 1.5-2.0 inches per hour and briefly higher in the strongest storms. This led to considerable flash flooding around Phoenix with several road closure and significant flow in major washes. Even after the strongest storms in Phoenix subsided in the late evening of the 22nd, areas of moderate to heavy rain continued from northeast to southwest through the night and through mid-afternoon on the 23rd. The continued rain through the 23rd was aided by a strengthening diffluent flow regime between the monsoon high to the north and a retrograding upper low moving west through New Mexico. Additional significant flash flooding was observed on the 23rd, mostly in the foothills north of the Phoenix metro, with many road closures, flowing washes and creeks, and some water rescues.
July 25, 2021	N/A	N/A	A retrograding upper level low combined with anomalously high moisture levels led to showers and isolated thunderstorms producing heavy rainfall and numerous instances of considerable flash flooding across south-central Arizona on the 25th. The places that saw the heaviest rainfall amounts were areas that experienced heavy showers training over the same locations. Western portions of the Phoenix metro saw training showers with heavy rainfall occur, leading to widespread amounts of 1.5-2.5 inches with locally higher amounts of 3+. As a result, there were numerous reports of flash flooding, including multiple water rescues and numerous road closures due to flooding. Heavy rainfall also fell over multiple burn scars, leading to several instances of burn scar flash flooding. One of the burn scars that saw heavy rainfall was the Bush fire burn scar, which led to enhanced runoff and a rapid rise on Sycamore Creek. Several people were rescued after getting stuck in the increased flow in Sycamore Creek. No injuries were reported.



Date(s) of Event	Declaration Number	County Included	Description
August 10, 2021	N/A	N/A	In a moisture rich environment, slow-moving thunderstorms in the morning of the 10th produced very heavy rainfall, with rain rates upwards of 2 to 2.5 inches per hour, leading to localized flash flooding in parts of Maricopa and Pinal counties.
August 11-12, 2021	N/A	N/A	An upper-level low sitting over central Arizona on the 11th and 12th led to the development of multiple rounds of showers and thunderstorms across the region. Anomalously high moisture in the region allowed this activity to produce heavy rainfall which led to multiple instances of flash flooding across south-central and southwest Arizona. Some of these thunderstorms became strong to severe and produced strong wind gusts that led to several reports of damage. No injuries were reported.
August 13-14, 2021	N/A	N/A	A classic bow echo developed along the Mogollon Rim in central Arizona on the 13th and merged with thunderstorm clusters that developed in south-central Arizona to form one southwestward-moving system that progressed all the way to the town of Yuma in far southwest Arizona on the 14th. The system produced widespread strong winds with localized damaging winds from individual microbursts across the region. The strong winds also generated dense blowing dust in southwest Arizona. In addition to the wind, storms were producing average rain rates of 1 to 2 inches per hour with briefly higher rates in the strongest cells. This led to flash flooding in multiple areas.
August 16-17, 2021	N/A	N/A	A shortwave trough rotating through the region led to steepening lapse rates and increasingly unstable conditions across central Arizona on the 16th. With abundant moisture, the environment was favorable for the development of strong to severe thunderstorms. Thunderstorms initially developed over the high terrain of eastern Arizona before racing toward the west/southwest into the lower deserts of south-central Arizona as a line of strong to severe thunderstorms. The main impacts associated with these thunderstorms occurred as they moved into the Phoenix metro, producing widespread damaging wind gusts. Multiple observations recorded wind gusts in excess of 60 mph with a few approaching 80 mph. Recently implemented damage threat categories for Severe Thunderstorm Warnings were put to the test with one destructive Severe Thunderstorm Warning being issued for 80 mph wind gusts for much of Phoenix. There were numerous reports of downed trees across the Valley as a result of the severe wind gusts. The strong winds also led to several reports of dense blowing dust in dust prone areas. Additionally, thunderstorms produced locally heavy rainfall that led to several instances of flash flooding. No injuries were reported.
August 18, 2021	N/A	N/A	Moderate to high instability and high moisture content supported scattered strong thunderstorms. Storms favored the foothills and mountainous areas of Maricopa and Gila counties. Most storms were producing at least 1 to 2 inch per hour rain rates, with several storms producing 2-to-3-inch rates and at times higher. Back-building and training of storms over the same areas resulted in significant to catastrophic flash flooding. A few burn scars experienced flash flooding, including the recent Telegraph burn area which had catastrophic flooding of the Russell Gulch drainage. There were also 2 fatalities on this day with off-roaders recreating near Camp Creek in northeast



Date(s) of Event	Declaration Number	County Included	Description
			Maricopa County. The strong to severe storms also produced damaging winds from microbursts and small hail over lower desert locations.
September 1, 2021	N/A	N/A	Thunderstorms produced locally heavy rainfall across parts of southwest and south-central Arizona during the early morning hours on the 1 st , resulting in some flash flooding. No damage or injuries were reported.
September 18, 2021	N/A	N/A	A shortwave trough moving through the region combined with a moist, unstable atmosphere promoted the development of showers and thunderstorms across south-central Arizona going into the afternoon on the 18th. Adequate shear allowed for some thunderstorms to become strong to severe, leading to multiple reports of damaging winds and dense blowing dust. Additionally, thunderstorms were capable of producing locally heavy rainfall leading to isolated flash flooding. No injuries were reported.
October 5, 2021	N/A	N/A	As the region transitioned out of the monsoon, parameters were sufficient for supercell thunderstorm development and a few supercells did develop amongst isolated to scattered storms in the afternoon across South-central Arizona. Damaging wind, hail, and isolated flash flooding was also observed through the afternoon.
December 24, 2021	N/A	N/A	A moderate to strong atmospheric river aligned over South-central Arizona and led to widespread light to moderate rain across the region. Rain began falling the night of the 23rd and lasted through the evening of the 24th. The Phoenix area measured 1-2 inches and most foothill and mountainous areas measured 2-3 inches, with a few localized spots measuring 3-4 inches. The high rainfall amounts led to minor urban flooding and elevated flows in typically dry washes as well as in several major creeks and rivers.
June 24-25, 2022	N/A	N/A	Outflow boundaries originating from distant thunderstorms converged on the valley floor during the evening hours. This resulted in the development of a strong thunderstorm over Chandler. Other weaker thunderstorms developed across the valley as well from the resulting outflow boundaries. A strong thunderstorm that developed near Morristown caused downed powerlines, resulting in the closure of US-60. No injuries were reported.
June 26, 2022	N/A	N/A	Widespread thunderstorm activity was observed across most of south-central and southwest Arizona. Storms first developed across the higher terrain north and east of Phoenix as well as across portions of southern Maricopa County during the early afternoon hours. These storms sent two outflow boundaries from opposing directions, which then collided across the Phoenix metro, sparking the development of additional storms over the Phoenix area. Another cluster of storms then developed across portions of southwest Arizona during the late afternoon into the early evening hours. No damages or injuries were reported.
July 13, 2022	N/A	N/A	Thunderstorm activity first developed across southeast Arizona and then were steered by the southeasterly flow into south-central Arizona. Portions of the East Valley got particularly hit hard between Gilbert and Mesa, where there were several reports of wind damage. No injuries were reported.



Date(s) of Event	Declaration Number	County Included	Description
July 24, 2022	N/A	N/A	A moisture-rich environment was in place on the 24th. A weak disturbance embedded in the flow aided in shower and thunderstorm development to persist out of southeast Arizona and into central portions of the state. Given the amount of moisture in the environment, thunderstorms were able to produce locally heavy rainfall which led to isolated flash flooding in southern Maricopa County.
July 25-26, 2022	N/A	N/A	Deep monsoonal moisture allowed for showers/thunderstorms to be efficient rainfall producers leading to isolated flash flooding. A trained spotter near Arcacia Drive and 186th Drive reported 0.50 of rain in 20 minutes. To the south, flash flooding was reported in Waterman Wash, making roads impassable and leading to a water rescue. Additional heavy rainfall in the evening resulted in more isolated flash flooding. No injuries were reported.
July 28, 2022	N/A	N/A	The combination of near record moisture content, moderate to strong instability, very slow steering flow and an upper-level disturbance resulted in a very conducive environment for the generation of thunderstorms producing very heavy rainfall activity across portions of south-central and southwestern Arizona, resulting in flash flooding. Activity first developed across the foothills and higher terrain of Eastern Maricopa and Gila Counties during the late morning-early afternoon hours. Another area of thunderstorms developed over northwestern Arizona during the mid-late afternoon hours and move southward towards La Paz County into the evening hours. One of the areas severely hit by flash flooding was Apache Junction, AZ. Weekes Wash, which runs through the town, went out of its banks, causing widespread flooding impacts across the city. Flooding also took place from drainage that occurred off the Goldfield and Superstitions Mountains.
July 30, 2022	N/A	N/A	Daytime heating combined with divergence aloft associated with an easterly wave near the Arizona/New Mexico border promoted thunderstorm initiation across southeast Arizona during the afternoon of the 30th. Outflow boundaries generated from these thunderstorms raced northwest toward south-central Arizona, resulting in a dust storm in Pinal County where multiple instances of dense blowing dust less than 1/4 mile were reported. New thunderstorm development occurred along these boundaries with some thunderstorms becoming severe. Numerous instances of damaging winds were reported across the Phoenix area and down into northwest Pinal County, which included multiple downed trees and power poles. A very moist environment allowed for thunderstorms to become efficient heavy rainfall producers. Rainfall amounts upwards of around 1.50 within an hour were reported during the event. There were multiple reports of flash flooding across northern parts of the Phoenix area, leading to several water rescues and making some roads impassable. Flash flooding also led to water and mud entering some apartments in north Phoenix causing extensive water damage. No injuries were reported with this event.
July 31, 2022	N/A	N/A	An upper-level disturbance lingering over the area led to the development of strong storms across portions of southern and central Arizona during the afternoon hours. Outflow winds led to areas of blowing dust with the more persistent storms leading to isolated flash flooding.



Date(s) of Event	Declaration Number	County Included	Description
August 4, 2022	N/A	N/A	A large thunderstorm complex developed and tracked into south-central Arizona during the early morning hours on the 4th with widespread heavy rainfall activity across the Phoenix area, leading to flash flooding. The thunderstorm complex continued to track westward through southwest Arizona and into the Lower Colorado River Valley through the morning hours while at the same time weakening in the process.
August 10, 2022	N/A	N/A	Under an easterly wind flow, thunderstorm activity moved across portions of south-central and southwestern Arizona during the late afternoon and early evening hours. The strongest thunderstorm activity was concentrated from western Maricopa County through most of La Paz and Yuma Counties. Strong instability resulted in an environment favorable for the development of strong to severe thunderstorms, which led to instances of damaging wind gusts as well as flash flooding.
August 12, 2022	N/A	N/A	Classical monsoonal regime, with deep-layered east to southeast flow, high instability along with abundant moisture resulted in an environment favorable for thunderstorms. An upper-level disturbance moving across Arizona, aided in increasing the areal coverage as well as enhancing the thunderstorm activity.
August 14, 2022	N/A	N/A	Abundant moisture and instability provided a favorable environment for strong to severe thunderstorms across south-central Arizona on the 14th. Daytime heating aided in thunderstorm development across the high terrain north of Phoenix before sending outflows traveling toward the south into the lower elevations. New thunderstorm development occurred along these outflows into the Valley where they produced damaging winds, dense blowing dust, and isolated flash flooding. Additional thunderstorm development occurred across southwest Arizona where better moisture allowed thunderstorms to be efficient rainfall producers, leading to multiple reports of flash flooding. No injuries were reported from this event.
August 17, 2022	N/A	N/A	Abundant moisture across south-central and southwest Arizona allowed for convective development to become strong to severe. Thunderstorms initiated over the high terrain of northern Arizona before working toward the south into the lower deserts. Severe thunderstorms produced damaging wind gusts upwards of 60-70 mph along with several reports of flash flooding. No injuries were reported.
August 18, 2022	N/A	N/A	Favorable monsoonal conditions promoted the development of severe thunderstorms across the region on the 18th. Abundant moisture and instability were in place across south-central and southwest Arizona, while increased easterly steering flow from an upper level low over northern Mexico aided in thunderstorms propagating off the high terrain. Strong to severe thunderstorms produced damaging winds from downbursts. Thunderstorms initially developed along the Mogollon Rim during the early afternoon hours before pushing into the lower deserts of south-central and southwest Arizona through the evening. No injuries were reported.
August 19-20, 2022	N/A	N/A	Thunderstorms on the 19th initiated across southeast Arizona and along the Mogollon Rim during the late morning/early afternoon hours before pushing into the lower elevations of south-central Arizona. A couple of upper-level features, which included an area of low pressure over northern Sonora and a shortwave trough over the Great Basin,



Date(s) of Event	Declaration Number	County Included	Description
			aided in ascent over the region in an environment characterized by high instability and anomalously high moisture. Given the moisture in place, thunderstorms were able to become efficient rainfall producers, leading to multiple reports of flash flooding across the area. No injuries were reported.
August 20, 2022	N/A	N/A	By the late afternoon and early evening hours on the 20th, new thunderstorms initiated over the high terrain of northern Arizona. High instability aided in maintaining strong to severe thunderstorms into the Phoenix area as thunderstorms pushed toward the south and into the lower deserts during the evening. Strong to severe downbursts were associated with the strongest thunderstorms. Thunderstorms were heavy rainfall producers, leading to several reports of flash flooding. No injuries were reported.
August 21, 2022	N/A	N/A	Isolated showers and thunderstorms initially began across parts of southern Gila County, along with eastern Maricopa County and northeast Pinal County, producing locally heavy rainfall leading to isolated flash flooding. By the late afternoon and early evening hours on the 20th, new thunderstorms initiated over the high terrain of northern Arizona. High instability aided in maintaining strong to severe thunderstorms into the Phoenix area as thunderstorms pushed toward the south and into the lower deserts during the evening. Strong to severe downbursts were associated with the strongest thunderstorms. Thunderstorms were heavy rainfall producers, leading to several reports of flash flooding. No injuries were reported.
August 23-24, 2022	N/A	N/A	A mid-level high pressure was situated across southern Nevada, with the local area under a northeasterly flow regime. The moisture and instability parameters were conducive to thunderstorm activity. As it is typical in a northeasterly flow regime, thunderstorms first began to develop along the Mogollon Rim early afternoon and then descended into the lower elevations during the mid to late afternoon hours, affecting the Greater Phoenix area and then tracking southwestward, affecting southwestern Arizona through the early evening hours.
August 27, 2022	N/A	N/A	High pressure situated south of the International Border led to a westerly flow aloft, which caused dry air advection. However, there was still sufficient moisture and instability to result in the development of strong thunderstorms across portions of south-central and southwest Arizona. There were favorable conditions for some of these thunderstorms to produce severe wind gusts.
September 2, 2022	N/A	N/A	Under a classic setup for storm motion from the Northern Arizona high terrain to Southern Arizona lower deserts, a few multicell storm clusters developed and progressed west-southwest through the lower deserts in the afternoon and evening hours of the 2nd. Increased east-northeast steering flow resulted in relatively high shear values for the monsoon. Moisture levels were also above normal which, in combination with the strong updrafts, supported high rainfall rates (1.5-2 inches per hour average). There were a few multicell clusters that moved through Southern Arizona. One through the southeast parts of the greater Phoenix area, another that developed in Yavapai County before descending southwest along US-60 in Maricopa and La Paz Counties, and a third that developed off the Kofa Wilderness terrain south of



Date(s) of Event	Declaration Number	County Included	Description
			Quartzsite before being caught by the cluster descending along US-60. Each cluster produced damaging winds, dense blowing dust, small to severe hail, and localized flash flooding.
September 9-10, 2022	N/A	N/A	Broad southeast flow associated with the circulation of Tropical Storm Kay, which was located just west of the Baja California Peninsula, set up across Arizona. High moisture and instability helped enhance the shower and thunderstorm activity.
September 11-12, 2022	N/A	N/A	The remnant mid-level circulation of what was Tropical Cyclone Kay was located over southern California. This led to southerly flow across Arizona, which helped increased moisture and instability. Strong to severe thunderstorms developed across southeast Arizona, near the Tucson area, during the late afternoon hours of the 11th and then progressed northward towards the Phoenix metro during the evening hours, resulting in widespread severe downburst winds and blowing dust as well as isolated flash flooding. The Phoenix Sky Harbor Airport reported a peak wind gust of 86 mph. Additional storms then developed across western Maricopa County, extending into La Paz County, during the early morning hours of the 12th with heavy rainfall leading to flash flooding become the biggest threat.
September 21, 2022	N/A	N/A	High pressure across the southern Plains and low pressure across the Great Basin led to a southerly flow across the region, advecting deep moisture. The forcing from the aforementioned low pressure helped to enhance the thunderstorm activity as it was moving from south to north.
September 23, 2022	N/A	N/A	An abundance of moisture and moderate to high instability led to the development of terrain and diurnally induced thunderstorm activity. Thunderstorms first began to develop across portions of southwestern Arizona during the early afternoon hours and thereafter, additional storm development occurred across the higher terrain east of Phoenix. Outflow from storms, particularly across the higher terrain east of Phoenix led to the development of more storms across portions of the Phoenix metro, particularly in the area between Chandler and Queen Creek.
October 6, 2022	N/A	N/A	A slow-moving cutoff low was situated over southern Arizona, providing forced ascent. Two rounds of convection occurred, with the first round affecting portions of south-central Arizona during the very early morning hours and the second round affecting far southwest Arizona during the early to midafternoon hours. With the help of daytime heating boosting instability values into the moderate to high side, the thunderstorm activity affecting southwestern Arizona became intense with reports of hail. Moisture content was also on the high side during the two rounds of convection with precipitable water values near record values for early October. This resulted in numerous reports of flash flooding, with the first round of convection during the early morning hours generating flash flooding along State Route 238, just to the northeast of Gila Bend, and the second round of convection during the early to mid-afternoon hours generating flash flooding across State Route 95, north of Yuma.
October 15-16, 2022	N/A	N/A	A slow-moving low-pressure system brought several rounds of showers and thunderstorms across portions of south-central and southwestern Arizona throughout the day on the 15th. Strong southerly flow out



Date(s) of Event	Declaration Number	County Included	Description
			ahead of the low-pressure system brought in highly anomalous moisture content across the southern half of Arizona at near record values for mid-October. Along with the highly anomalous moisture values, moderate to high instability values were also present. The combination of the highly anomalous moisture content, instability, and shear along with the strong dynamic forcing to the east and north of the low-pressure system was a recipe for these showers and thunderstorms to produce flash flooding as well as severe wind gusts and hail. The greatest flash flood impact occurred along portions of western Maricopa County in the area from Buckeye to Tonopah. The greatest damaging wind impact occurred in the Tonopah area, where two rounds of severe thunderstorms, one hour apart, impacted causing widespread power outages due to downed power poles, destroyed two mobile homes, damaged dairy farm structures, and resulted livestock losses. Severe hail was also reported with a storm that moved into the Mesa to Scottsdale area during the overnight period.
March 2, 2023	N/A	N/A	A strong late season winter storm moved across the Desert Southwest during the afternoon and evening on the 1st, lasting through the early morning hours on the 2nd. Strong winds were observed out ahead of an associated cold front with gusts in excess of 40 mph observed. Moderate to locally heavy rains associated with the cold front were also observed with most areas in and around the Phoenix metro observing between 0.5 to 1. This rainfall was enough to result in some elevated flows across northern Maricopa County near the Carefree and Cave Creek areas. Behind the cold front, a very cold air mass was pulled down into the region changing the rain to snow across areas mainly above 2000 feet during the overnight hours of the 1st into the 2nd, resulting in measurable snowfall accumulations.
March 4-31, 2023	N/A	N/A	Anomalous snowfall across the high terrain of Arizona as well as lower elevation rainfall led to greater than normal runoff into the Salt and Verde watersheds. As a result of this, dam releases were conducted at multiple locations in these watersheds, leading to heightened flows in these rivers. Upstream releases led to additional releases from Granite Reef Dam, which initially began to cause impacts on the 4th when releases from the dam increased above 1,000 cfs. Granite Reef Dam releases continued to increase going through the month of March and at one point during the month was releasing nearly 40,000 cfs. Releases from this dam led to downstream flow in the normally dry Salt River, which runs through the Phoenix metro. The anomalous runoff into the Salt and Verde watersheds and the resultant dam releases led to numerous impacts along the Salt, Verde, and Gila Rivers, including multiple unbridged river crossings being flooded, multiple water rescues, and one recreational fatality. Flow in the Salt River continued downstream into the Gila River, causing more impacts along the way down to Painted Rock Dam. Releases continued through the remainder of the month and into April, resulting in prolonged impacts.
March 11, 2023	N/A	N/A	A robust moisture plume from an atmospheric river event moved across the region. The available moisture in combination with orographic lift resulted in the development of a couple of thunderstorms



Date(s) of Event	Declaration Number	County Included	Description
			across the foothills to the north and east of Phoenix during the afternoon hours.
March 15-16, 2023	N/A	N/A	An area of low pressure moving across the western states resulted in waves of rainfall across the region during the day on the 15th. A round of widespread light to locally moderate rainfall activity was observed during the morning hours followed by a more significant round with thunderstorms during the evening hours in association with a cold front. Moisture levels associated with this low-pressure system were in the 99th percentile for mid-March, signifying that environment was favorable for heavier rainfall rates to materialize. As a result of the heavier rainfall activity observed during the evening hours, flooding was observed across the Wickenburg area in northwestern Maricopa County, where over an inch of total rainfall was observed. Flooding was also observed along the low-water crossings that intersect the Hassayampa River, which runs from north to south along the western third of Maricopa County. Strong storms were also observed during the afternoon hours across southwestern Arizona, producing isolated gusts around 60 mph in the Yuma area.
March 22-24, 2023	N/A	N/A	A storm system moving across the west coast in combination with well above normal moisture levels for mid-March standards with values above the 99th percentile resulted in waves of light to moderate rainfall activity across the region. The heaviest rainfall was observed across the areas to the north and east of Phoenix, where multiple inches of rain were observed. Given that the flows along rivers, small streams, creeks, and washes were elevated due to previous precipitation activity from previous storms and with the additional rainfall that fell, the water levels rose above alarm stage, resulting in flooding along low-water crossings.
April 1-30, 2023	N/A	N/A	Snowmelt runoff from the anomalous amounts of snow over the Arizona high terrain led to continued elevated flows in the Salt and Verde River watersheds. Dam releases being conducted in these watersheds to deal with the abnormal runoff led to continued downstream impacts along the Salt and Gila Rivers, which initially began in March. Continued releases from Granite Reef Dam allowed for elevated flows to persist in the normally dry Salt River with multiple unbridged river crossings remaining closed due to flooding. The heightened flows in the Salt River led to the fatalities of two men who were caught in an undercurrent while paddle boarding down the river. Releases from Granite Reef Dam were significantly reduced by the end of April as runoff into the watersheds decreased. Flow in the Salt and Gila Rivers continued to travel downstream to Painted Rock Dam. Releases from this dam led to elevated flows traveling down the Gila River into Yuma County, leading to numerous additional closures of unbridged river crossings. Elevated flows in the Salt and Gila Rivers allowed for impacts to persist into the month of May.
May 1-31, 2023	N/A	N/A	Water being held in the Painted Rock Reservoir from abnormal winter and early spring runoff continued to be released downstream from April through the month of May. As a result of these continued releases from Painted Rock Dam, downstream impacts along the Gila River between the dam and the Colorado River persisted through the month. Impacts along the Gila River included continued road closures of multiple



Date(s) of Event	Declaration Number	County Included	Description
			unbridged crossings. Flow in the Gila River began to drop below Action Stage by the end of the month as releases from Painted Rock Dam decreased. The long duration high flow that occurred in the Gila River resulted in multiple unbridged river crossings being damaged.
May 19, 2023	N/A	N/A	An upper-level low pressure system situated near the northern Baja Peninsula aided in bringing in abnormally high moisture content into south-central and southwest AZ. Precipitable water values of approximately 1 were observed, which for mid-May is a record. The combination of the moisture and instability resulted in the development of an intense cluster of thunderstorms across the higher terrain zones northwest of Phoenix during the afternoon hours, with the activity gradually drifting into northwestern portions of Maricopa County. The activity affected the Wickenburg area, where strong winds and flash flooding due to rainfall just over an inch in one hour were reported.
August 31, 2024	N/A	N/A	The overall pattern featured an upper-level low pressure situated along the west coast and the subtropical high pressure centered over New Mexico. This overall pattern configuration resulted in southerly flow across Arizona, which helped transport moisture into the region. Thus, the environment became conducive for thunderstorm activity across most of central and southern AZ with a very favorable setup for strong to severe winds. Thunderstorms first developed over southeast Arizona and then, with the southerly flow, were steered into south-central AZ. There were widespread reports of dense blowing dust with visibilities reduced to 1/4 mile or less as well as wind damage as winds were in excess of 60 mph. In addition, a training thunderstorm over northern Maricopa County, in the Anthem area, resulted in 2-4 of rain according to doppler radar estimates and led to significant flash flooding.
September 13, 2023	N/A	N/A	The synoptic pattern was characterized by strong westerly flow aloft situated across most of the Desert Southwest with embedded shortwave energy providing the main source for rising motion. Above normal moisture was present. The available moisture in combination with the daytime heating led to the development of moderate instability. The strong westerly flow aloft led to strong vertical shear. All of these factors led to a very favorable environment for the development of strong to severe thunderstorms across portions of south-central AZ. Scattered thunderstorms started to develop by the early afternoon hours of the 12th with multiple rounds continuing into the evening hours. One severe thunderstorm in particular developed near the Buckeye area, became supercellular, and tracked generally eastward affecting areas such as Goodyear, Glendale, Phoenix, Scottsdale, Mesa and Apache Junction, causing extensive straight-line wind damage along its path. Additional thunderstorms developed just east of the Phoenix metro area during the overnight and early morning hours of the 13th, with the main impact being isolated flash flooding.
January 23, 2024	N/A	N/A	A shortwave trough moving across the Desert Southwest combined with well-above normal moisture resulted in multiple rounds of light to moderate rainfall with embedded thunderstorms across south-central AZ from the 21st to 23rd. Rainfall rates during these multiple rounds of rain generally ranged between 0.10-0.50, resulting in storm total amounts of between 0.5-3 across the region during a 72-hour period.



Date(s) of Event	Declaration Number	County Included	Description
			The highest rainfall amounts were observed across portions of western Pinal and southwest Maricopa Counties, where there were reports of flooding.
April 1, 2024	N/A	N/A	An upper-level low pressure system moving across the Desert Southwest resulted in large scale forcing for ascent with highly anomalous moisture in place. This result in an area of moderate to locally heavy rain to develop over the Phoenix metro area with many areas receiving between 0.5-1 inches. The rainfall was enough to cause Indian Bend Wash, located in Scottsdale, to reach action stage and thus cause some flooding along some low water crossings.
July 16-17, 2024	N/A	N/A	The typical afternoon thunderstorm activity developed across the higher terrain areas of northern and eastern AZ. Most the activity remain anchored over the high terrain with barely any activity observed across the lower elevations given the strong convective inhibition in place. However, the environment was still favorable for any thunderstorm that developed to become strong. A strong, nearly stationary thunderstorm developed during the evening hours over the Wildcat Burn Scar in northern Maricopa County, dumping rainfall amounts in excess of 1.5 inches in less than an hour. This was enough rainfall in a short time period to result in flood issues in the burn scar area.
July 25, 2024	N/A	N/A	With the subtropical high pressure centered near the Lower Colorado River Valley, the steering flow pattern across much of eastern and central AZ was from the north to northeast. Thunderstorm activity developed across the Mogollon Rim during the late morning into the early afternoon hours and was steered south to southwestward into south-central AZ. An upper-level disturbance moving in from New Mexico helped enhance the vertical ascent and thus resulted in the thunderstorm coverage to become quite numerous with deep and colliding outflow boundaries helping to spark new activity across the lower deserts of south-central AZ. The parameters were favorable for these thunderstorms to generate strong to severe downburst winds. The steering flow was very light, resulting in slow storm motions and thus heavy rainfall leading to isolated instances of flash flooding.
August 3, 2024	N/A	N/A	With the subtropical high-pressure system centered over the Four Corners Region, the flow across the region was from the southeast. Thunderstorms developed during the afternoon hours, particularly over Pima County in southeast AZ, and were steered northwestward towards western Maricopa County with additional activity developing from outflow boundaries. Some of the thunderstorm activity was also slow moving, resulting isolated flash flooding, with the area of Cruft Wash south of Buckeye reaching bankfull and resulting in flooding along low-water crossings.
August 7, 2024	N/A	N/A	With the subtropical high-pressure system situated across northern AZ, the steering flow was from the east. Riding underneath the subtropical high was an easterly disturbance near the International Border, which helped enhance the easterly flow at mid-levels upwards of 25 kts as well as the forcing for ascent. The enhanced easterly flow, which increased the vertical shear upwards of 25-30 kts, contributed to the overall storm organization and thus for most of the thunderstorm activity to become severe. Thunderstorm activity first developed across the higher terrain



Date(s) of Event	Declaration Number	County Included	Description
			areas of eastern and southeastern AZ with additional activity developing over the lower deserts via outflow boundaries.
August 22-23, 2024	N/A	N/A	Thunderstorm activity developed across much of eastern AZ, along the higher terrain features, during the early afternoon hours. Outflow boundaries emanating from the activity over the higher terrain areas sparked a complex of robust thunderstorms over Pinal County. A northwestward moving outflow boundary that developed from the Pinal County storms produced wind gusts in excess of 50 mph as well as areas of dense blowing dust across the Phoenix East Valley. Additional thunderstorm activity then developed over central Phoenix during the late afternoon, likely instigated by a convergence zone that set up right over the area with little convective inhibition in place and thus it did not take much of a triggering mechanism to get convective initiation.

Source: (National Centers for Environmental Information 2024); (FEMA 2025)

Note: Data available through November 30, 2024

4.11.5 Probability

One of the most widely adopted design and regulatory standards for flooding in Arizona is an event of a certain magnitude that has a 1% probability of being equaled or exceeded in any given year, or the 1% annual chance of exceedance (ACE) flood. The 1% ACE flood is the standard formally adopted by FEMA for regulatory use and is often referred to with the recurrence interval moniker of “100-year flood.” The reality is that a community could experience multiple 1% ACE flood events (100-year floods) in any given year (Arizona Department of Emergency and Military Affairs 2023). However, flooding events below the 100-year flood threshold are a common occurrence in the City of Phoenix, especially urban flooding.

The 2021 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan estimates the probability for emergency spillway flow and dam failure as unlikely (extremely rare with no documented history of occurrences or events; annual probability of less than 0.001%) (Maricopa County 2021).

The Arizona State Hazard Mitigation Plan notes that the probability of a FEMA accredited or USACE Authority levee failing is low (Arizona Department of Emergency and Military Affairs 2023).



4.12 FUTURE FLOODING ASSESSMENT

As the City has grown in population and expanded in developed areas over the past several decades, re-development and additional development are ongoing. Areas that are at continued risk are those areas along the transition from mountains to urban development, areas behind embankments – particularly canals – where ponding occurs, new developments where sheet flow is channelized, and older areas of the City with limited stormwater infrastructure. Projects have been completed, are underway, or planned to help reduce flood hazards in these areas.

The City is seeing new development on the fringes, particularly in the northern extents of the City limits. Developments are being designed to help preserve the natural washes as best as possible which promotes the natural floodplain functions of the area.

Re-development is also occurring within the City with undeveloped lots being infilled or older properties being replaced with newer often more densified developments.

The likelihood of flooding in these areas is present but has been reduced thanks to state-of-the-art hydrologic and hydraulic modeling. The modeling helps support the design of the developments to reduce the flood hazards in the area. The possibility still exists in these areas but with proper modeling, design review, and construction, the likelihood is greatly reduced.

Climate change could impact these areas as less-frequent, more-intense storm events are to be expected. These storms could overwhelm areas if they do occur. Flood control dams and levees around the City help reduce the risks and hazards to people and property, but they are not eliminated. Areas along the transition from mountain to urban areas and areas along embankments are particularly at risk due to the limited time to react to the storm event or no way of move the ponded water behind an embankment.

4.13 OTHER NATURAL HAZARDS

The Arizona State Hazard Mitigation Plan addresses 15 hazards with a total of 12 not addressed within this FMP. This section will describe the severity, history, and probability of these hazards occurring.

- Drought
 - Severity: High
 - History: Frequent and ongoing
 - Probability: High
 - Discussion: Drought is a large concern for a majority of the western United States. It is a long-term challenge for the City as drought is an ongoing issue throughout Arizona and the Colorado River Basin. The City has a Drought Management Plan that was adopted in 1990 and updated over the years, and reaffirmed in 2021.
- Earthquake
 - Severity: Low
 - History: None within the last 12 months.
 - Probability: Low
 - Discussion: The City has no major faults and is at minimal risk to earthquakes.



- Extreme Heat
 - Severity: High
 - History: Frequent and ongoing
 - Probability: High
 - Discussion: The City, each summer, is subject to significant heat with rising temperatures beginning typically in May and lasting through September. In 2024, the City had 113 consecutive days over 100 degrees Fahrenheit, with 70 days over 110 degrees Fahrenheit. Extreme heat is a serious risk to life every summer.
- Fissure and Land Subsidence
 - Severity: Medium
 - History: One site within the City is currently under study
 - Probability: Medium
 - Discussion: With groundwater pumping in the surrounding area for agriculture and drinking water, earth fissures and land subsidence are risks not only to the City but also to the surrounding Maricopa County and neighboring Pinal County. Risks within the City are minimal.
- Landslide
 - Severity: High
 - History: None
 - Probability: Low
 - Discussion: The mountains surrounding the City are mostly rock, which limits the potential for landslides.
- Severe Wind
 - Severity: High
 - History: Limited with monsoon seasons
 - Probability: Medium
 - Discussion: Monsoon season typically brings higher than normal winds during storm events. High winds pick up dust from the surrounding areas to create dust storms. High winds are also likely outside of monsoon season, especially during the changing of seasons during the month of April. April is typically the windiest month of the year for the City.
- Wildfire
 - Severity: High
 - History: Jomax Fire in 2019
 - Probability: High
 - Discussion: The City has multiple mountain preserves and parks within the City that are at fire risk with dry conditions. Additionally, to the north of the City is Tonto National Forest which frequently has to battle with wildfires year-after-year.
- Winter Storm
 - Severity: N/A
 - History: N/A
 - Probability: N/A
 - Discussion: A winter storm in the City is highly unlikely to occur.



5 STEP 5: ASSESS THE PROBLEM

5.1 VULNERABILITY ASSESSMENT

5.1.1 Summary of Vulnerability

The vulnerability assessment results from the 2021 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan and information from the USACE National Dam and Levee Databases were used to assess the City of Phoenix's vulnerabilities to flooding.

Riverine and alluvial fan flooding impacts were collectively analyzed based on exposure to high hazard flood zones. Urban flooding was discussed qualitatively as all of the City of Phoenix could potentially experience urban flooding. For riverine/alluvial fan and urban flooding, the City is highly vulnerable to these types of hazards.

Dam failure was analyzed based on exposure to emergency spillway inundation and potential inundation from medium and high hazard dams. Levee failure was analyzed based on population and assets protected by levees identified in the USACE National Levee Database. Dam and levee failure are less of a vulnerability to the City, as both the City and the Flood Control District of Maricopa County have robust dam safety programs with annual inspections and ongoing maintenance work.

5.1.2 Impact on Life, Health, and Safety

The impact of flooding on life, health, and safety is dependent upon several factors including the severity of the event and whether or not adequate warning time is provided to residents. Exposure represents the population living in or near floodplain areas that could be impacted should a flood event occur. Additionally, exposure should not be limited to only those who reside in a defined hazard zone, but everyone who may be affected by the effects of a hazard event (e.g., people are at risk while traveling in flooded areas, or their access to emergency services is compromised during an event). The degree of that impact will vary and is not strictly measurable.

Riverine Flooding and Alluvial Fan Flooding

Table 5-1 displays the population in the City of Phoenix exposed to high hazard flood zones. The 2021 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan found that 34,577 people (2.21% of the City population) are located in high hazard flood zones (Maricopa County 2021).

Table 5-1. Population Exposure to High Hazard Flood Zones

Total Population	Total Population Exposed to High Hazard Flood Zones	Percentage Population Exposed to High Hazard Flood Zones	Total Population Over 65	Total Population Over 65 Exposed to High Hazard Flood Zones	Percentage of Total Population Over 65 Exposed to High Hazard Flood Zones
1,561,296	34,577	2.21%	143,448	2,701	1.88%

Source: (Maricopa County 2021)



Urban Flooding

Urban flooding is traditionally shallow flooding, focused on roadways. The Centers for Disease Control and Prevention report that over half of all flood-related drownings occur when a vehicle is driven into hazardous flood water. The next highest percentage of flood-related deaths is due to walking into or near flood waters. People underestimate the force and power of water. Many of the deaths occur in cars swept downstream. Many of these drownings are preventable. A mere 6 inches of fast-moving flood water can knock over an adult. It takes just 12 inches of rushing water to carry away most cars and just 2 feet of rushing water can carry away SUVs and trucks (NWS n.d.).

Dam and Levee Failure Flooding

Table 5-2 displays the population in the City of Phoenix exposed to emergency spillway inundation. In total, 224,541 in the City of Phoenix (14.38% of the City population) are exposed to emergency spillway inundation (Maricopa County 2021). Table 5-3 displays the population exposed to the dam failure inundation in Maricopa County. No residents are anticipated to be exposed to the dam failure inundation hazard area (Maricopa County 2021).

Table 5-2. Population Exposure Due to Emergency Spillway Inundation

Total Population	Total Population Exposed to Emergency Spillway Inundation	Percentage Population Exposed to Emergency Spillway Inundation	Total Population Over 65	Total Population Over 65 Exposed to Emergency Spillway Inundation	Percentage of Total Population Over 65 Exposed to Emergency Spillway Inundation
1,561,296	224,541	14.38%	143,448	24,137	17.06%

Source: (Maricopa County 2021)

Table 5-3. Population Exposure Due to Dam Failure Inundation

Dam Hazard Level	Total Population	Total Population Exposed	Percentage Population Exposed	Total Population Over 65	Total Population Over 65 Exposed	Percentage of Total Population Over 65 Exposed
High	1,561,296	0	0%	143,448	0	0%
Medium	1,561,296	0	0%	143,448	0	0%

Source: (Maricopa County 2021)

According to the National Levee Database, levees in the City of Phoenix protect 69,582 people (USACE 2025). The failure of levees could threaten this population. Refer to Table 4-4 for more information on each levee.

Warning and Evacuating

The City does an annual exercise to support review and improvements of their emergency action plans. These documents are done either as a tabletop exercise or full-scale exercise to go through the response to a flood event or potential dam/levee failure. The City also has plans for evacuation with the Emergency Management department.



Flood Water Health Impacts and Mold

In the event of a flood at a structure, health impacts are a significant hazard, especially mold. Homes could experience little flooding but be impacted by mold long-term. Riverine and urban flooding present the most risk to health and the presence of mold due to their increased likelihood, as compared to dam and levee failure. The City has resources to support residents and property owners in the event of a flood event to help get the support needed to get the structure back into a healthy state.

5.1.2.1 Socially Vulnerable Populations

Social vulnerability is defined as the susceptibility of social groups to the adverse impacts of natural hazards, including disproportionate death, injury, loss, or disruption of livelihood. Social vulnerability considers the social, economic, demographic, and housing characteristics of a community that influence its ability to prepare for, respond to, cope with, recover from, and adapt to environmental hazards.

Socially vulnerable populations are most susceptible to flood events based on several factors, including their physical and financial ability to react or respond during a flood. Vulnerable populations include homeless persons, elderly (over 65 years old), low income or linguistically isolated populations, people with life-threatening illnesses, and residents that may struggle to evacuate. The population over the age of 65 is also more vulnerable. They may require extra time to evacuate or need assistance to evacuate and are more likely to seek or need medical attention.

Riverine Flooding and Alluvial Fan Flooding

The 2021 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan found that 2,701 people over the age of 65 are located in high hazard flood zones (Maricopa County 2021).

Urban Flooding

Urban flooding traditionally is shallow flooding, focused on roadways. Residents that walk to work because they lack access to a personal vehicle are likely to choose to walk through flooded roadways, exposing themselves to drowning risks.

Dam and Levee Failure Flooding

24,137 people over the age of 65 are exposed to emergency spillway inundation in the City of Phoenix. No socially vulnerable populations are exposed to dam failure inundation (Maricopa County 2021).

5.1.3 Impact on General Building Stock

Flooding can severely impact buildings by causing structural damage to foundations, walls, and floors, damaging electrical systems, contaminating water supplies, and leading to significant property loss, particularly when buildings are located in floodplains (FEMA 2022).

Riverine Flooding and Alluvial Fan Flooding

The 2021 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan found that in the City of Phoenix, 11,833 structures (2.0% of the City's residential building stock) are located in high hazard flood zones (Maricopa County 2021).



Table 5-4. Residential Structure Exposure Due to High Hazard Flood Zones

<i>Residential Building Count</i>	<i>Total Residential Buildings Exposed to High Hazard Flood Zones</i>	<i>Percentage Residential Buildings Exposed to High Hazard Flood Zones</i>	<i>Total Residential Building Replacement Value</i>	<i>Residential Building Replacement Value Exposed to High Hazard Flood Zones</i>	<i>Percentage of Residential Building Replacement Value Exposed to High Hazard Flood Zones</i>
590,476	11,833	2.0%	\$167,455,500,000	\$3,355,733,000	2.0%

Source: (Maricopa County 2021)

Urban Flooding

Urban flooding traditionally is shallow flooding, focused on roadways. Unless extremely severe, urban flooding does not usually result in damage to buildings.

Dam and Levee Failure Flooding

The 2021 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan found that 90,618 of the City of Phoenix's residential building structures (15.35% of the City's residential building stock) are exposed to emergency spillway inundation. No residential structures in the City of Phoenix are exposed to dam failure inundation from high or medium hazard dams (Maricopa County 2021).

Table 5-5. Residential Structure Exposure Due to Emergency Spillway Inundation

<i>Residential Building Count</i>	<i>Total Residential Buildings Exposed</i>	<i>Percentage Residential Buildings Exposed</i>	<i>Total Residential Building Replacement Value</i>	<i>Residential Building Replacement Value Exposed</i>	<i>Percentage of Residential Building Replacement Value Exposed</i>
590,476	90,618	15.35%	\$167,455,500,000	\$25,698,678,000	15.35%

Source: (Maricopa County 2021)

Table 5-6. Residential Structure Exposure Due to Dam Failure Inundation

<i>Dam Hazard Level</i>	<i>Residential Building</i>	<i>Total Residential Buildings Exposed</i>	<i>Percentage Residential Buildings Exposed</i>	<i>Total Residential Building Replacement Value</i>	<i>Residential Building Replacement Value Exposed</i>	<i>Percentage of Residential Building Replacement Value Exposed</i>
High	590,476	0	0%	\$25,698,678,000	0	0%
Medium	590,476	0	0%	\$25,698,678,000	0	0%

Source: (Maricopa County 2021)

According to the National Levee Database, levees in the City of Phoenix protect 12,528 buildings (USACE 2025). Failure of levees could threaten these buildings. Refer to Table 4-4 for more information on each levee.

5.1.4 Impact on Critical Facilities and Infrastructure

Critical facilities and infrastructure can be at high risk to flooding events. Flooding often can result in impassable roadways, reducing or eliminating access to critical services. Flooding can result in utility failure and the contamination of drinking water.



Table 5-7. Critical Facilities and Infrastructure Most Likely Impacted by Flood

Lifeline Categories	Notable Impacts
Safety and Security	Community safety may be threatened due to potential direct harm from flooding and compounding effects on administration of services. Transportation infrastructure issues may directly impact the abilities of law enforcement, fire service, search and rescue, and other government services to respond to a flooding hazard.
Food, Hydration, Shelter	Flooding can cause damage to structures which provide shelter, and the food that people store in those structures. While the food supply chain may be disrupted due to impacts on agricultural production and transportation infrastructure.
Health and Medical	Medical facilities can be impacted due to damage to structures from flooding, while patient movement and medical supply chains can be impacted by effects on transportation infrastructure.
Energy	Components of electric power generation, transmission and distribution systems are at risk for damage by floods, potentially resulting in service failure. Flooding can also adversely impact oil and gas production and electricity generation impacting energy supply.
Communications	Flooding can damage telecommunications equipment. Communications can also be impacted by power outages caused by flooding. This can impact response coordination.
Transportation	Flooding can strain the Transportation lifeline in both the short- and long-term through transportation delays and infrastructure damage. When flooding occurs on roadways, it can make transportation dangerous or even impossible. Damage to the Transportation lifeline has cascading effects among other lifelines which depend on movement of people or goods.
Hazardous Materials	The Hazardous Materials lifeline could be impacted by flooding. Facilities may be directly impacted, or transport of hazardous materials could be hindered by flooded infrastructure. Flooding of contaminated sites can uproot those hazardous materials which may be present and transport them amongst the floodwaters.
Water Systems	Flooding could pose a threat to the Water System lifeline. Floods can damage drinking water wells and lead to aquifer or well contamination. Sewage systems especially those that are combined may be affected leading to backups in sewer pipes or direct overflow discharge of sewage into water sources.

Source: (NJOEM 2024)

Riverine Flooding and Alluvial Fan Flooding

The 2021 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan found that 15 community facilities in the City of Phoenix (1.58% of the City's total facilities) are located in high hazard flood zones (Maricopa County 2021).

Table 5-8. Asset Inventory Exposure to High Hazard Flood Zones

Total Facilities in the Community	Impacted Facilities	Percentage of Total Community Facilities Impacted	Total Replacement Value of All Facilities Reported by Community	Estimated Replacement Value of Facilities Exposed to Hazard
947	15	1.58 %	\$7,843,312,000	\$111,523,000

Source: (Maricopa County 2021)



Urban Flooding

Urban flooding traditionally is shallow flooding, focused on roadways and heavily impacted the transportation lifeline. In most instances, flooding results in service interruptions and roadways are not passable, but severe floods may result in damages to the roadway infrastructure.

Dam and Levee Failure Flooding

The 2021 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan found that 96 facilities in the City of Phoenix (10.14% of the City's total community facilities) are exposed to emergency spillway inundation. No facilities in the City of Phoenix are exposed to dam failure inundation from high or medium hazard dams (Maricopa County 2021).

Table 5-9. Asset Inventory Exposure Due to Emergency Spillway Inundation

<i>Total Facilities in the Community</i>	<i>Impacted Facilities</i>	<i>Percentage of Total Community Facilities Impacted</i>	<i>Total Replacement Value of All Facilities Reported by Community</i>	<i>Estimated Replacement Value Exposed to Hazard</i>
947	96	10.14%	\$7,843,312,000	\$455,408,000

Source: (Maricopa County 2021)

Table 5-10. Asset Inventory Exposure Due to Dam Failure Inundation

<i>Dam Hazard Level</i>	<i>Total Facilities in the Community</i>	<i>Impacted Facilities</i>	<i>Percentage of Total Community Facilities Impacted</i>	<i>Total Replacement Value of All Facilities Reported by Community (x \$1,000)</i>	<i>Estimated Replacement Value Exposed to Hazard (x \$1,000)</i>
High Hazard	947	0	0.00%	\$7,843,312	\$0
Medium Hazard	947	0	0.00%	\$7,843,312	\$0

Source: (Maricopa County 2021)

According to the National Levee Database, levees in the City of Phoenix protect 14 critical facilities (USACE 2025). Failure of levees could threaten these facilities. Refer to Table 4-4 for more information on each levee.

5.1.5 Impact on the Economy

Flooding can result in a variety of environmental impacts including damage to structures, cleanup costs, and lost wages. Even minor flooding can result in damages to agriculture. According to the 2022 Census of Agriculture, Maricopa County is home to 1,527 farms with a total of \$1.558 billion in annual market value sold (USDA 2022).

Riverine Flooding and Alluvial Fan Flooding

The 2021 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan found that \$3,355,733,000 of the City's residential building replacement cost value (2.0% of the City's total residential building replacement cost value) is located in high hazard flood zones. An additional \$111,523,000 in community facility



replacement cost value is exposed (Maricopa County 2021). See Table 5-4 and Table 5-8 for more information.

Urban Flooding

Urban flooding is traditionally shallow flooding, focused on roadways. While structures and facilities are not exposed, vehicles can be damaged if they are parked in areas that flood or attempt to drive through flooded roadways. This may result in costs for cleanup, replacement of parts, or total loss of the vehicle. According to Carfax, Arizona ranks 29th out of the top 100 metros for having flood-damaged cars in the market (ABC15 2024).

Dam and Levee Failure Flooding

The 2021 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan found that no residential structures are exposed to dam failure inundation from medium and high hazard dams, but \$25,698,678,000 in residential building value is exposed to emergency spillway inundation in the City of Phoenix. See Table 5-5 and Table 5-6 for more information. Additionally, \$455,408,000 in community facilities are exposed to emergency spillway inundation (Maricopa County 2021).

According to the National Levee Database, levees in the City of Phoenix protect roughly \$8.067 billion in property value (USACE 2025). Failure of levees could threaten this property value. Refer to Table 4-4 for more information on each levee.

5.1.5.1 Review of Damaged Buildings and Flood Insurance Claims

The City of Phoenix participates in the National Flood Insurance Program (NFIP). Participating in the NFIP is voluntary and to join, a community must complete an application; adopt a resolution of intent to participate and cooperate with FEMA; and adopt and submit a floodplain management ordinance that meets or exceeds the minimum NFIP criteria, and the ordinance must also adopt any FIRM or FHBM for the community. By participating, communities agree to adopt and implement local floodplain management regulations that protect lives and reduce risk from future flooding. In return, the federal government makes flood insurance available to property owners throughout the community (FEMA 2020) (FEMA 2022).

There are 3,352 NFIP policies in the City of Phoenix. These policies contribute roughly \$2.5 million in annual premiums and have an insurance in force of \$887 million. There have been 1,283 claims for a total payment of \$8.9 million. It should be noted that this information is strictly limited to structures that are insured through the NFIP. Other structures may have flood insurance through private insurers.

According to the most recent available data from FEMA, there are 53 repetitive loss properties and 5 severe repetitive loss properties in the City of Phoenix (FEMA 2023a). The occupancy class of these properties was not available for this FMP update. According to FEMA, a repetitive loss (RL) property is a NFIP-insured structure that has had at least two paid flood losses of more than \$1,000 in any 10-year period since 1978. A severe repetitive loss (SRL) property is a NFIP-insured structure that has had four or more separate claim payments made under a standard flood insurance policy, with the amount of each claim exceeding \$5,000 and with the cumulative amount of such claims payments exceeding \$20,000; or at least two separate claims payments made under a standard flood insurance policy with the cumulative amount of such claim payments exceed the fair market value of the insured building on the day before each loss (FEMA 2022).



Table 5-11 summarizes the NFIP community statistics for the City of Phoenix.

Table 5-11. National Flood Insurance Program Statistics

Total Policies	Total Premiums	Total Insurance in Force	Total Claims	Total Payment	Repetitive Loss Properties	Severe Repetitive Loss Properties
3,352	\$2,555,011	\$887,441,000	1,283	\$8,946,137	53	5

Source: (FEMA 2025); (FEMA 2023a)

Notes: Total policies, total premiums, total insurance in force, total claims, and total payment data current as of 3/3/2025.

Repetitive Loss and Severe Repetitive Loss data current as of 9/11/2023

5.1.6 Impact on Historic and Cultural Resources

The City of Phoenix is home to 54 historic districts and has a large inventory of historic and cultural resources (Phoenix 2024). Historic structures were not constructed to the modern building code and are less likely to be able to withstand the forces of flooding. This may result in structures being pushed off their foundations, collapses, and other failures. Historic structures in the floodplain are also very unlikely to be built to the modern design elevation, making them more likely to be damaged by flooding events.

5.1.7 Impact on Ecosystems and Natural Resources

The environmental impacts of a flood can include significant water quality and debris-disposal issues. Flood waters can back up sanitary sewer systems and inundate wastewater treatment plants, causing raw sewage to contaminate residential and commercial buildings and the flooded waterway. The contents of unsecured containers of oil, fertilizers, pesticides, and other chemicals get added to flood waters. Hazardous materials may be released and distributed widely across the floodplain. Water supply and wastewater treatment facilities could be offline for weeks. After the flood waters subside, contaminated and flood-damaged building materials and contents must be properly disposed of. Contaminated sediment must be removed from buildings, yards, and properties. In addition, severe erosion is likely; such erosion can negatively impact local ecosystems.

As the City of Phoenix's development has expanded, a priority to preserve natural corridors for drainage has been implemented. This not only preserves the natural functions of the washes within the area, but also allows for a more natural ecosystem with pathways for wildlife to traverse. Internally, an initiative for Green Stormwater Infrastructure and Low Impact Development has been ongoing. Within an urban environment, Green Stormwater Infrastructure and Low Impact Development will mimic natural floodplain functions by attenuating flow and also improving stormwater quality.

5.1.8 Impact of Future Population on Flooding

The population for the City of Phoenix and the surrounding area is forecast to continued growing. Increases in population result in more potential exposure to flooding. Increased stormwater requirements and more detailed hydrologic and hydraulic modeling will help reduce the impacts of flooding on the growing population. This includes population increases for those who live within the City of Phoenix and those in



the broader municipal planning area that are likely to work or travel through the City of Phoenix. Table 5-12 displays the projected population growth for the Phoenix Municipal Planning Area.

Table 5-12. Population Projections for the Phoenix Municipal Planning Area

2020	2030	2040	2050	2060
1,665,200	1,867,300	2,007,800	2,101,500	2,184,600

Source: (Maricopa Association of Governments 2025)

5.1.9 Impact of Development on Flooding

Increased development is likely to result in greater levels of runoff which can increase the frequency and severity of flooding. Development that occurs within the floodplain will be at a higher risk to flooding impacts.

High hazard flood zones throughout Phoenix are primarily located along established watercourses, conveyance corridors, canals, and flood control facilities. Development changes anticipated for the northwest part of the City include a new industrial development at the northwest corner of Loop 303 and I-17. Continued active commercial and residential development in the northeast areas of the City are currently located within an alluvial fan flood zone that is planned for mitigation. Other new developments throughout the City will be regulated per the City's floodplain management ordinance and drainage design policies (Maricopa County 2021).

The majority of new development within the City of Phoenix is associated with infill development and residential development within the southwest area of the City. As the development efforts do not lie within areas of levee failure hazard, development changes will not impact this hazard (Maricopa County 2021). Additional development in the northern section of the City is underway. With the completion of a semiconductor manufacturing facility in the north part of Phoenix, development will move into the area where currently no development is present. The City will support developers wanting to preserve washes and drainage corridors to keep the natural floodplain functions in the area.

The City has dedicated mountain preserves where natural floodplain functions will persist to help reduce flood impacts to properties downstream.

5.1.10 Impact of Climate Change on Future Flooding

Overall, climate change is likely to result in more frequent and more severe flooding in the City of Phoenix.

The Fourth National Climate Assessment (NCA) report (U.S. Global Change Research Program 2018) is relatively silent on non-coastal flood-related impacts except as they are indirectly influenced by deepening drought, increased wildfire potential, etc. Prior work in the 3rd Edition (U.S. Global Change Research Program 2014) notes that one of the anticipated impacts of climate change for the Southwest is a shift in rain patterns with more intense winter rains, less snow, and less frequent but more intense monsoon-related thunderstorms. A reduction in average annual precipitation and streamflow volumes. For Northern Region communities, the impacts could result in more severe winter season flooding. A second study by Luong (Thang M. Luong 2017) notes that monsoon thunderstorms in the Central and Southern Regions of



the state have become more intense over a recent 20-year period (1991- 2010) when compared to events recorded in the past (1950-1970). The study concludes that the trend will likely continue as the temperatures rise and provide more moisture storage capacity in the lower atmosphere. The increased intensities may result in increased flood levels. Statewide, the overall flooding conditions could also be exacerbated by watersheds with reduced vegetation due to increases in drought or wildfire conditions (Arizona Department of Emergency and Military Affairs 2023).

From a dam safety perspective, the primary climate change impacts will be related to potential changes in the way precipitation and resultant flood patterns may vary and influence the potential for increased wildfire activity. The Fourth National Climate Assessment (NCA) report (U.S. Global Change Research Program 2018) notes that one of the anticipated impacts of climate change for the Southwest is a reduction in average annual precipitation and streamflow volumes. The report and supporting documents also indicate that winter storm intensities are anticipated to increase, which may lead to increased event-based flooding. The NCA report also notes that winter precipitation will be less in the form of snow and more frequent rain, which may indicate more frequent winter flooding. The potential for reduced vegetation could also exacerbate the overall flooding conditions for watersheds upstream of dam facilities due to increased drought and post-wildfire flooding conditions (Arizona Department of Emergency and Military Affairs 2023).

Climate change impacts to emergency spillway and dam failure inundation hazard are anticipated to occur in relation to the assumed increase in wildfire occurrences. Wildfires typically change a watershed's hydrology with regard to rainfall-runoff processes, causing significant increases in peak discharge and runoff volumes during precipitation events. Dams and flood regulation service supplies located in the county are typically not designed for post wildfire flooding volumes and flow rates and could pose significant increased risks of emergency spillway operation or failure should a large wildfire occur in the watershed. Other indirect impacts could be linked to increased presence of fissure and subsidence due to increased groundwater withdrawal due to reduced surface water supplies (Maricopa County 2021).

From a levee safety perspective, the primary climate change impacts will be related to potential changes in the way precipitation and resultant flood patterns may vary, and influence of the potential for increased wildfire activity (Arizona Department of Emergency and Military Affairs 2023).

5.2 PROBLEM SUMMARY

After review of the capability assessment and the vulnerability assessment the following flood related problems have been identified:

- Additional stormwater and floodplain management education is needed for City leaders, Councilmembers, and Neighborhood Services.
- Additional education is needed for the City Council.
- Additional written outreach is needed for the public, City leaders, policy makers, and the City's Neighborhood Services department.
- Regular social media outreach is needed for floodplain education.



- Regular stormwater outreach should be deployed through direct mailings.
- Outreach could be delivered to neighborhood association meetings, festivals, and garden shows.
- Additional public education on the importance of dams and their risks is needed.
- Properties in repetitive loss areas require education on flood risks and potential mitigation measures.
- Continued dam safety and flood response exercises are needed to maintain high levels of emergency preparedness.
- Coordination is needed among local and regional agencies for flood warning and emergency response.
- City staff should attend regular trainings for emergency response and floodplain management.
- Coordination is needed to develop a network of Continuously Operating Reference Stations (CORS).
- The City lacks a Substantial Damage Response Plan to coordinate identification, evaluation, and mitigation of substantially damaged properties.
- Annual education is needed to provide the public with recommendations for proper vegetation maintenance and flood preparedness.
- Requirements for new developments should be evaluated to preserve natural floodplain function and encourage green stormwater techniques.
- Capital Improvement Program projects to reduce flood risk should continue to be identified and supported.
- Critical infrastructure and facilities should be mapped to determine flood exposure.
- Critical infrastructure and facilities should be evaluated for flood risks.
- Flood fighting materials (sand and bags) should be stockpiled near critical infrastructure and facilities.
- Critical infrastructure and facilities inventories should be regularly updated to keep up to date for potential flood mitigation.
- Emergency Action Plans should address flood response scenarios for City-owned critical infrastructure and facilities.
- Emergency Action Plan contact list and notification charts should be updated annually.
- Maintenance at floodprone areas should be tracked.
- Drywell maintenance should be monitored.
- The City's 311 App and webpage for reporting flood maintenance issues should be better advertised to increase use.
- Stormwater maintenance work by the City should be publicized.
- Stormwater and floodplain requirements, zoning and subdivision ordinances, guidelines, regulations, codes, design manuals, and land use plan should be annually evaluated for updates and potential improvements to reduce future flood risks.
- Building Codes should be regularly evaluated for updates and potential improvements to reduce future flood risks.
- The public needs guidance on vegetation maintenance for privately owned wash corridors, storm drain inlets and outlets, and stormwater storage basins.



- City-owned storm drain infrastructure should be evaluated for maintenance and rehabilitation needs.
- Flood mitigation funding needs could be supported by General Obligation Bond funding.
- Flood mitigation funding needs could be supported by state and federal funding opportunities.
- Continued partnership with the Flood Control District of Maricopa County is needed to support flood mitigation projects.
- Additional funding resources for stormwater project funding should be explored.

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6 STEP 6: SET GOALS

Mitigation goals represent broad statements that are consistent with the hazards identified in the FMP and achieved through the implementation of specific mitigation actions. Mitigation objectives are defined, short-term, measurable efforts that lead to achieving an overall goal. Mitigation goals and objectives provide the guidance for the development of the mitigation actions.

6.1 PREVIOUS GOALS AND OBJECTIVES

6.1.1 Previous FMP Goals

The 2016 City of Phoenix Floodplain Management Plan and the 2021 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan had a single overarching goal: Reduce or eliminate the risk to people and property from natural hazards.

6.1.2 Previous FMP Objectives

The objectives for the 2016 City of Phoenix Floodplain Management Plan and the 2021 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan were as follows:

1. Reduce or eliminate risks that threaten life and property in the incorporated, unincorporated, and tribal jurisdictions within City of Phoenix/Maricopa County.
2. Reduce risk to critical facilities and infrastructure from natural hazards.
3. Promote hazard mitigation throughout the incorporated, unincorporated, and tribal jurisdictions within City of Phoenix/Maricopa County.
4. Increase public awareness of hazards and risk that threaten the incorporated, unincorporated, and tribal jurisdictions within City of Phoenix/Maricopa County.

6.2 UPDATED GOALS, AND OBJECTIVES

The FMP Committee reviewed the goals from the 2016 City of Phoenix Floodplain Management Plan and the 2021 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan and identified the following opportunities for modifications for 2025 FMP:

- The prior objectives could be converted to goals.
- A goal could be established to encourage proper maintenance and preventative measures for stormwater infrastructure.
- The public awareness goal could be expanded to include policy makers and city leaders.
- A goal targeting the effective use of public funding could be established.



6.2.1 2025 FMP Goals

The updated goals for the 2025 FMP are as follows:

- **Goal 1:** Educate the public, policymakers, and City leaders on stormwater and floodplain management and risks.
- **Goal 2:** Coordinate with other jurisdictions and agencies to mitigate flooding hazards and improve emergency response.
- **Goal 3:** Reduce the danger of flood hazards to people, property, critical infrastructure/facilities, and natural resources.
- **Goal 4:** Enhance proactive maintenance and preventive measures for stormwater infrastructure.
- **Goal 5:** Utilize public funding in the most effective manner for stormwater and floodplain management.

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7 STEP 7: REVIEW POSSIBLE ACTIVITIES

7.1 STATUS OF PREVIOUS ACTIONS

For the 2025 FMP, the actions from the 2016 City of Phoenix Floodplain Management Plan and the 2021 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan were reviewed by the FMP Committee and each identified lead department.

7.1.1 2016 City of Phoenix Floodplain Management Plan

The 2016 Floodplain Management Plan included an action plan comprised of 18 actions. These actions are described in Table 7-1.

Table 7-1. Actions from the 2016 City of Phoenix Floodplain Management Plan

Action	Description	Deadline
Administrative Actions		
1	Plan Adoption	October 2016
2	Monitoring and Reporting	October – annually
3	Community Rating System	CRS Recertification Visit
Program Action Items		
4	Dam Improvements	Continuous Activity
5	Levee Improvements	Continuous Activity
6	Drainage system maintenance	Continuous Activity
7	Drainage system improvements	October 2016
8	Property protection funding	October 2016
9	Regulatory review	CRS Recertification Visit
10	NFIP administration	After Community Assistance Contact (CAC)
11	Certified Floodplain Managers	October 2016
12	Flood response plan	Continuous Activity
Public Information Action Items		
13	Newspaper notifications	Continuous Activity
14	City Notes articles	Continuous Activity
15	City Website	October 2016
16	Technical References	CRS Recertification Visit
17	Public information projects	Continuous Activity
18	Public information messages	Continuous Activity



7.1.2 2021 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan

The 2021 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan included 20 mitigation actions specific to the City of Phoenix. The flood related actions are included in Table 7-2.

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Table 7-2. Flood Related Mitigation Actions from the 2021 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan

Action	Description	Hazard(s) Mitigated	Community Assets Mitigated (Ex/New)	Estimated Cost	Priority Ranking	Planning Mechanism(s) for Implementation	Anticipated Completion Date	Primary Agency/Job Title Responsible for Implementation	Funding Source
1	Review building permits for compliance with Floodplain Ordinance and NFIP regulations.	Flood, Dam Inundation	Both	Staff time	High	Staff Training, Plan Review	Annual-Ongoing	Public Works / Floodplain Manager	General Funds
2	Continue to include in the General Plan policies that protect the natural flow regime of washes, designate areas for Open Space and Preserves, and when fiscally possible support the use of green stormwater infrastructure/ low impact development to address multiple risks.	Flood, Dam Inundation, Extreme Heat, Drought	Both	Staff time	High	Land acquisition and natural resource protection	Annual-Ongoing	Parks and Recreation/PPPI Administrator	Phoenix Parks Preserves Initiative; General Fund; Bonds
3	Storm Drain CIP Program. Construct drainage facilities to mitigate flooding	Flood, Levee Failure	Both	Variable	High	Staff Training, Plan Review, Design and Construction	Ongoing	Street Transportation Department/ Deputy Street	Bonds/Impact Fees



Action	Description	Hazard(s) Mitigated	Community Assets Mitigated (Ex/New)	Estimated Cost	Priority Ranking	Planning Mechanism(s) for Implementation	Anticipated Completion Date	Primary Agency/Job Title Responsible for Implementation	Funding Source
	hazard to residents of the city.							Transportation Director	
4	Coordinate review and approval of development projects located within flood hazard areas with PDD and Floodplain Management.	Flood, Extreme Heat	Both	Staff time	High	GIS	Annual - ongoing	Planning and Development Department / Planning Researcher	Enterprise
8	Revise and ratify the General Plan every ten years.	Flood	Both	Staff time	Medium	State statute; Smart Growth Requirement	Ongoing	Planning and Development Department/ Planning Manager	General Fund
9	Update and adopt a revised building code.	Flood, Severe Wind, Excessive Heat	Both	Staff time; Materials	Medium	Staff training; Community Outreach; Plan review	Annual - ongoing	Planning and Development Department / Assistant Director	Permit fees
10	Continue to ensure zoning stipulations are met before construction permits are issued, and zoning is compatible	Flood, Excessive Heat	Both	Staff time	Medium	Zoning Ordinance; Staff training; Plan review	Annual - ongoing	Planning and Development Department / Deputy Director	Permit fees



Action	Description	Hazard(s) Mitigated	Community Assets Mitigated (Ex/New)	Estimated Cost	Priority Ranking	Planning Mechanism(s) for Implementation	Anticipated Completion Date	Primary Agency/Job Title Responsible for Implementation	Funding Source
	with the zoning ordinance.								
11	Dam/Levee Safety Program – Operate and Maintain Dams/Levees to mitigate flooding hazard to the residents of the city.	Flood, Dam Inundation, Levee Failure	Both	Staff Time, Materials	Medium	Staff Training, Plan Review	Annual - ongoing	Street Transportation Department / Deputy Street Transportation Director	General Funds
12	Continue to provide links on the Phoenix.gov/Office of Emergency Management website to sources of hazard mitigation educational materials such as FEMA.gov and Ready.gov	Dam Inundation, Drought, Flood, Severe Wind, Wildfire	Both	Staff Time	Medium	N/A	Annual - ongoing	Office of Homeland Security and Emergency Management, City of Phoenix IT	General Funds
16	Design and construct Rio Salado Oeste in Salt River (19th Ave-83rd Ave), including low flow channel improvements and riparian/xeri-riparian	Flooding and extreme heat	Both	Staff time, design and construction expenses	High	Rio Reimagined, Land acquisition, design and construction	2030	Parks and Recreation Department/ Natural Resource Division Deputy Director	TBD; anticipated USACE Civil Works project funds and local city match



Action	Description	Hazard(s) Mitigated	Community Assets Mitigated (Ex/New)	Estimated Cost	Priority Ranking	Planning Mechanism(s) for Implementation	Anticipated Completion Date	Primary Agency/Job Title Responsible for Implementation	Funding Source
	vegetation to improve flow conveyance and increase native vegetation/ habitat.								
20	Implement a notification system for Downtown Phoenix businesses to raise hazard awareness and provide advanced warning of potential threats in the area.	All Hazards	Both	TBD, plan to put out RFP Q2 2021	High	Downtown Phoenix Business Master Plan	2022	Downtown Phoenix Partnership/ Strategy and Community Affairs	TBD



For each action in the previous flood mitigation strategy, the FMP Committee and each identified lead department provided a status update using the guidance below:

- No Progress – The mitigation action has not been completed.
- In Progress – Implementation of the mitigation action has begun but has not been completed.
- Ongoing Capability – The mitigation action has been implemented and will be completed on an annual or regular basis (for example, maintenance activities, annual outreach, etc.).
- Completed – The mitigation action has been fully implemented and was removed from the updated mitigation strategy.

The results of this review are provided in Table 7-3.

Table 7-3. Review of Previous Flood Mitigation Actions

Action	Description	Status Update
2016 Phoenix FMP-1	Plan Adoption	Completed. City Council adopted the previous FMP on June 22, 2016.
2016 Phoenix FMP-2	Monitoring and Reporting	Ongoing Capability. Annually completed.
2016 Phoenix FMP-3	Community Rating System	Ongoing Capability. CRS Recertification Visit annually completed.
2016 Phoenix FMP-4	Dam Improvements	Ongoing Capability. Continuous activity.
2016 Phoenix FMP-5	Levee Improvements	Ongoing Capability. Continuous activity.
2016 Phoenix FMP-6	Drainage system maintenance	Ongoing Capability. Continuous activity.
2016 Phoenix FMP-7	Drainage system improvements	In Progress. The Street Transportation Department provides annual funding to perform local drainage studies and seek flood hazard mitigation projects in partnership with the Flood Control District of Maricopa County. The City performs approximately one to two projects per year addressing local drainage hazards with includes cost participation from the Flood Control District of Maricopa County.
2016 Phoenix FMP-8	Property protection funding	Ongoing Capability. The Street Transportation Department provides annual funding to perform local drainage studies and seek flood hazard mitigation projects in partnership with the Flood Control District of Maricopa County. The City performs approximately one to two projects per year addressing local drainage hazards with includes cost participation from



Action	Description	Status Update
		the Flood Control District of Maricopa County.
2016 Phoenix FMP-9	Regulatory review	Ongoing Capability. CRS Recertification Visit annually completed. Community Assistance Visit by Arizona Department of Water Resources completed in June 2023.
2016 Phoenix FMP-10	NFIP administration	Ongoing Capability. NFIP administration completed Floodplain Management, Office of the City Engineer.
2016 Phoenix FMP-11	Certified Floodplain Managers	Completed. Several staff are Certified Floodplain Managers (CFMs).
2016 Phoenix FMP-12	Flood response plan	Ongoing Capability. Emergency plans are maintained and updated annually.
2016 Phoenix FMP-13	Newspaper notifications	Ongoing Capability. Continuous activity.
2016 Phoenix FMP-14	City Notes articles	Ongoing Capability. Continuous activity.
2016 Phoenix FMP-15	City Website	Ongoing Capability. Updated as necessary.
2016 Phoenix FMP-16	Technical References	Ongoing Capability. Annual CRS Recertification and Community Assistance Visits by Arizona Department of Water Resources as needed.
2016 Phoenix FMP-17	Public information projects	Ongoing Capability. Continuous activities.
2016 Phoenix FMP-18	Public information messages	Ongoing Capability. Continuous activities.
2021 Maricopa MJHMP-1	Review building permits for compliance with Floodplain Ordinance and NFIP regulations.	Ongoing Capability. Continuous activity.
2021 Maricopa MJHMP-2	Continue to include in the General Plan policies that protect the natural flow regime of washes, designate areas for Open Space and Preserves, and when fiscally possible support the use of green stormwater infrastructure/ low impact development to address multiple risks.	Ongoing Capability. Continuous activity.
2021 Maricopa MJHMP-3	Storm Drain CIP Program. Construct drainage facilities to mitigate flooding hazard to residents of the city.	Ongoing Capability. The Street Transportation Department provides annual funding to perform local drainage studies and seek flood hazard mitigation projects in partnership with the Flood Control District of Maricopa County. The City performs approximately one to two projects per year addressing local drainage hazards with includes cost participation from the Flood Control District of Maricopa County.



Action	Description	Status Update
2021 Maricopa MJHMP-4	Coordinate review and approval of development projects located within flood hazard areas with PDD and Floodplain Management.	Ongoing Capability. Continuous activity.
2021 Maricopa MJHMP-8	Revise and ratify the General Plan every ten years.	Ongoing Capability. Continuous activity.
2021 Maricopa MJHMP-9	Update and adopt a revised building code.	Ongoing Capability (evaluated every 5 years)
2021 Maricopa MJHMP-10	Continue to ensure zoning stipulations are met before construction permits are issued, and zoning is compatible with the zoning ordinance.	Ongoing Capability. Continuous activity.
2021 Maricopa MJHMP-11	Dam/Levee Safety Program – Operate and Maintain Dams/Levees to mitigate flooding hazard to the residents of the city.	Ongoing Capability. Continuous activity.
2021 Maricopa MJHMP-12	Continue to provide links on the Phoenix.gov/Office of Emergency Management website to sources of hazard mitigation educational materials such as FEMA.gov and Ready.gov	Ongoing Capability. Continuous activity.
2021 Maricopa MJHMP-16	Design and construct Rio Salado Oeste in Salt River (19th Ave-83rd Ave), including low flow channel improvements and riparian/xeri-riparian vegetation to improve flow conveyance and increase native vegetation/ habitat.	In Progress. Existing conditions assessment and public outreach underway.
2021 Maricopa MJHMP-20	Implement a notification system for Downtown Phoenix businesses to raise hazard awareness and provide advanced warning of potential threats in the area.	Completed. Emergency warnings are delivered through the Community Emergency Notification System (CENS), Wireless Emergency Alerts (WEA), the Emergency Alert System (EAS) via radio and TV, and the Outdoor Warning Siren System.

Actions that were in progress or had no progress were evaluated to determine if they should be discontinued or included in the 2025 FMP. Reasons for discontinuing an action include that the action has been evaluated as being duplicative, impractical, unfeasible, or undesirable, or if the problem that the action was originally developed for is no longer present. Actions that were identified for inclusion in the updated mitigation strategy received additional evaluation to determine if the action should be revised to reflect any new information obtained as part of the plan update process (for example, changes in risk, capabilities, lead agency, or available funding sources).

7.2 CATALOG OF MITIGATION ALTERNATIVES

The planning team used findings of public outreach efforts, the risk assessment results, and the actions identified in the 2016 FMP, 2021 Maricopa County MJHMP, and the 2025 Pima County FMP to finalize the catalog for the 2025 FMP. The resulting catalog includes alternatives that are categorized by what the alternative would do:



- Manipulate the flooding hazard
- Reduce exposure to the flooding hazard
- Reduce vulnerability to the flooding hazard
- Increase the ability to respond to or be prepared for the flooding hazard.

The catalog includes actions to mitigate current risk from the flood hazards assessed by this plan as well as actions to help reduce risk from changes in the impacts of these hazards resulting from climate change. It provides a baseline of mitigation alternatives that are backed by a planning process, are consistent with the established goals and objectives, and are generally within the capabilities of the City to implement. Some of its alternatives may not be feasible based on the selection criteria identified for this plan. Actions were selected based on an analysis of the City's ability to implement the action and general feasibility. Actions from the catalog that are not included in the action plan were not selected for one or more of the following reasons:

- The action is not feasible.
- The action is already being implemented.
- The City lacks the current capability to implement the action.
- There is apparently a more cost-effective alternative.
- The action does not have public or political support.

7.3 PREVENTIVE ACTIVITIES

The City has several preventive activities in place. These activities include, but are not limited to, zoning, stormwater management design regulations, building codes, subdivision ordinances, mountain preserves, and a general plan. The documents all work together to provide for safe development within the City.

These tools can reduce future flood impacts through strict review procedures for design plans and in-depth inspection during construction. This requires multiple City departments working together to help develop safely. The current regulations meet or exceed the minimum requirements of the NFIP and support effective development within the City. The City plans support a long-term vision for where the City needs to go and what needs to be done. The City General Plan 2025 prioritizes a more connected City and through the connectivity the City expects to see prosperity, increase in health and well-being, and a reduction in environmental impacts.

The City is continually seeking ways to improve upon their regulations while still allowing development to occur. The City should seek to update building codes on a regular interval to keep them current within the last 5-years. Currently, outside of the building codes, the City does not have any pressing needs to revise or adopt new regulations.

7.4 REGULATORY STANDARDS FUTURE OUTLOOK

The City's regulatory standards are sufficient to address current and future needs. As updates are made to precipitation data in the area, the requirements will increase based on the current equations and



analyses needed within the City's design guidelines and standards. In addition, the City often references the Flood Control District of Maricopa County guidelines that are updated as needed to meet the needs of the County.

Activities within this FMP will support ongoing reviews of the regulatory standards for updates.

7.5 PROPERTY PROTECTION ACTIVITIES

The City provides technical support to those inquiring about floodplain related issues at their properties. The City does not have a history with acquisition of properties or retrofitting. However, the City provides support in where to find resources for flood insurance. This support can help direct a property owner into getting a policy to protect their assets.

Activities within this FMP will support ongoing public outreach and technical support to residents when needed for flood insurance and other flood related needs.

7.6 PLAN REVIEW ACTIVITIES

The City's General Plan 2025 wants to address the connectivity of the City not only from a transportation aspect but also with natural open spaces and corridors. Keeping these areas open and natural not only helps with the natural floodplain functions and reductions of flood risks, but they also allow for connectivity. Additionally, protecting the mountain preserves from development will help reduce future increased flood risks by preserving as much natural open space as possible.

Activities within this FMP will support preserving open space within the City and promoting keeping drainage corridors and washes in their natural state as development occurs in the area.

7.7 EMERGENCY SERVICES ACTIVITIES

The City conducts annual exercises to determine the readiness of the different departments in the event of a flood emergency. The City's dams group utilizes the emergency action plans for the dams to enact these exercises that involves people from different departments of the City and external stakeholders. These exercises will continue on an annual basis with updates to the emergency action plans completed on an as needed basis.

Activities within this FMP will support emergency services through annual exercises and plans. These plans will guide the City staff in the event of an emergency with what needs to be done and who needs to be involved in the process. Also, the City will work in partnership with the Flood Control District of Maricopa County to place flood fight (sand and sandbags) in strategic locations around the City.

7.8 STRUCTURAL PROJECT ACTIVITIES

The City has several ongoing structural projects to reduce flooding impacts on its residents. Activities within the FMP will support the completion of these projects and the long-term maintenance required to



keep them functioning as designed. These projects include storm drain rehabilitation, channels, dam and levee maintenance, and new storm drains and basins.

7.9 PUBLIC OUTREACH ACTIVITIES

Public outreach is vital to any City project. Getting community support or helping direct them to the resources they need is critical. The City does outreach as part of each project they do in order to inform residents and property owners of a study or design that is being conducted to get input or when a project is about to go into construction.

Activities within this FMP will help provide more information to the public on what they can do to reduce their flood risks and also promote what the City is doing and what resources the City has to help.

7.10 FUNDING CAPABILITY

The City utilizes a variety of sources to fund different projects. A detailed discussion is provided within Section 4.1.4, and these include the City's general fund, state and federal grants, and partnerships with the Flood Control District of Maricopa County. Several activities discussed will involve staff time alone which will reduce the impact to get the activity completed.



8 STEP 8: DRAFT AN ACTION PLAN

8.1 DEVELOPING MITIGATION ACTIONS

The FMP Committee reviewed the results of the risk and capability assessments; the City of Phoenix's mitigation strategy in the 2016 City of Phoenix Floodplain Management Plan and the 2021 Maricopa County Multi-Jurisdictional Hazard Mitigation Plan; the 2025 FMP goals; and the catalog of mitigation alternatives, and selected actions to be included in the 2025 FMP Action Plan.

8.2 MITIGATION ACTION CATEGORIZATION

Mitigation actions were selected to include a variety of action types. The following action types were included.

8.2.1 Prevention

Preventive activities are intended to keep hazard problems from getting worse and are typically administered through programs or regulatory actions that influence the way land is developed and assets are built. In the context of this plan, prevention measures also include security initiatives. Prevention measures are particularly effective in reducing a jurisdiction's future vulnerability, especially in areas where development has not occurred or capital improvements have not been substantial. Examples of preventive activities include:

- Planning and zoning
- Open space preservation
- Floodplain regulations
- Stormwater management regulations
- Drainage system maintenance
- Capital improvement programs
- Riverine setbacks

8.2.2 Property Protection

Property protection activities involve the modification of existing buildings, assets, and structures to help them better withstand the forces of a hazard or the removal of the structures from hazardous locations. Examples include:

- Acquisition
- Relocation
- Asset and building elevation
- Structural retrofitting



8.2.3 Natural Resource Protection

Natural resource protection activities reduce the impact of natural hazards by preserving or restoring natural areas and their protective functions. Such areas include floodplains, wetlands, and steep slopes:

- Floodplain protection
- Watershed management
- Riparian buffers
- Habitat preservation
- Erosion and sediment control
- Wetland preservation and restoration
- Slope stabilization
- Forest and vegetation management
- Green stormwater infrastructure

8.2.4 Emergency Services

Although not typically considered a “mitigation” technique, emergency service activities do minimize the impact of a hazard event on people and property. These commonly are actions taken immediately prior to, during, or in response to a hazard event. Examples include:

- Warning and communication systems
- Evacuation planning and management
- Emergency response training and exercises
- Sandbagging for flood protection

8.2.5 Structural Projects

Structural mitigation activities are intended to lessen the impact of a hazard by modifying the environmental natural progression of the hazard event through construction. They are usually designed by engineers and managed or maintained by jurisdiction staff. Examples include:

- Reservoirs
- Dams, levees, dikes, and floodwalls
- Diversions, detention, retention
- Channel modification
- Stormwater infrastructure expansion
- Water and sewer infrastructure improvements

8.2.6 Public Information

Public education and awareness activities are used to advise residents, elected officials, business owners, potential property buyers, and visitors about hazards, hazardous areas, and mitigation techniques they can use to protect themselves and their property. Examples of measures to educate and inform the public include:



- Outreach projects
- Speaker series and demonstration events
- Hazard map information
- Library materials
- School-age educational programs
- Social media campaigns

8.3 MITIGATION ACTIONS SELECTED FOR THE ACTION PLAN

The 2025 FMP Action Plan includes 34 unique flood mitigation actions identified for implementation by the FMP Committee. Table 8-1 provides the following information for each action in the 2025 FMP Action Plan:

- Action Number: An identification number for future tracking of progress.
- Description: A short discussion of the details of the action.
- Responsible Party: The agencies responsible for overseeing implementation of the action.
- Funding Source: Potential sources of funding to conduct/implement each action.
- Timeline: A proposed timeline for the completion of the action.
- Category: Categorization of the action type.
- Priority: Actions were prioritized according to funding availability, the immediacy of the need for each project, and informal review of benefits versus costs.

Actions have been selected to support each of the five goals for the 2025 FMP.



Table 8-1. 2025 Phoenix FMP Action Plan

Action Number	Description	Responsible Party	Funding Source	Timeline	Category	Priority
FMP Goal 1: Educate public, policy makers, and City leaders on stormwater and floodplain management and risks						
2025 PHOENIX FMP-1	Create an annual stormwater and floodplain management workshop for City leaders, Councilmembers, and Neighborhood Services to help with stormwater and floodplain education and outreach held prior to presentation at Council Meeting.	Floodplain/City Engineer	Staff Time	Ongoing	Public Information	Medium
2025 PHOENIX FMP-2	Present annually at a City of Phoenix Council Meeting on state of City's stormwater and floodplain program.	Floodplain/City Engineer	Staff Time	Ongoing	Public Information	Low
2025 PHOENIX FMP-3	Develop flyers, CRS Annual Outreach Letter, and ongoing updates to the City's Floodplain webpage for use by the public, City leaders, policy makers, and the City's Neighborhood Services department.	Floodplain/City Engineer, Public Information Office	Staff Time	Ongoing	Public Information	Low
2025 PHOENIX FMP-4	Post at least five times per year on stormwater, floodplain, or flood insurance related topics on the City's social media platforms.	Floodplain/City Engineer, Public Information Office	Staff Time	Ongoing	Public Information	Low
2025 PHOENIX FMP-5	Include stormwater section bi-annually within the City's water bill for stormwater and floodplain outreach and education purposes.	Floodplain/City Engineer, Public Information Office, Water Services Department	Staff Time	Ongoing	Public Information	Low
2025 PHOENIX FMP-6	Attend/Present at four neighborhood associations meetings, festivals, or home & garden shows per year to provide information to the public on recent, current, and future stormwater and floodplain projects and the importance of flood insurance if property in floodplain.	Floodplain/City Engineer, Public Information Office	Staff Time	Ongoing	Property Protection, Public Information	Low



Action Number	Description	Responsible Party	Funding Source	Timeline	Category	Priority
2025 PHOENIX FMP-7	Place signage at City dams to educate the public of the presence of the structure, the need for the structure, and risks.	Streets, Public Information Office, Parks	General Fund	2027	Public Information	Low
2025 PHOENIX FMP-8	Provide annual outreach to repetitive loss areas.	Floodplain/City Engineer, Public Information Office	General Fund	Ongoing	Public Information	High
FMP Goal 2: Coordinate with other jurisdictions and agencies to mitigate flooding hazards and improve emergency response						
2025 PHOENIX FMP-9	Continue to participate in local or independent annual dam safety and flood response exercises and invite other agencies to participate.	Floodplain/City Engineer, Streets, Emergency Management, Public Information Office	General Fund	Ongoing	Preventative, Emergency Services	High
2025 PHOENIX FMP-10	Continue to coordinate with other local and regional agencies for flood warnings and emergency response.	Floodplain/City Engineer, Streets, Emergency Management, Public Information Office	General Fund	Ongoing	Preventative, Emergency Services	Medium
2025 PHOENIX FMP-11	Have at least one City staff attend a FEMA training/workshop annually for emergency response or floodplain management.	Floodplain/City Engineer	Staff Time	Ongoing	Emergency Services	Medium
2025 PHOENIX FMP-12	Coordinate with Arizona Department of Water Resources to establish a network of Continuously Operating Reference Stations (CORS) throughout the City to provide overlapping coverage to support increased detail in surveys for development and public infrastructure projects.	Floodplain/City Engineer, Streets	General Fund	2030	Preventative, Emergency Services	Low
2025 PHOENIX FMP-13	Develop a substantial damage response plan and coordinate with outside groups and agencies to ensure NFIP requirements are met following disaster events.	Floodplain/City Engineer, Planning and Development, Public Information	FEMA FMA, Staff Time	2030	Emergency Services	Medium



Action Number	Description	Responsible Party	Funding Source	Timeline	Category	Priority
		Office, Emergency Management				
FMP Goal 3: Reduce the danger of flood hazards to people, property, critical infrastructure/facilities, and natural resources						
2025 PHOENIX FMP-14	Hold an annual in person meeting, and record for a webcast, to provide recommendations for proper vegetation maintenance and flood preparedness.	Floodplain/City Engineer, Public Information Office	Staff Time	Ongoing	Preventative, Natural Resource Protection, Public Information	Low
2025 PHOENIX FMP-15	Evaluate the requirement for new developments to preserve natural drainage corridors and implement Green Stormwater Infrastructure and Low Impact Development.	Floodplain/City Engineer, Planning and Development	Staff Time	2030	Natural Resource Protection	Medium
2025 PHOENIX FMP-16	Complete major projects within the current Capital Improvement Program – Paradise Ridge Drainage Improvements; Drainage Improvements: 20th Street between Winchcomb Drive and 19th Way; Storm Drain Replacement Study; Laveen Flood Mitigation; Hohokam Drainage Program; 3rd Street and Thomas; 12 ARPA Projects; and Storm Drain Asset Management and Replacement Program	Floodplain/City Engineer, Streets	General Fund, General Obligation Bond, Federal Grants, Partner Funding	2030	Structural Projects	High
2025 PHOENIX FMP-17	Identify and map critical infrastructure and facilities within the City of Phoenix (for Internal City Use Only).	Emergency Management	Staff Time	2030	Emergency Services	Medium
2025 PHOENIX FMP-18	Evaluate flood risks for critical infrastructure and facilities (for Internal City Use Only).	Floodplain/City Engineer, Emergency Management	Staff Time	2030	Emergency Services	Medium
2025 PHOENIX FMP-19	Provide flood fight materials (sand and bags) at/near critical infrastructure and facilities based on flood risk (for Internal City Use Only).	Floodplain/City Engineer, Streets, Emergency Management	Staff Time	2030	Emergency Services	Medium



Action Number	Description	Responsible Party	Funding Source	Timeline	Category	Priority
2025 PHOENIX FMP-20	Annually update database of critical infrastructure and facilities (for Internal City Use Only).	Emergency Management	Staff Time	Ongoing	Emergency Services	Medium
2025 PHOENIX FMP-21	Establish or Update Emergency Action Plans to address flood response scenarios for City-owned critical infrastructure and facilities (for Internal City Use Only).	Floodplain/City Engineer, Streets, Water Services Department, Emergency Management	General Fund	Ongoing	Emergency Services	High
2025 PHOENIX FMP-22	Update Emergency Action Plans notification charts annually for the City's flood control dams.	Floodplain/City Engineer, Streets, Water Services Department, Emergency Management	General Fund	Ongoing	Emergency Services	High
2025 PHOENIX FMP-23	Submit a Letter of Map Revision to FEMA to have over 2,000 acres of land taken out of the 100-year floodplain as a result of the recently completed Rawhide wash channelization project in northeast Phoenix.	Floodplain/City Engineer, Planning and Development	Staff Time	2027	Preventative	High
FMP Goal 4: Enhance proactive maintenance and preventive measures for stormwater infrastructure						
2025 PHOENIX FMP-24	Documentation of maintenance occurring at problematic areas throughout the year, including cost to complete each occurrence.	Floodplain/City Engineer, Streets, Public Information Office	Staff Time	2026	Preventative	Medium
2025 PHOENIX FMP-25	Continue monitoring of self-audit maintenance for drywells installed after 2022 when guidance was established.	Environmental	Staff Time	Ongoing	Preventative, Property Protection	Medium
2025 PHOENIX FMP-26	Publicize City's 311 App and Webpage for reporting maintenance issues.	Floodplain/City Engineer, Streets, Public Information Office	Staff Time	2026	Public Information	Medium



Action Number	Description	Responsible Party	Funding Source	Timeline	Category	Priority
2025 PHOENIX FMP-27	Publicize a summary of the City's stormwater maintenance work completed each year (webpage, social media post, and/or water bill).	Floodplain/City Engineer, Streets	Staff Time	Ongoing	Preventative, Public Information	Low
2025 PHOENIX FMP-28	Continue to evaluate on an annual basis the current stormwater and floodplain requirements, zoning and subdivision ordinances, guidelines, regulations, codes, design manuals, and land use plan for updates.	Floodplain/City Engineer, Streets, Planning and Development	Staff Time	Ongoing	Preventative	Medium
2025 PHOENIX FMP-29	Evaluate and update Building Codes on a routine basis (at least every 5 years).	Planning and Development	Staff Time	2030	Preventative	Medium
2025 PHOENIX FMP-30	Develop a publicly facing vegetation maintenance guide for private use for wash corridors, storm drain inlets and outlets, and stormwater storage basins and provide at outreach events and on City's website.	Floodplain/City Engineer	Staff Time	2030	Property Protection, Natural Resource Protection, Public Information	Low
2025 PHOENIX FMP-31	Evaluate City-owned storm drain infrastructure for maintenance and rehabilitation needs.	Floodplain/City Engineer, Streets	General Obligation Bond	2030	Preventative, Structural Projects	High
FMP Goal 5: Utilize public funding in the most effective manner for stormwater and floodplain management						
2025 PHOENIX FMP-32	Utilize General Obligation Bond funding to mitigate flooding risks.	Floodplain/City Engineer, Streets	General Obligation Bond	2030	Structural Projects	High
2025 PHOENIX FMP-33	Seek opportunity to apply for grants through state and federal agencies to reduce the burden on the City for stormwater and floodplain management projects.	Floodplain/City Engineer	Staff Time	Ongoing	Structural Projects	High
2025 PHOENIX FMP-34	Continue partnership with the Flood Control District of Maricopa County and the Small Projects Assistance Program.	Floodplain/City Engineer, Streets	Staff Time	Ongoing	Structural Projects	Medium



9 STEP 9: ADOPT THE PLAN

This chapter documents formal adoption of the 2025 FMP by the Phoenix City Council (CRS Step 9). A copy of the adoption resolution is provided in Figure 9-1.

Figure 9-1 City of Phoenix 2025 Floodplain Management Plan Adoption

WILL BE INCLUDED IN THE FINAL VERSION

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10 STEP 10: IMPLEMENT, EVALUATE, REVISE

This chapter presents a plan implementation and plan maintenance process (CRS Step 10) that includes the following:

- A process to incorporate the FMP into other planning mechanisms
- A process for implementing the FMP actions
- A method for monitoring and evaluating the floodplain management plan over a 5-year cycle by the FMP Committee
- A process for the public to continue to participate in the plan maintenance process
- A process for the City of Phoenix to update the FMP

By establishing a plan maintenance strategy, the City of Phoenix can ensure that the 2025 FMP remains an active and relevant document. It includes a schedule for monitoring and evaluating the 2025 FMP annually and producing an updated plan every five years to meet CRS requirements. The strategy also describes how public participation will be integrated throughout the plan maintenance and implementation process. It explains how the mitigation strategies outlined in the 2025 FMP will be incorporated into existing planning mechanisms and programs, such as comprehensive land-use planning processes, capital improvement planning, hazard mitigation planning, and building code enforcement and implementation. The 2025 FMP's format allows sections to be reviewed and updated when new data becomes available, resulting in a plan that will remain current and relevant.

10.1 INCORPORATION INTO OTHER PLANNING MECHANISMS

The City of Phoenix will incorporate the 2025 FMP into relevant decision-making processes, plans, or mechanisms, where feasible. The following planning processes and programs are to be coordinated with the recommendations of the 2025 FMP:

- Local hazard mitigation plan
- Emergency response plan
- Capital improvement programs
- Municipal codes
- Community design guidelines
- Water-efficient landscape design guidelines
- Stormwater management programs
- Water system vulnerability assessments

Some action items do not need to be implemented through regulation. Instead, these items can be implemented through the creation of new educational programs, continued interagency coordination, or improved public participation. As information becomes available from other planning mechanisms that can enhance the 2025 FMP, that information will be incorporated via the update process.



10.2 IMPLEMENTING THE 2025 FMP THROUGH EXISTING PROGRAMS

To successfully reduce future losses, implementing the actions within this plan is highly recommended. The City of Phoenix involved a wide range of staff in the plan development process and many departments, divisions, or other partners participating in the 2025 FMP are responsible for implementing specific mitigation actions identified by each jurisdiction. Every proposed action listed in the mitigation action plan is assigned to a specific “lead” department or partner in order to assign responsibility and accountability and increase the likelihood of implementation.

In addition to the assignment of a local lead department or partner, an implementation time period or a specific implementation date has been assigned in order to assess whether actions are being implemented in a timely fashion. The City of Phoenix will seek outside funding sources to implement mitigation projects in both the pre-disaster and post-disaster environments. When applicable, specific potential funding sources have been identified for proposed actions listed in the mitigation action plan.

The Office of the City Engineer will have lead responsibility for overseeing the 2025 FMP implementation and maintenance strategy. Implementation and evaluation will be a shared responsibility among all agencies identified as lead agencies in the mitigation action plan.

10.3 MONITORING AND EVALUATING THE 2025 FMP

The FMP Committee oversaw the development of the 2025 FMP and made recommendations on key elements of the plan, including the maintenance strategy. It was the FMP Committee’s position that an oversight committee with representation similar to that of the FMP Committee should have an active role in the 2025 FMP maintenance strategy. Therefore, it is recommended that a FMP Committee remain a viable body involved in key elements of the plan maintenance strategy. The new FMP Committee should include representation from local stakeholders.

The FMP Committee will meet once annually during the five-year performance period of this Plan and provide input to the Office of the City Engineer on possible enhancements to be considered at the next update. This frequency of meeting will also assist in implementation, as meetings will be coordinated with the strategic planning process. Future plan updates will be overseen by a FMP Committee similar to the one that participated in development of the 2025 FMP, so keeping an interim FMP Committee intact will provide a head start on future updates.

The minimum task of the ongoing annual FMP Committee meeting will be the evaluation of the progress of the action plan during a 12-month performance period. This review will include the following:

- Summary of any flood hazard events that occurred during the performance period and the impact these events had on the City of Phoenix
- Review of mitigation success stories
- Review of continuing public involvement
- Brief discussion about why targeted strategies were not completed



- Re-evaluation of the action plan to determine if the timeline for identified projects needs to be amended (such as changing a long-term project to a short-term one because of new funding)
- Recommendations for new projects
- Changes in or potential for new funding options (grant opportunities)
- Impact of any other planning programs or actions that involve floodplain management.

A template for preparing a progress report is provided in Appendix E. The FMP Committee will provide feedback to the City of Phoenix Floodplain Management Department on items included in the template. The City of Phoenix Floodplain Management Department will then prepare a formal annual report on the progress of the plan. This report should be used as follows:

- Posted on the Floodplain Management web page
- Provided to the local media through a press release
- Provided to the City Council to inform them of the progress of mitigation actions implemented during the reporting period
- Provided as part of the CRS annual re-certification package. The CRS requires an annual recertification to be submitted every calendar year for which the community has not received a formal audit.

10.4 ONGOING PUBLIC INVOLVEMENT

Public participation is an integral component to the floodplain management planning process and will continue to be essential as this plan evolves over time. Public involvement procedures were reviewed as part of the 2025 FMP development process. The public will continue to be apprised of the plan's progress through the floodplain management plan website and by providing copies of annual progress reports to the media

(<https://www.phoenix.gov/administration/departments/city-engineer/floodplain-management.html>). The website will not only house the final plan, but it will also become the one-stop shop for information regarding the plan and plan implementation. Copies of the plan will also be distributed to the City of Phoenix library system. Upon initiation of future update processes, a new public involvement strategy will be initiated based on guidance from a new FMP Committee. This strategy will be based on the needs and capabilities of City of Phoenix at the time of the update. At a minimum, this strategy will include the use of local media outlets.

10.5 UPDATING THE PLAN

The City of Phoenix intends to update the 2025 FMP on a 5-year cycle from the date of its adoption (CRS Step 10). This cycle may be accelerated to less than 5 years based on the following triggers:

- A federal flood-related disaster declaration that impacts the City of Phoenix
- A flood event that causes loss of life
- A comprehensive update of the City of Phoenix general plan.



It will not be the intent of future updates to develop a completely new floodplain management plan. The update will, at a minimum, include the following elements:

- The update process will be convened through a FMP Committee.
- The hazard risk assessment will be reviewed and, if necessary, updated using best available information and technologies.
- The action plan will be reviewed and revised to account for any actions completed, dropped, or changed and to account for changes in the risk assessment or new policies identified under other planning mechanisms (such as the general plan).
- The draft update will be sent to appropriate agencies and organizations for comment.
- The public will be given an opportunity to comment on the update prior to adoption.
- The City of Phoenix City Council and Mayor will adopt the updated plan.

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TERMINOLOGY

ACRONYMS

ACE—Annual Chance of Exceedance

ADA—Americans with Disabilities Act

ADEQ—Arizona Department of Environmental Quality

ADMPU—Area Drainage master Plan Update

ADOT—Arizona Department of Transportation

ADWR—Arizona Department of Water Resources

ARPA—American Rescue Plan Act

ARS—Arizona Revised Statute

ASLD—Arizona State Land Department

AZ DEMA—Arizona Department of Emergency and Military Affairs

AZSTORM—AZ Stormwater Outreach for Regional Municipalities

BCEGs—Building Code Effectiveness Grading Schedule

BFE—Base Flood Elevation

BUILD— Better Utilizing Investments to Leverage Development

CAP—Community Assistance Program

CAC—Community Assistance Contact

CAV—Community Assistance Visit

CAZCA—Central Arizona Conservation Alliance

CDBG—Community Development Grant Program

CDC/ARSDR—Centers for Disease Control and Prevention and Agency for Toxic Substances and Disease Registry

CENS—Community Emergency Notification System

CFM—Certified Floodplain Manager



CFR—Code of Federal Regulations

CIAO—Critical Infrastructure Assurance Office

COOP—Continuity of Operations Plan

CRS—Community Rating System

CWA—Clean Water Act

DFE—Design Flood Elevation

DMA— Disaster Mitigation Act

EAP—Emergency Action Plan

EAS—Emergency Alert System

EMPG—Emergency Management Performance Grants

ESA—Endangered Species Act

EWP—Emergency Watershed Program

FCDMC—Flood Control District of Maricopa County

FEMA—Federal Emergency Management Agency

FERC—Federal Energy Regulatory Commission

FHBM—Flood Hazard Boundary Map

FHWA—Federal Highway Administration

FIRM—Flood Insurance Rate Map

FMA—Flood Mitigation Assistance

FMP—Floodplain Management Plan

FPA—Floodplain Administrator

FPMS—Flood Plain Management Services Program

FTA—Federal Transit Authority

FY—Fiscal Year

GI—General Investigation



GIS—Geographic Information System

HHPD—High Hazard Potential Dam

HIFLD—Homeland Infrastructure Foundation-Level Data

HMA—Hazard Mitigation Assistance

HMGP—Hazard Mitigation Grant Program

HSGP—Homeland Security Grant Program

HUD—U.S. Department of Housing and Urban Development

IA—Individual Assistance

ICW—Inspection of Completed Works Program

IDDE—Illicit Discharge Detection and Elimination

IJA—Infrastructure Investment and Jobs Act

ISO—Insurance Services Office

LPDM—Legislative Pre-Disaster Mitigation

LSAC—Levee Safety Action Classification

MAG—Maricopa Association of Governments

MCCOAD—Maricopa County Community Organizations Active in Disaster

MCDEM—Maricopa County Department of Emergency Management

MCDOT—Maricopa Department of Transportation

MC-LEPC—Maricopa County Local Emergency Planning Committee

MJHMP—Multi-jurisdictional Hazard Mitigation Plan

NCA—National Climate Assessment

NCEI—National Centers for Environmental Information

NDSP—National Dam Safety Program

NFIP—National Flood Insurance Program

NFPP—National Fish Passage Program



NLCS—National Committee on Levee Safety

NLSP—National Levee Safety Program

NID—National Inventory of Dams

NIMS—National Incident Management System

NOAA—National Oceanic and Atmospheric Administration

NPDES—National Pollutant Discharge Elimination System

NRCS—National Resources Conservation Service

NRI—National Risk Index

NWS—National Weather Service

OEP—Phoenix Office of Environmental Program

OHSEM—Office of Homeland Security and Emergency Management

PA—Public Assistance

PAS—Planning Assistance to States

PIT—Point-in-Time

PUD—Planned Unit Development

RAISE—Rebuilding American Infrastructure with Sustainability and Equity

RIP—Rehabilitation and Inspection Program

RL—Repetitive Loss

SBA—Small Business Administration

SEOC—State Emergency Operations Center

SERP—State Emergency Response and Recovery Plan

SFHA—Special Flood Hazard Area

SPAP—Small Project Assistance Program

SPC—Storm Prediction Center

SRL—Severe Repetitive Loss



STORM RLF—Safeguarding Tomorrow through Ongoing Risk Mitigation Revolving Loan Fund

SVI—Social Vulnerability Index

SWM—Phoenix Stormwater Management Section

SWMP—Stormwater Management Plan

THIRA—Threat & Hazard Identification & Risk Assessment

TIGER—Transportation Investment Generating Economic Recovery

TOC—Tactical Operations Center

USACE—U.S. Army Corps of Engineers

USDA—U.S. Department of Agriculture

USDHSES—U.S. Department of Health and Human Services

USDOT—U.S. Department of Transportation

USEPA—U.S. Environmental Protection Agency

USFWS—U.S. Fish and Wildlife Service

USGS—U.S. Geological Survey

WFPO—Watershed and Flood Prevention Operations Program



DEFINITIONS

100-Year Flood: The flood that has a 1 percent chance of being equaled or exceeded in any given year. The 100-year flood does not necessarily occur once every 100 years. It is possible for a 100-year flood to occur more than once in a relatively short period of time.

Acre-Foot: The amount of water it takes to cover 1 acre to a depth of 1 foot. This measure is used to describe the quantity of storage in a water reservoir. An acre-foot is a unit of volume. One acre foot equals 7,758 barrels; 325,829 gallons; or 43,560 cubic feet. An average household of four will use approximately 1 acre-foot of water per year.

Base Flood: Another term for the 100-year flood—the flood having a 1 percent chance of being equaled or exceeded in any given year. The base flood is used as a reference flood level to ensure that all properties subject to the National Flood Insurance Program are protected to the same degree against flooding.

Benefit/Cost Analysis: A systematic, quantitative method of comparing projected benefits to projected costs of a project or policy. It is used as a measure of cost effectiveness. For the purposes of benefit-cost analysis of proposed mitigation actions, benefits are limited to specific, measurable, risk reduction factors, including reduction in expected property losses (buildings, contents, and functions) and protection of human life.

Capability Assessment: A description and analysis of a community's current capacity to address threats associated with flooding. The assessment includes two components: an inventory of an agency's mission, programs, and policies, and an analysis of its capacity to carry them out. A capability assessment is an integral part of the planning process in which a community's actions to reduce losses are identified, reviewed, and analyzed, and the framework for implementation is identified.

Community Rating System (CRS): A voluntary program that provides flood insurance premium discounts to property owners in communities that exceed the minimum requirements of the National Flood Insurance Program and complete activities that reduce flood hazard risk.

Critical Facility: A structure or other improvement that, because of its function, size, service area, or uniqueness, provides indispensable service that enables the continuous operation of critical business and government functions, and is critical to human health and safety or economic security.

Drainage Basin: A basin is the area within which all surface water—whether from rainfall, snowmelt, springs or other sources—flows to a single water body or watercourse. The boundary of a river basin is defined by natural topography, such as hills, mountains, and ridges. Drainage basins are also referred to as watersheds or basins.

Economically Disadvantaged Populations: Households with household incomes below a federally defined minimum.

Exposure: The number and dollar value of assets considered to be at risk during the occurrence of a specific hazard.



Federal Disaster Declaration: Declarations for events that cause more damage than state and local governments and resources can handle without federal government assistance. Generally, no specific dollar loss threshold has been established for such declarations. A federal disaster declaration puts into motion long-term federal recovery programs to help disaster victims, businesses, and public entities.

Flash Flood: A flood that occurs with little or no warning when water levels rise at an extremely fast rate.

Flood Insurance Rate Map (FIRM): The official map on which the Federal Emergency Management Agency delineates special flood hazard area for a given location.

Flood Insurance Study: A report published by the Federal Insurance and Mitigation Administration for a community in conjunction with the community's Flood Insurance Rate Map. The study contains such background data as the base flood discharges and water surface elevations that were used to prepare the FIRM. In most cases, a community FIRM with detailed mapping will have a corresponding flood insurance study.

Floodplain: Any land area susceptible to being inundated by flood waters from any source. A flood insurance rate map identifies most, but not necessarily all, of a community's floodplain as the special flood hazard area.

Floodway: Areas within a floodplain that are reserved for the purpose of conveying flood discharge without increasing the base flood elevation more than 1 foot. Generally speaking, no development is allowed in floodways, as any structures located there would block the flow of floodwaters.

Freeboard: The margin of safety added to the base flood elevation in the design of structures intended to mitigate flooding.

Frequency: How often a hazard of specific magnitude, duration, and/or extent is expected to occur on average. Statistically, a hazard with a 100-year frequency is expected to occur about once every 100 years on average and has a 1 percent chance of occurring any given year. Frequency reliability varies depending on the type of hazard.

Goal: A general guideline that explains what is to be achieved. Goals are usually broad-based, long-term, policy type statements and represent global visions. Goals help define the benefits that a plan is trying to achieve. The success of a floodplain management plan is measured by the degree to which its goals have been met (that is, by the benefits in terms of actual floodplain management).

Geographic Information System (GIS): A computer software application that relates data regarding physical and other features on the earth to a database for mapping and analysis.

Hazard: A source of potential danger or adverse condition that could harm people and/or cause property damage.

Hazard Mitigation Grant Program: A FEMA program that provides grants to states, tribes, and local governments to implement hazard mitigation actions after a major disaster declaration. The purpose of



the program is to reduce the loss of life and property due to disasters and to enable mitigation activities to be implemented as a community recovers from a disaster.

Hydrology: The analysis of waters of the earth. For example, a flood discharge estimate is developed by conducting a hydrologic study.

Intensity: The measure of the effects of a hazard.

Inventory: A list of assets identified in a study region that could be lost when a disaster occurs, and community resources are at risk. Assets include people, buildings, transportation, and other valued community resources.

Lifeline: A lifeline enables the continuous operation of critical government and business functions and is essential to human health and safety or economic security.

Local Government: Any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments, regional or interstate government entity, or agency or instrumentality of a local government; any Indian tribe or authorized tribal organization, or Alaska Native village or organization; and any rural community, unincorporated town or village, or other public entity.

Localized Flooding: Refers to smaller scale flooding that can occur anywhere in a community. This can include flooding in zone X as depicted on the flood insurance rate map. The term is also used to refer to shallow flooding that occurs in low lying areas after heavy rain, ponding, and localized storm water and drainage problems anywhere in the community. In this guide, “local flooding” and “localized flooding” are used interchangeably.

Mitigation: A preventive action that can be taken in advance of an event that will reduce or eliminate risk to life or property.

Mitigation Actions: Mitigation actions are specific actions to achieve goals and objectives that minimize the effects from a disaster and reduce the loss of life and property.

Objective: A short-term aim that, when combined with other objectives, forms a strategy or course of action to meet a goal. Unlike goals, objectives are specific and measurable.

Preparedness: Actions that strengthen the capability of government, citizens, and communities to respond to disasters.

Probability of Occurrence: A statistical measure or estimate of the likelihood that a hazard will occur. This probability is generally based on past hazard events in the area and a forecast of events that could occur in the future.

Repetitive Loss Property: Any NFIP-insured property that, since 1978 and regardless of any changes of ownership during that period, has experienced:

- Four or more paid flood losses in excess of \$1,000.00; or



- Two paid flood losses in excess of \$1,000.00 within any 10-year period since 1978; or
- Three or more paid losses that equal or exceed the current value of the insured property.

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

Risk Assessment: The process of measuring potential loss of life, personal injury, economic injury, and property damage resulting from hazards. This process assesses the vulnerability of people, buildings, and infrastructure to hazards and focuses on (1) hazard identification; (2) impacts of hazards on physical, social, and economic assets; (3) vulnerability identification; and (4) estimates of the cost of damage or costs that could be avoided through mitigation.

Severe Repetitive Loss Property: Any NFIP-insured property that, since 1978 and regardless of any changes of ownership during that period, that has had four or more separate claim payments made under a standard flood insurance policy, with the amount of each claim exceeding \$5,000 and with the cumulative amount of such claims payments exceeding \$20,000; or at least two separate claims payments made under a standard flood insurance policy with the cumulative amount of such claim payments exceed the fair market value of the insured building on the day before each loss.

Special Flood Hazard Area: The base floodplain delineated on a Flood Insurance Rate Map. The SFHA is mapped as a Zone A in river situations and zone V in coastal situations. The SFHA may or may not encompass all of a community's flood problems.

Stakeholder: Business leaders, civic groups, academia, non-profit organizations, major employers, managers of critical facilities, farmers, developers, special purpose districts, and others whose actions could impact floodplain management.

Vulnerability: An asset's susceptibility to damage during a hazard event. Vulnerability depends on an asset's construction, contents, and the economic value of its functions.

Watershed: An area that drains down-gradient from areas of higher land to areas of lower land to the lowest point, a common drainage basin.

Zoning Ordinance: An ordinance that designates allowable land use and intensities for a local jurisdiction. Zoning ordinances consist of two components: a zoning text and a zoning map.



APPENDIX A. PUBLIC OUTREACH MATERIALS

DRAFT

Extreme Heat Warning in Effect Until August 8

Select trails will be **restricted** from **8 a.m. to 5 p.m.** at Camelback Mountain Preserve, Phoenix Mountains Preserve and South Mountain Park and Reserve. [Learn More](#). Read tips on how to stay safe and find Heat Relief locations at [Phoenix.gov/Summer](https://phoenix.gov/Summer).

City of Phoenix official website



City of Phoenix

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Floodplain Management Plan

The City of Phoenix participates in the National Flood Insurance Program's (NFIP) Community Rating System (CRS). As part of the program, the City is updating its existing Floodplain Management Plan (FMP).



The plan identifies flood hazards in the community, sets goals, and recommends a program of activities to address the City'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 City.

In accordance ARS §48-3616 and as required by the NFIP Community Rating System, the City prepared a Floodplain Management Plan (FMP). The 2016 FMP can be viewed on the City's website under the Floodplain Management subsection on the Street Transportation Department Page. ARS §48-3616 requires that updates be prepared

least every five years and shall (1) indicate past efforts of the City in eliminating or minimizing flood control problems, (2) state the planned future work of the City to eliminate or minimize flood control problems, and (3) review and recommend a program of activities to address the City's vulnerability to flooding and educate residents about loss reduction measures and the beneficial functions of floodplains.

Helpful Resources

- ↓ [2025 Floodplain Management Plan Fact Sheet](#)
- ↓ [2016 Floodplain Management Plan \(Most Recent\)](#)
- ↓ [Metro Phoenix Drainage Master Plan](#)
- ↓ [Floodplain Determination Form](#)
- ☞ [Maricopa County Hazard Mitigation Plan](#)
- ↓ [Glossary of Terms](#)

If you are interested in more information on the City's FMP Update, please send an email to Ryan.Bentz@phoenix.gov .

FMP Update Community Engagement

On May 22, 2025, the team hosted a Citywide Virtual Public Meeting at 6:00 p.m. to learn about the plan and its goals. View or listen to the video below.

2025 Floodplain Management Plan Public Meeting



As part of the 2025 update, a Floodplain Management Plan Committee (Committee) has been established. The Committee is made up of representatives of the City of Phoenix, State of Arizona, federal agencies, municipalities, organizations, and the

general public. The Committee will help identify hazards, assess the problems, and identify potential solutions.

Subscribe to the monthly Phoenix resident newsletter for updates, news, and events.

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Contact

Phoenix City Hall

200 W. Washington Street

Phoenix, AZ 85003 • [Map](#) • [Contact Form](#) • [Phone Directory](#)

Main: 602-262-3111

Water/Sewer/City Services Bill: 602-262-6251

TTY: 711

Accommodations

Do you require an accommodation to participate in a City program, service, or activity? Contact the [ADA Compliance Program](#) at least five business days before the event.

Documents are available in alternative formats upon request. [Learn more about ADA Compliance](#)

[Provide feedback about modernized Phoenix.gov](#)

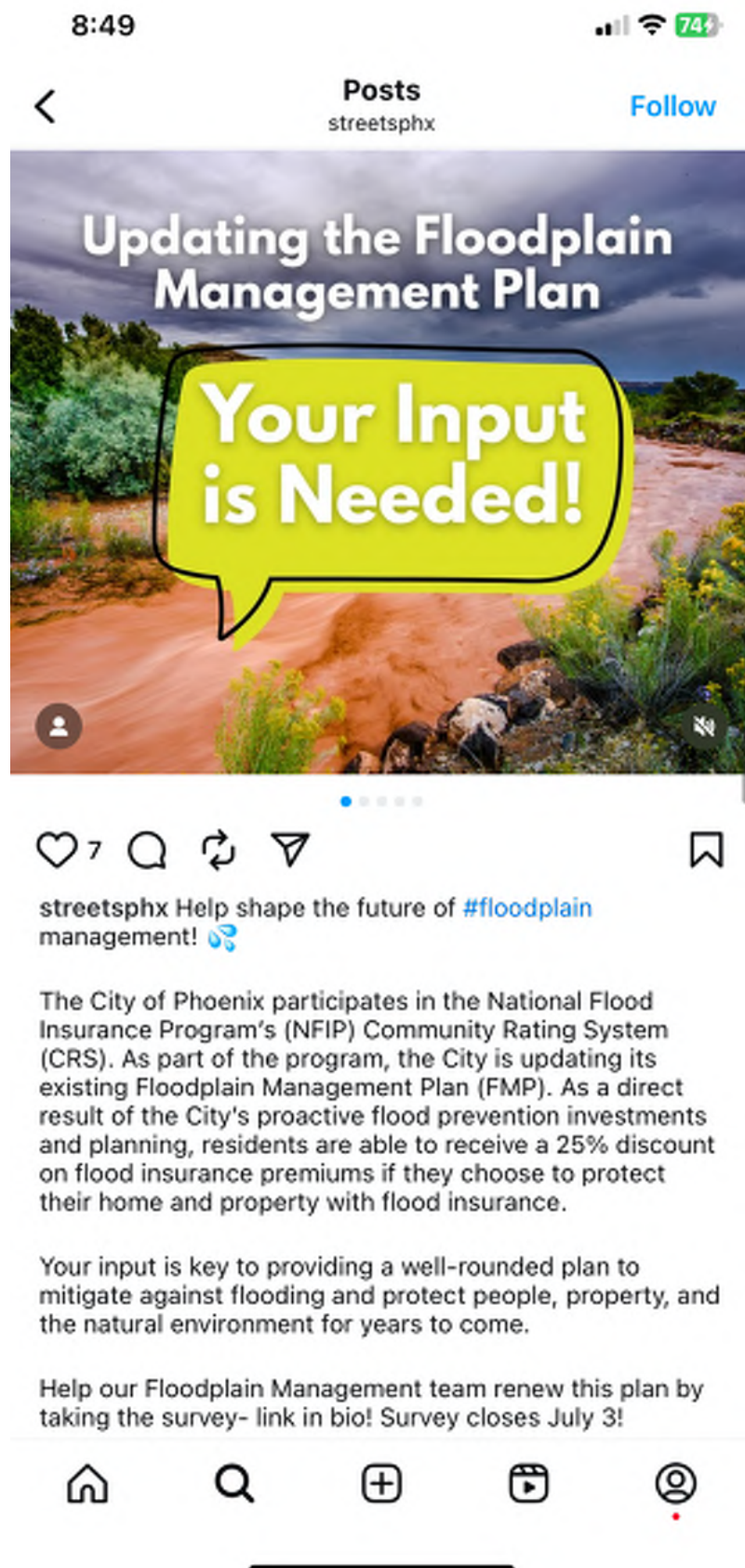
Follow Us

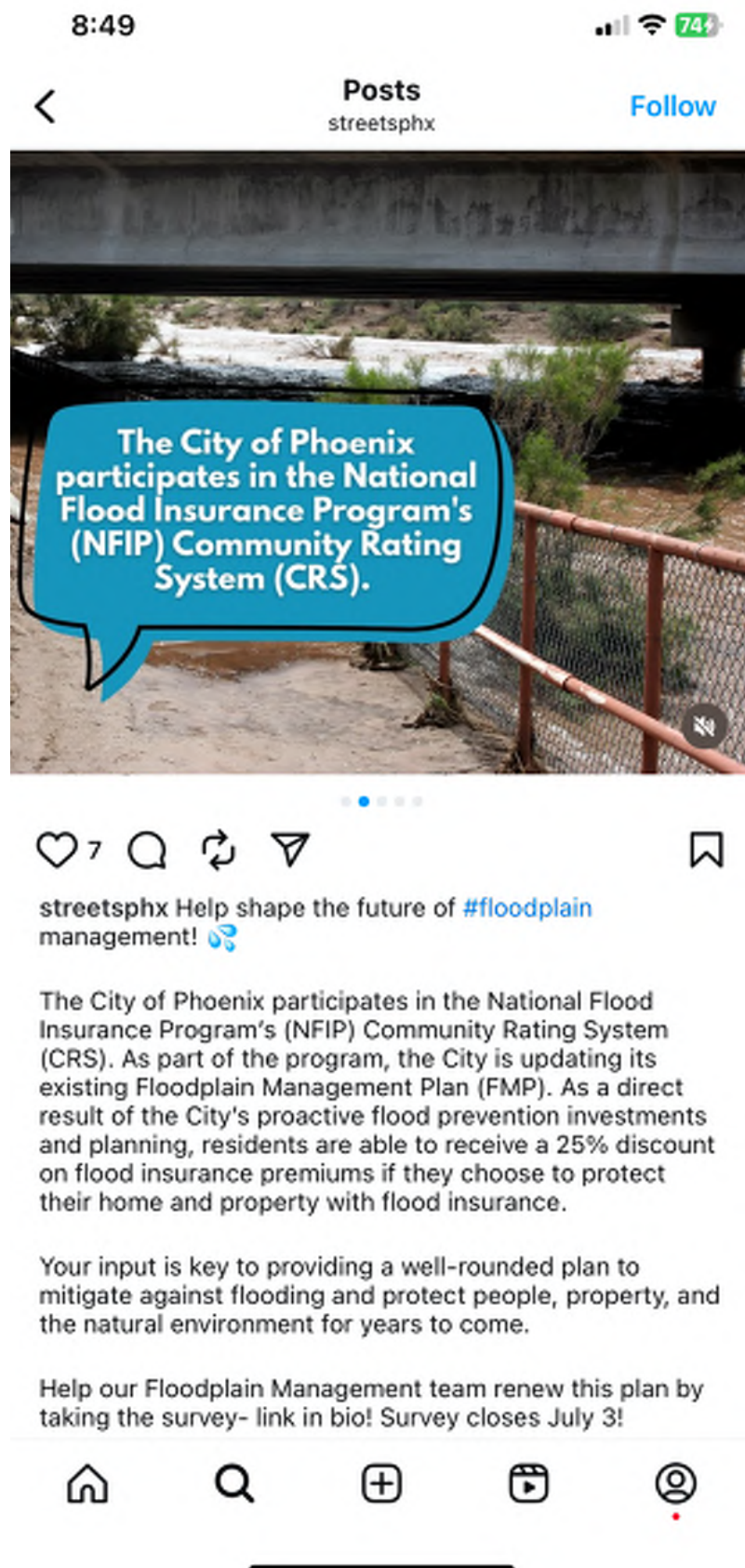
Department Social Media Accounts

© 2025 **City of Phoenix:** All rights reserved and disclaimers. Review our privacy policy and statement of commitment. **For Employees:** eCHRIS login.



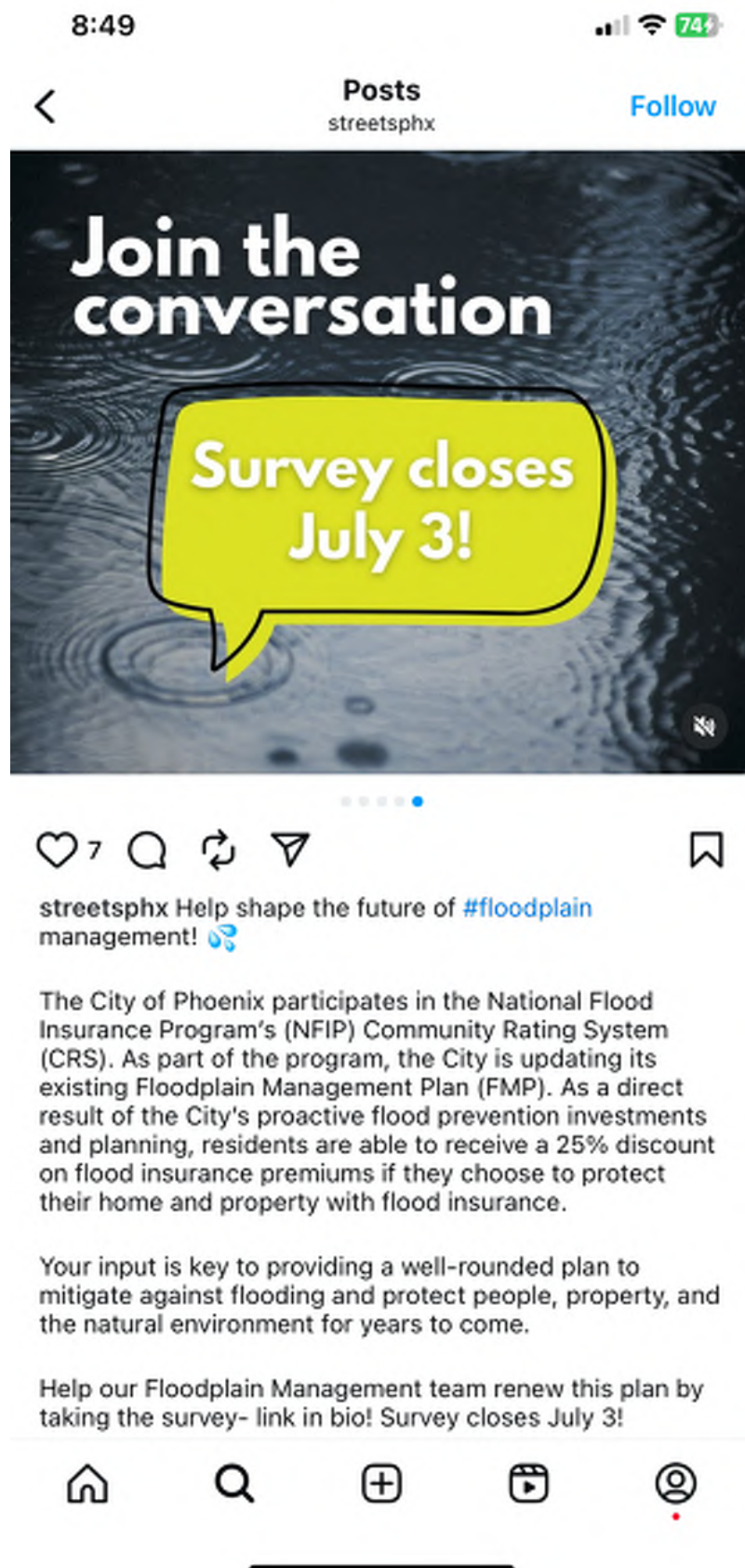


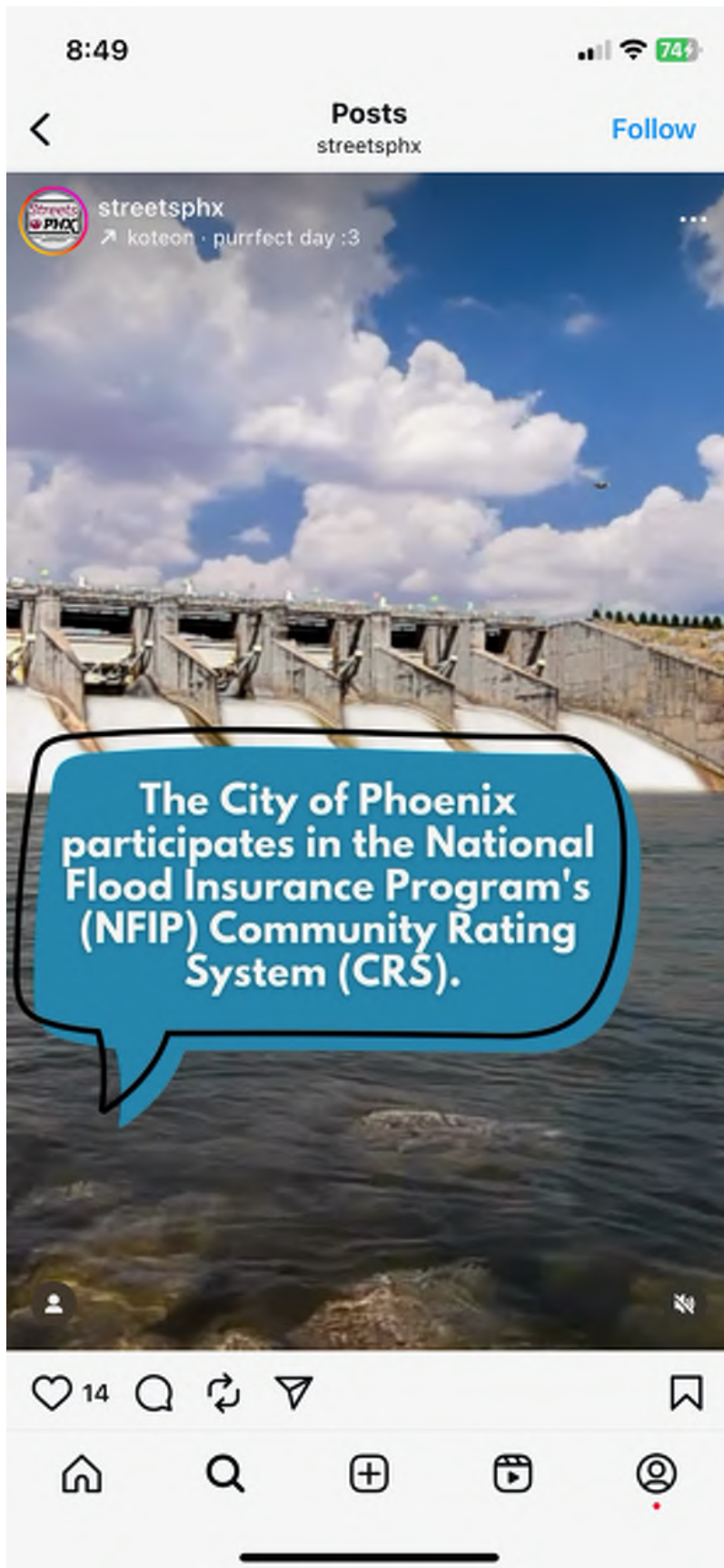


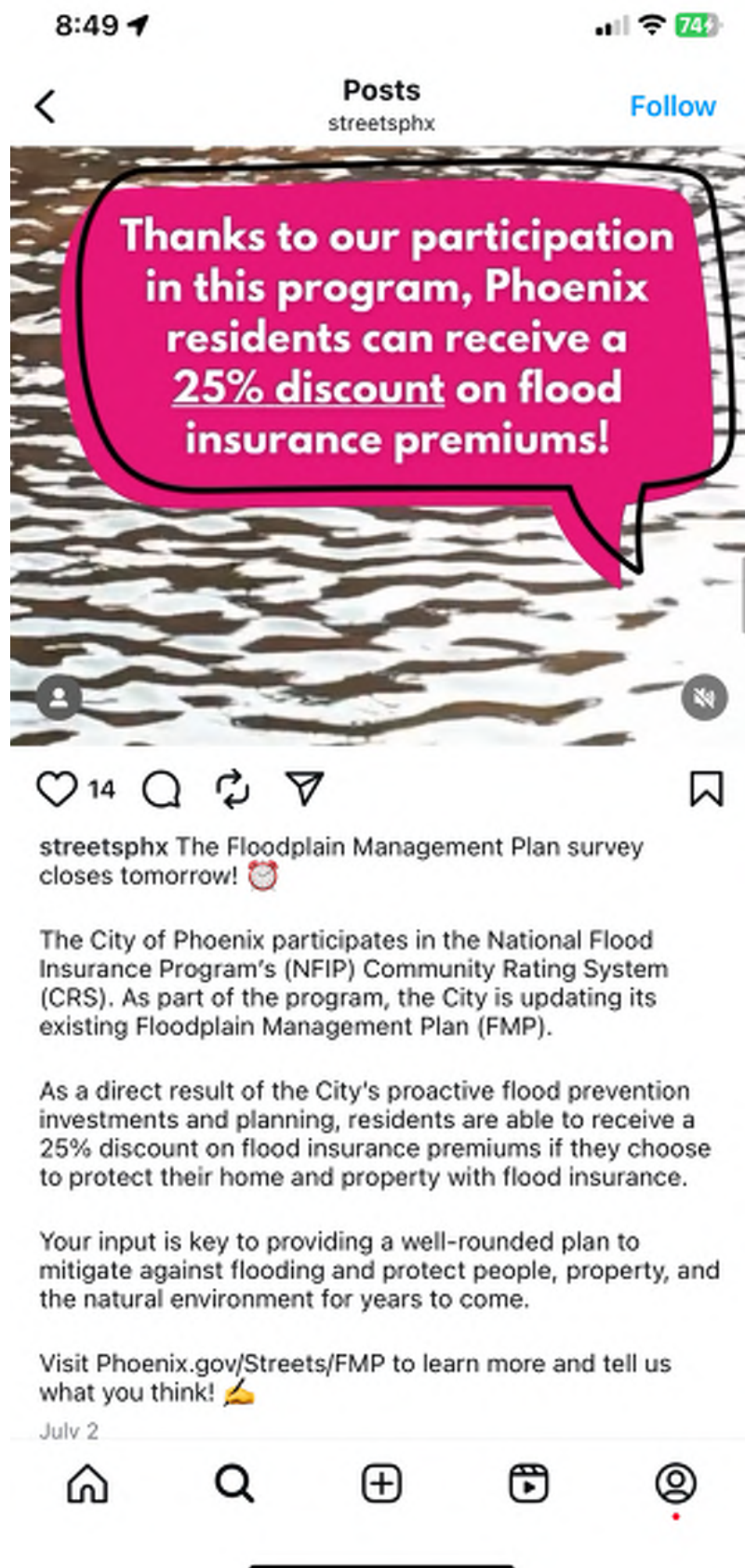














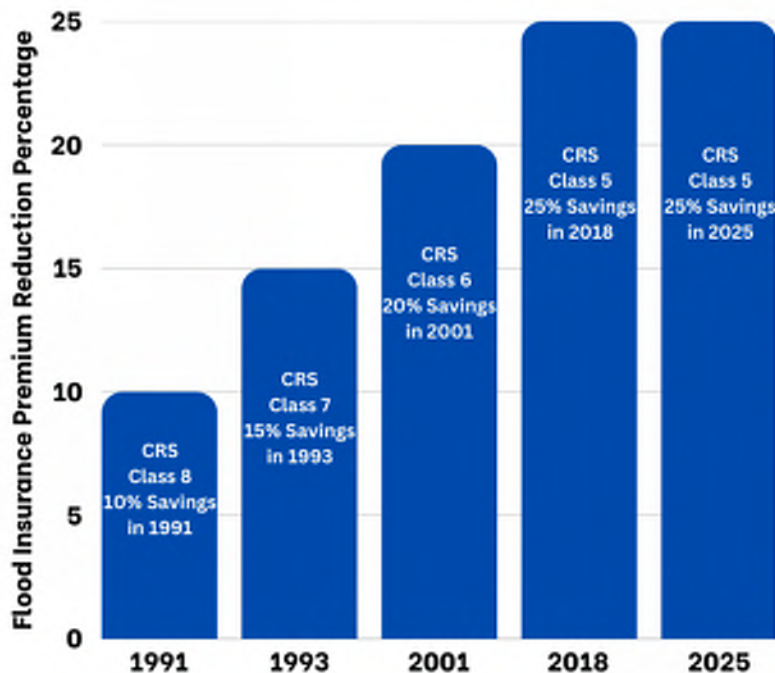
City of Phoenix Floodplain Management Plan FACT SHEET

What is a Floodplain Management Plan?

The Floodplain Management Plan is an overall strategy of programs, projects and measures aimed at reducing the adverse impacts of flood hazards on the community. This plan identifies flood risks, their impact on the community, and a prioritized action plan for reducing flood risks. The National Flood Insurance Program (NFIP) requires the city to review this plan annually.

What are the benefits of this plan?

- Prioritizes flood management activities.
- Identifies improvement projects to reduce flooding risks.
- Educates the public and increases local awareness of flooding risks.
- Creates successful partnerships with local, county and government agencies.
- Strengthens the opportunity for resident cost savings on flood insurance premiums.
 - Residents currently benefit from a **25% reduction** in flood insurance premiums for policies located both in and out of a FEMA Special Flood Hazard Area.



A lower CRS Class from the NFIP indicates better planning, preparedness and mitigation, which results in a discounted rate for property owners who purchase flood insurance.

PLAN PURPOSE & NEED

- Meets the Federal Emergency Management Agency (FEMA) NFIP guidelines under the Flood Insurance Administration
- Reflects the City's floodplain management efforts which contribute to the class rating.
- Strengthens the support and opportunity for resident cost savings on flood insurance premiums.

How can you contribute?

We seek your input for the City's Floodplain Management Plan. Your input is key to providing a well-rounded plan to mitigate against flooding and protect people, property, and the natural environment.

Please complete the public survey by visiting www.surveymonkey.com/r/QDP2WZ3 or scan the QR code below.



Join the virtual public meeting on May 22, 2025 at 6 PM www.phoenix.gov/streets/meetings or scan the QR code below.

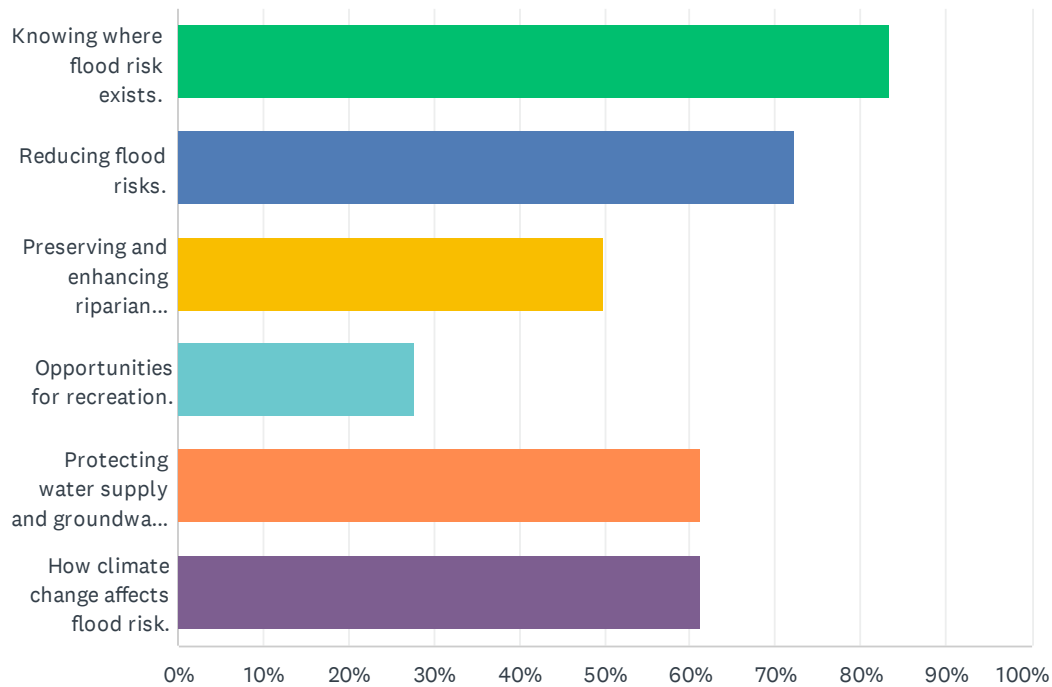


Visit the City's Floodplain Management Plan webpage www.phoenix.gov/streets/fmp.html or scan the QR code below.



Q1 What floodplain issues are important to you? Check all that apply.

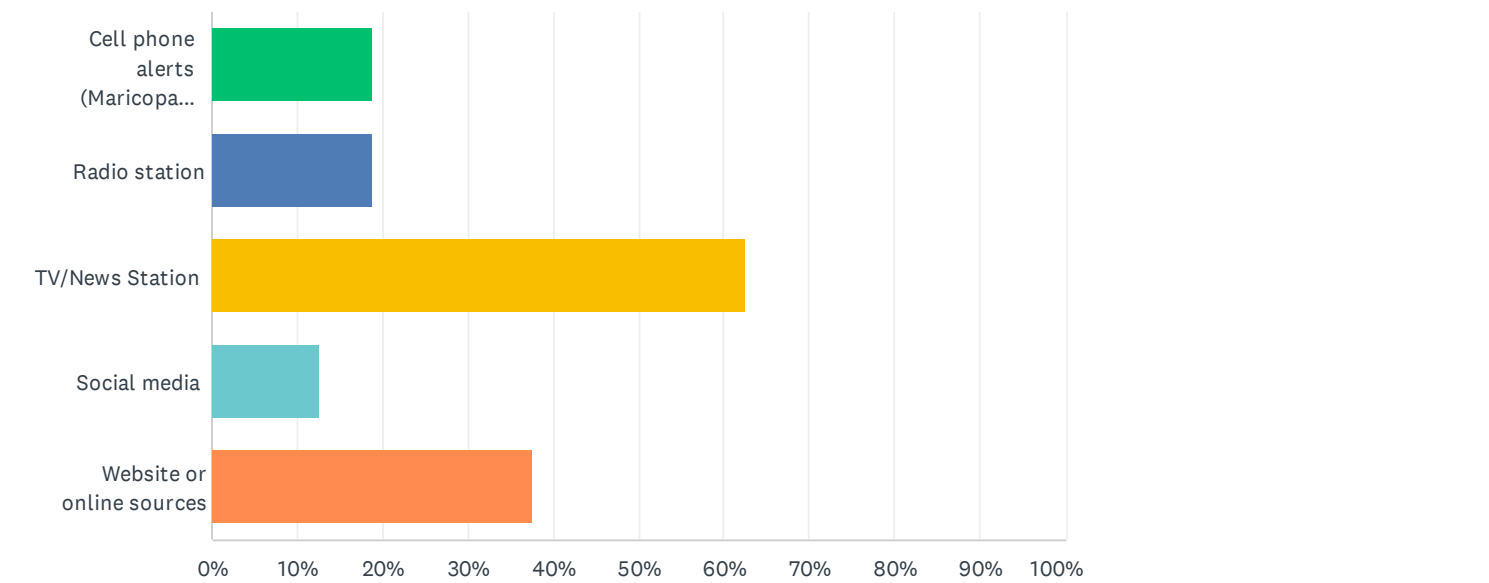
Answered: 18 Skipped: 0



ANSWER CHOICES	RESPONSES	
Knowing where flood risk exists.	83.33%	15
Reducing flood risks.	72.22%	13
Preserving and enhancing riparian habitat.	50.00%	9
Opportunities for recreation.	27.78%	5
Protecting water supply and groundwater recharge.	61.11%	11
How climate change affects flood risk.	61.11%	11
Total Respondents: 18		

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

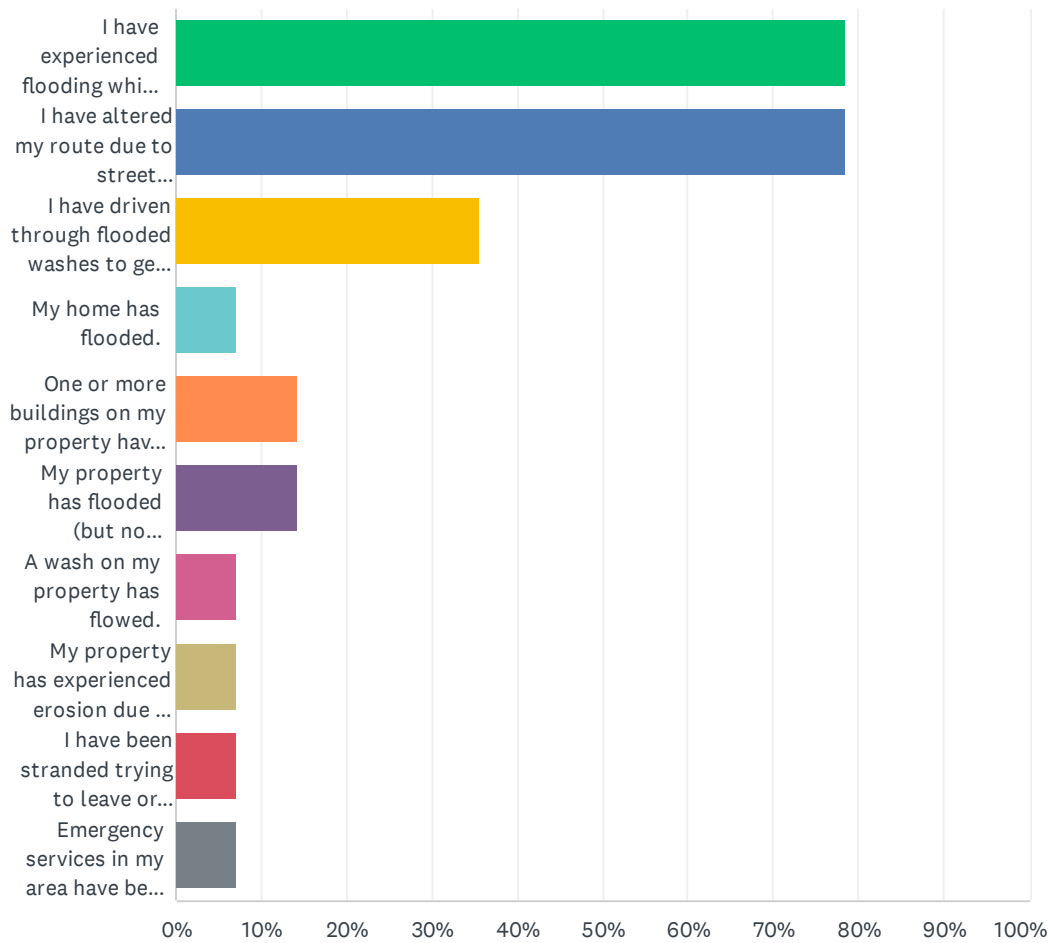
Answered: 16 Skipped: 2



ANSWER CHOICES	RESPONSES	
Cell phone alerts (Maricopa County RAVE)	18.75%	3
Radio station	18.75%	3
TV/News Station	62.50%	10
Social media	12.50%	2
Website or online sources	37.50%	6
Total Respondents: 16		

Q3 What flooding situations have you experienced? Check all that apply.

Answered: 14 Skipped: 4



2025 Floodplain Management Plan Survey

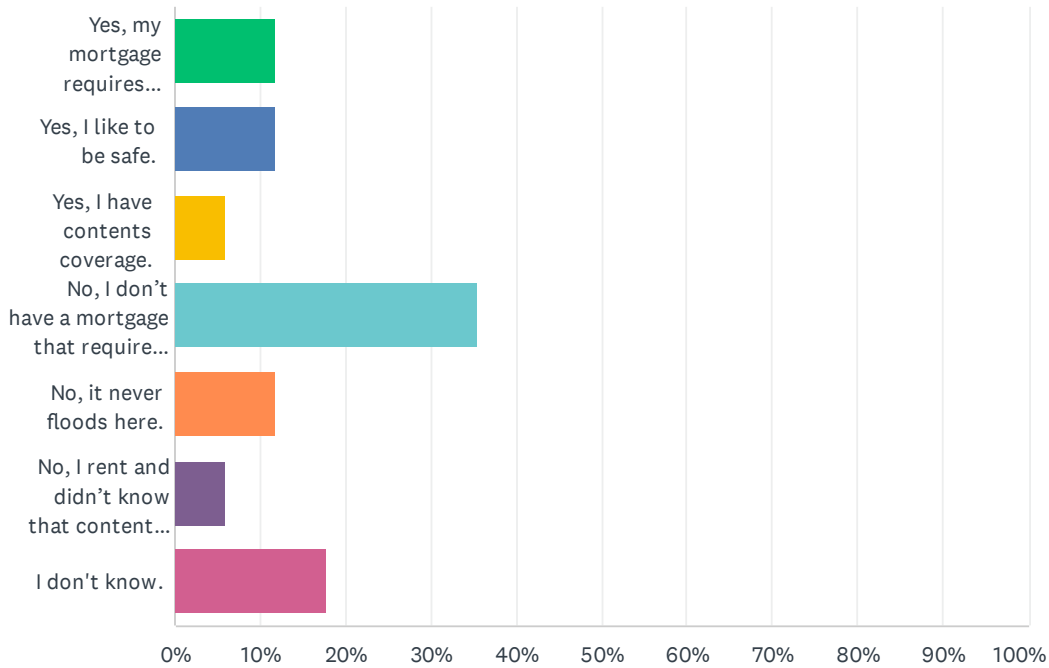
ANSWER CHOICES	RESPONSES	
I have experienced flooding while driving.	78.57%	11
I have altered my route due to street flooding.	78.57%	11
I have driven through flooded washes to get to my destination.	35.71%	5
My home has flooded.	7.14%	1
One or more buildings on my property have flooded.	14.29%	2
My property has flooded (but no buildings).	14.29%	2
A wash on my property has flowed.	7.14%	1
My property has experienced erosion due to flooding.	7.14%	1
I have been stranded trying to leave or return home due to flooding.	7.14%	1
Emergency services in my area have been delayed due to flooding.	7.14%	1
Total Respondents: 14		

Q4 Please describe any other flooding hazards or drainage problems that occur in your area. Provide cross streets closest to the area of concern.

Answered: 11 Skipped: 7

Q5 Do you have flood insurance?

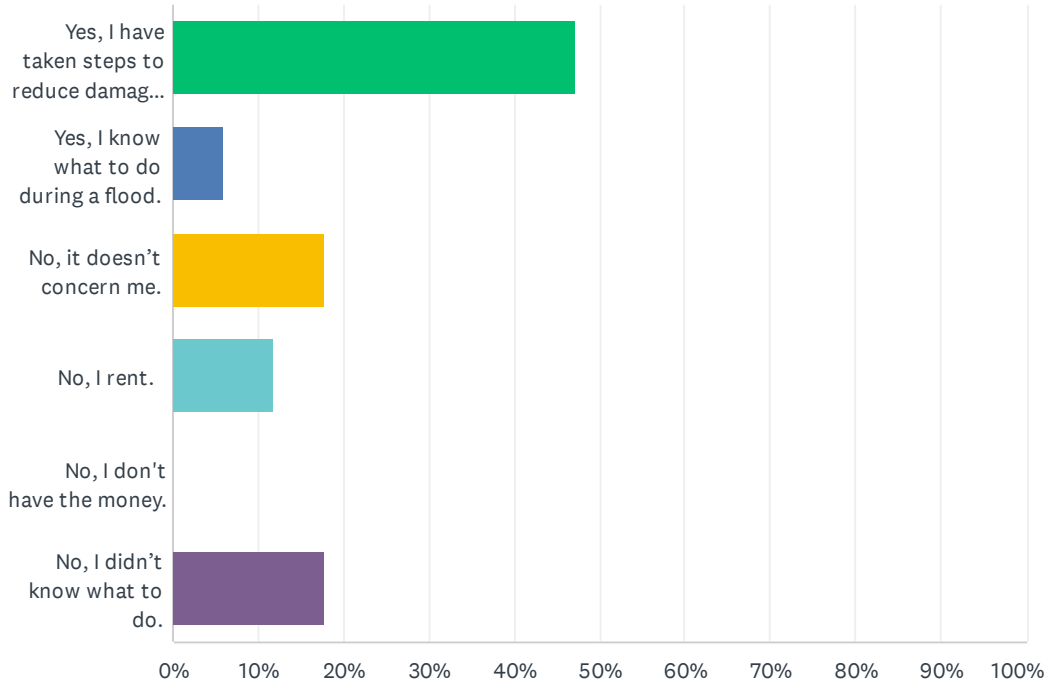
Answered: 17 Skipped: 1



ANSWER CHOICES	RESPONSES	
Yes, my mortgage requires building coverage.	11.76%	2
Yes, I like to be safe.	11.76%	2
Yes, I have contents coverage.	5.88%	1
No, I don't have a mortgage that requires it.	35.29%	6
No, it never floods here.	11.76%	2
No, I rent and didn't know that contents coverage was available.	5.88%	1
I don't know.	17.65%	3
TOTAL		17

Q6 Have you taken steps to reduce the impacts of flooding on your property and/or prepared for flooding?

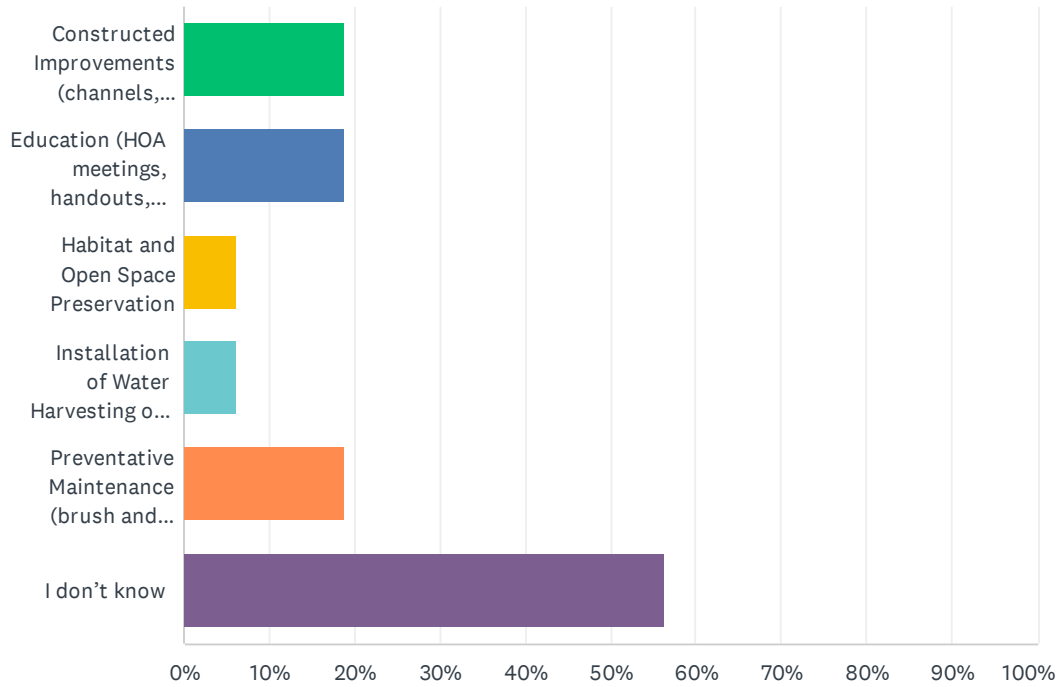
Answered: 17 Skipped: 1



ANSWER CHOICES	RESPONSES	
Yes, I have taken steps to reduce damages to my property.	47.06%	8
Yes, I know what to do during a flood.	5.88%	1
No, it doesn't concern me.	17.65%	3
No, I rent.	11.76%	2
No, I don't have the money.	0.00%	0
No, I didn't know what to do.	17.65%	3
TOTAL		17

Q7 What steps have been taken in your area or neighborhood to reduce flood risk? Check all that apply.

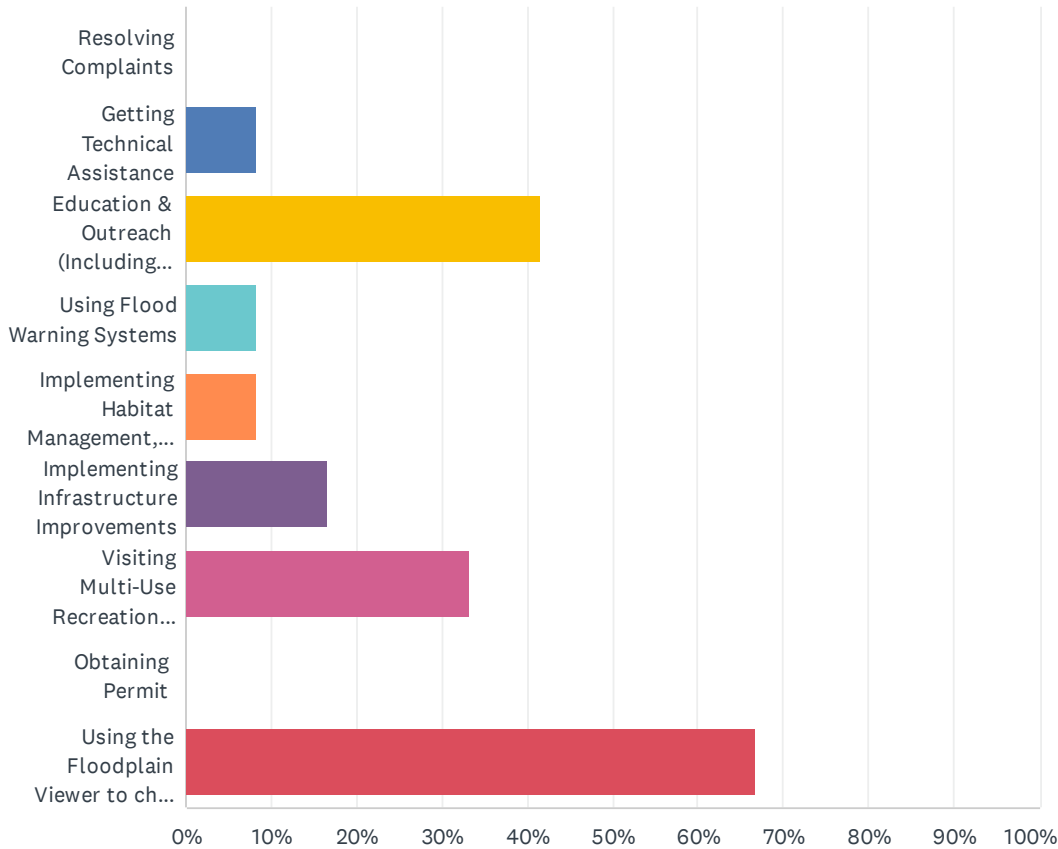
Answered: 16 Skipped: 2



ANSWER CHOICES	RESPONSES	
Constructed Improvements (channels, culverts, crossings, and erosion control)	18.75%	3
Education (HOA meetings, handouts, public events)	18.75%	3
Habitat and Open Space Preservation	6.25%	1
Installation of Water Harvesting or Other Green Infrastructure	6.25%	1
Preventative Maintenance (brush and debris removal)	18.75%	3
I don't know	56.25%	9
Total Respondents: 16		

Q8 Which of the following activities in which you have participated? Check all that apply.

Answered: 12 Skipped: 6



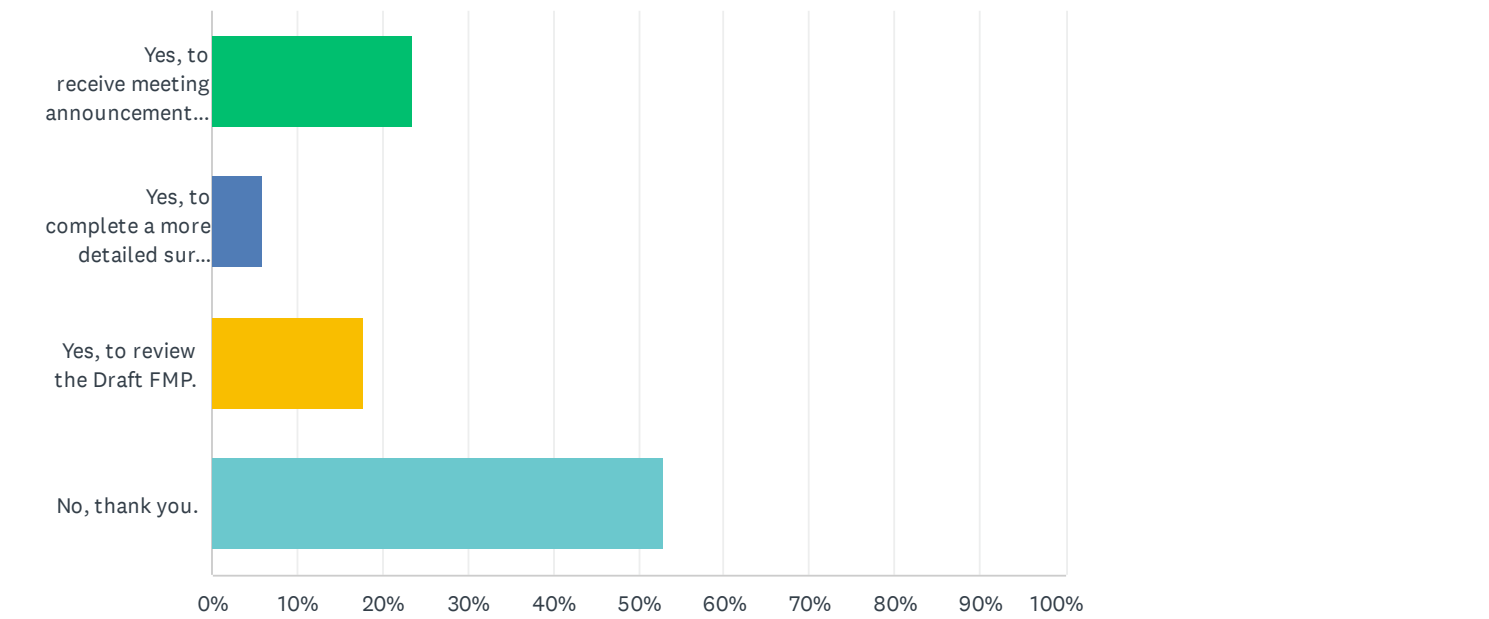
ANSWER CHOICES	RESPONSES	
Resolving Complaints	0.00%	0
Getting Technical Assistance	8.33%	1
Education & Outreach (Including attending project meetings and workshops.) Using Flood Maps & Studies, or Obtaining Elevation Certificates	41.67%	5
Using Flood Warning Systems	8.33%	1
Implementing Habitat Management, Water Harvesting and Green Infrastructure	8.33%	1
Implementing Infrastructure Improvements	16.67%	2
Visiting Multi-Use Recreation Sites	33.33%	4
Obtaining Permit	0.00%	0
Using the Floodplain Viewer to check if your home is in a FEMA designated floodplain?	66.67%	8
Total Respondents: 12		

Q9 Is there anything else you would like us to know to help shape the Floodplain Management Plan?

Answered: 5 Skipped: 13

Q10 Would you be interested in participating further in the Floodplain Management Plan process?

Answered: 17 Skipped: 1



ANSWER CHOICES	RESPONSES	
Yes, to receive meeting announcements and project update emails.	23.53%	4
Yes, to complete a more detailed survey about flood hazard awareness and management preferences.	5.88%	1
Yes, to review the Draft FMP.	17.65%	3
No, thank you.	52.94%	9
TOTAL		17

Q11 Please provide your email address.

Answered: 16 Skipped: 2

ANSWER CHOICES	RESPONSES	
Name	0.00%	0
Company	0.00%	0
Address	0.00%	0
Address 2	0.00%	0
City/Town	0.00%	0
State/Province	0.00%	0
ZIP/Postal Code	0.00%	0
Country	0.00%	0
Email Address	100.00%	16
Phone Number	0.00%	0

2025 FLOODPLAIN MANAGEMENT PLAN

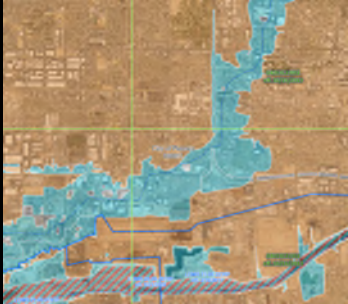
Public meeting:
April 23, 2025



1

PROJECT TEAM

Nazar Nabaty – Floodplain Administrator/Floodplain Group Manager
Ryan Bentz – Project Manager
Nick Ramirez – Principal Engineering Tech
Matt Hann – Consultant (Black & Veatch)
Zaria Sanchez – Consultant (Black & Veatch)



2

MEETING AGENDA

- National Flood Insurance Program
- Community Rating System
- What is the Floodplain Management Plan?
- Floodplain Management Plan Development
- Timeline
- How can you get involved?
- Q&A



3

3

NATIONAL FLOOD INSURANCE PROGRAM (NFIP)

- National Flood Insurance Act of 1968
 - Reducing future flood damage
 - Protecting property owners
- Mapping
- Flood Insurance
- Regulations
- Community Rating System (CRS)



4

4

COMMUNITY RATING SYSTEM (CRS)

- Voluntary Incentive Program
- Above and beyond the NFIP minimum requirements
- Incentives for flood insurance premiums
- Phoenix - Class 5 Community (25% Flood Insurance Premium Reduction)

CRS Classes and Discount Table

CRS Class	10	9	8	7	6	5	4	3	2	1
CRS Discount (Premium Reduction)	0%	5%	10%	15%	20%	25%	30%	35%	40%	45%

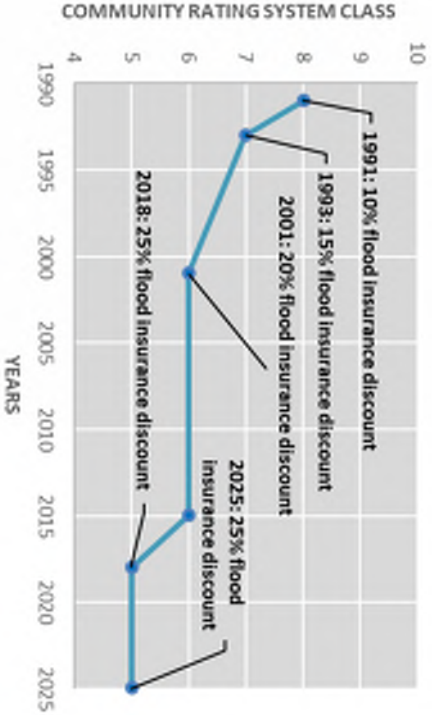


5

CRS Classes and Discount Table

CRS Class	10	9	8	7	6	5	4	3	2	1
CRS Discount (Premium Reduction)	0%	5%	10%	15%	20%	25%	30%	35%	40%	45%

Phoenix Community Rating System (CRS) History



6

6

FLOODPLAIN MANAGEMENT PLAN (FMP) OVERVIEW

- Part of the Community Rating System
- Identifies flood hazards
- Sets goals
- Provides recommendations to address the City's vulnerability to flooding
- Updates existing Floodplain Management Plan
 - As required by Community Rating System



Figure 11 - FEMA FIS Figure 1 FEMA - Figure 1. Looking downstream on the Salt River
During the December 1955 Flood (50yr Return Interval) August surveys are in the center.)



7

7

FLOODPLAIN MANAGEMENT PLAN (FMP) COMMITTEE

- Development of the 2025 Phoenix Floodplain Management Plan was supported by the following:
 - Arizona Department of Emergency and Military Affairs
 - Arizona Department of Transportation
 - Arizona Department of Water Resources
 - Arizona State Land Department
 - Flood Control District of Maricopa County
 - Maricopa County Department of Emergency Management
 - National Weather Service / National Oceanic and Atmospheric Administration
 - City of Phoenix Residents



8

8

FLOODPLAIN MANAGEMENT PLAN (FMP) DEVELOPMENT STEPS

- Step 1 – Organize
- Step 2 – Involve the Public
- Step 3 – Coordinate
- **Step 4 – Assess the Hazard (FMP Committee Meeting #1)**
- **Step 5 – Assess the Problem (FMP Committee Meeting #2)**
- **Step 6 – Set Goals (FMP Committee Meeting #3)**
- **Step 7 – Review Possible Actions (FMP Committee Meeting #4)**
- **Step 8 – Draft an Action Plan (FMP Committee Meeting #5)**
- Step 9 – Adopt a Plan
- Step 10 – Implement, Evaluate, and Revise



9

2025 FLOODPLAIN MANAGEMENT PLAN (FMP) HAZARDS IDENTIFIED

- Special Flood Hazard Areas (Floodplains)
- Alluvial Fans
- Transitions from Mountain to Urban
- Dams and Levees
- Other Non-Flood Related Hazards
 - Wildfires
 - Drought
 - Funding



10

10

2025 FLOODPLAIN MANAGEMENT PLAN (FMP) GOALS

- **Educate** public, policy makers, and City leaders on stormwater and floodplain management and risks
- **Coordinate** with other jurisdictions and agencies to mitigate flooding hazards and improve emergency response
- **Reduce the danger of flood hazards** to people, property, critical infrastructure/facilities, and natural resources
- Establish **proactive maintenance and preventative measures** for stormwater infrastructure
- Utilize **public funding** in the most effective manner for stormwater and floodplain management



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2025 FLOODPLAIN MANAGEMENT PLAN (FMP) ACTION ITEMS

- **Currently Under Development and Finalization**
- Will address FMP Goals previously provided and will also focus on the following:
 - Preventive
 - Property Protection
 - Natural Resource Protection
 - Emergency Services
 - Structural Projects (e.g., Storm drains, channels)
 - Public Information



12

12



13



14



QUESTIONS...?





FMP Public
Survey



City's FMP
Webpage



15

April 23, 2025 - South Mountain and Laveen Chamber of Commerce Attendance List

FMP Neighborhood Association Presentation

1	Timestamp	Name	Email	Address	Phone number	Would you like to received our new
2	2/26/2025 18:15:22	Myrtle Hall	myrtlehalla@realestate@	2424 W. Park Street Pho	602-881-2702	Yes
3	2/26/2025 18:15:34	Charity Tovar	Charity@charitysplumbi	3930 W Estes Way Lave	6024009649	Yes
4	2/26/2025 18:24:47	Julie Starkey	Jstarkey@laveeneld.org	5001 west Dobbins road	6022379100	Yes
5	2/26/2025 18:25:47	Sydney Zimmerman	srzimmerman.work@gn	13421 N 43rd Ave Apt 3	5632999392	Yes
6	3/26/2025 18:01:01	Doug Meyer	meyer@alacoyotes.org	6036 S 27th Ave, Phoeni	6026260084	Yes
7	2/26/2025 18:31:23	Victor Miranda	Topqualitytintandblinds	5542 W Winston Dr	6027140124	Yes
8	2/26/2025 18:32:56	Marc Sutton	marc.sutton@oyla.org	5449 W. Allen St , Lavee	602-570-0502	Yes
9	2/26/2025 18:33:37	Herman Loreda	h.loreda@globalcu.org	5008 S 21st PL Phoenix,	6025313657	Yes
10	2/26/2025 18:34:26	Noemi Ortiz	noemi.ortiz@desertfinar	5140 w Baseline rd Lave	6026959039	Yes
11	2/26/2025 18:35:42	Fabian Pena	Fabian.Pena@desertfinar	3230 E Baseline Rd Ste 1	6026959077	Yes
12	2/26/2025 18:45:24	Isaac Salas	isaac@cesargraphics.cc	2610 w. Baseline rd.	6028286460	Yes
13	3/26/2025 17:51:06	Jennifer Armenta	jennya@c4mechanical	6909 w. Melody dr Lave	6026153876	Yes
14	2/26/2025 18:50:44	BRANDON HAMPTON	Brandon@GameDayRea	2030 W Baseline Road S	3106295777	Yes
15	3/26/2025 17:27:34	Rashawn Richardson	richardson@electservices	4108 w Lydia Ln.	4804527015	Yes
16	3/26/2025 17:30:22	Valencia Lee	valencia.r.lee@gmail.coi	7310 s 55th Ln Laveen, A	4807101063	Yes
17	3/26/2025 17:32:11	Jacqueline Alvarado	jacque.jcrealty@gmail.c	6831 S 64th Ave	602-451-0919	Yes
18	3/26/2025 17:33:59	Christina Lombardo	christinalombardo14@g	309 E La Mirada Dr, Pho	6029996375	Yes
19	3/26/2025 17:42:55	Shay Sanchez	sheila.sanchez@usbank	34 W Pueblo Ave phoeni	4805275623	Yes
20	3/26/2025 17:48:09	Gabriel Rubalcaba	gabe@phoenixsolarclea	5703 W Lydia Ln	6232467465	Yes
21	3/26/2025 17:51:10	Michael Okonkwo	michaelo@pinnacleheal	5216 south 17th street	4806038059	Yes
22	3/26/2025 17:51:26	Andrew Simek	andrewsimekaz@gmail.	3770 N 7th St Phoenix A	6232033232	Yes
23	3/26/2025 17:52:03	Ariana	Info@gryathglass.com	4809 W Lydia Ln laveen	480-492-1138	Yes
24	4/23/2025 17:44:17	Matthew Hann	hammm@bv.com	1027 East Seldon Lane	6023814445	No
25	4/23/2025 17:48:15	Christina Lombardo	christinalombardo14@g	309 E La Mirada Dr.	6028991769	Yes
26	4/23/2025 17:51:47	Novlet Simonette	info@stepbystepconsult	3427 W T Ryan Ln	6016307735	Yes
27	4/23/2025 18:44:58	Jeanette Arnds	REDEEMNEIGHBORHOOC	5413 W Apollo rd laveen	6027728313	Yes
28	4/23/2025 18:45:09	Tyler Bruce	tyler_bruce@us.afac.co	124 W Milada Drive	7739091807	Yes
29	4/23/2025 18:45:19	Ariana and Ivan	Info@gryathglass.com	4809 W Lydia Lane Lave	602-410-0605	Yes
30	4/24/2025 12:18:10	Nazar Nabaty	nnabaty@gmail.com	27605 N 74 St		No



APPENDIX B. STAKEHOLDER OUTREACH MATERIALS

DRAFT

Step 3: Coordinate - Stakeholder Outreach

Flood Control District of Maricopa County Outreach Meeting – 3/19/2025 at 2:00pm

Kathryn Gross - FCDMC

Matt Hann – Black & Veatch (on behalf of the City of Phoenix)

- Do you have any recent, ongoing, or future projects related to stormwater, flooding, or floodplains adjacent to or with the City of Phoenix?
 - Numerous projects have been completed.
 - Ongoing – Metro Phoenix ADMS/P Update
 - Support for Hohokam Flood Mitigation Project
 - Dam safety for the dams surrounding City of Phoenix – annual exercises for response
 - Small Project Assistance Program
- Is there any data or information that can be shared related to the project(s)?
 - Working in direct partnership with City of Phoenix.
- What are/will be the completion date(s) of the project(s)?
 - Metro Phoenix ADMS/P should be completed within the next two years
- Would you like to be notified of when the Draft Floodplain Management Plan for the City of Phoenix is ready for stakeholder and public review?
 - Yes.

Step 3: Coordinate - Stakeholder Outreach

NOAA/NWS Outreach Meeting – 3/28/2025 at 11:30am

Mike Schaffner – NOAA/NWS

Matt Hann – Black & Veatch (on behalf of the City of Phoenix)

- Do you have any recent, ongoing, or future projects related to stormwater, flooding, or floodplains adjacent to or with the City of Phoenix?
 - Constantly working to improve thresholds for warnings and situational awareness for municipalities and agencies.
- Is there any data or information that can be shared related to the project(s)?
 - All information is provided publicly.
- What are/will be the completion date(s) of the project(s)?
 - Ongoing and improving.
- Would you like to be notified of when the Draft Floodplain Management Plan for the City of Phoenix is ready for stakeholder and public review?
 - Yes. Tom Frieders will be stepping in to support.

Step 3: Coordinate - Stakeholder Outreach

Arizona Department of Transportation Outreach Meeting – 4/3/2025 at 9:00am

Robert Guerrero - ADOT

Matt Hann; Zaria Sanchez – Black & Veatch (on behalf of the City of Phoenix)

- Do you have any recent, ongoing, or future projects related to stormwater, flooding, or floodplains adjacent to or with the City of Phoenix?
 - I-17 Storm Drain project Greenway to ACDC Canal.
 - Broadway Curve.
 - Loop 101 Widening.
 - Scatter Wash maintenance – annual frequency taken care of prior to monsoon season.
 - New River and Deadman Wash Levee inspections completed annually. Completing a more detailed 5-year inspection currently.
 - Future private development around Loop 101 near Desert Ridge that will require coordination with ADOT.
 - Working with Phoenix Water Services Department for storm drain outlet for 23rd Avenue treatment plant as it shares an outfall with ADOT.
- Is there any data or information that can be shared related to the project(s)?
 - Work directly with the City for coordination over the next 5-years.
- What are/will be the completion date(s) of the project(s)?
 - I-17 Storm Drain project Greenway to ACDC Canal has been completed.
 - Broadway Curve to be complete in 2025.
 - Loop 101 Widening 75th Avenue estimated to be completed in early 2027.
- Would you like to be notified of when the Draft Floodplain Management Plan for the City of Phoenix is ready for stakeholder and public review?
 - Yes. Want to be aware of how this may impact ADOT.

Step 3: Coordinate - Stakeholder Outreach

Central Arizona Conservation Alliance Outreach Meeting – 4/2/2025 at 2:30pm

Challie Facemire - CAZCA

Matt Hann; Zaria Sanchez – Black & Veatch (on behalf of the City of Phoenix)

- Do you have any recent, ongoing, or future projects related to stormwater, flooding, or floodplains adjacent to or with the City of Phoenix?
 - No recent, ongoing, or future projects within the City of Phoenix. Have a web map natural resource infrastructure viewer to support educating the public.
 - https://web.tplgis.org/cazca_plan/
- Is there any data or information that can be shared related to the project(s)?
 - N/A
- What are/will be the completion date(s) of the project(s)?
 - N/A
- Would you like to be notified of when the Draft Floodplain Management Plan for the City of Phoenix is ready for stakeholder and public review?
 - Yes.

Step 3: Coordinate - Stakeholder Outreach

Arizona Department of Water Resources Outreach Meeting – 4/8/2025 at 2:30pm

Brian Cosson - ADWR

Matt Hann; Zaria Sanchez – Black & Veatch (on behalf of the City of Phoenix)

- Do you have any recent, ongoing, or future projects related to stormwater, flooding, or floodplains adjacent to or with the City of Phoenix?
 - None.
- Is there any data or information that can be shared related to the project(s)?
 - N/A
- What are/will be the completion date(s) of the project(s)?
 - N/A
- Would you like to be notified of when the Draft Floodplain Management Plan for the City of Phoenix is ready for stakeholder and public review?
 - Yes.

Step 3: Coordinate - Stakeholder Outreach

City of Scottsdale Outreach Meeting – 4/3/2025 at 3:00pm

Hasan Mushtaq – City of Scottsdale

Matt Hann; Zaria Sanchez – Black & Veatch (on behalf of the City of Phoenix)

- Do you have any recent, ongoing, or future projects related to stormwater, flooding, or floodplains adjacent to or with the City of Phoenix?
 - Recently completed – Rawhide Wash Flood Hazard Mitigation Project – channelization, new levees and embankments, and floodplain delineation updates are pending.
- Is there any data or information that can be shared related to the project(s)?
 - Rawhide Wash was a tri-party project with Phoenix, Scottsdale, and Flood Control District of Maricopa County
- What are/will be the completion date(s) of the project(s)?
 - Completed – February 2025
- Would you like to be notified of when the Draft Floodplain Management Plan for the City of Phoenix is ready for stakeholder and public review?
 - Yes.

Step 3: Coordinate - Stakeholder Outreach

Town of Paradise Valley Outreach Meeting – 4/10/2025 at 3:00pm

Shar Johnson – Town of Paradise Valley

Matt Hann; Zaria Sanchez – Black & Veatch (on behalf of the City of Phoenix)

- Do you have any recent, ongoing, or future projects related to stormwater, flooding, or floodplains adjacent to or with the City of Phoenix?
 - Town is currently development a Stormwater Master Plan.
- Is there any data or information that can be shared related to the project(s)?
 - Yes, potentially there is information to share.
- What are/will be the completion date(s) of the project(s)?
 - Stormwater Master Plan anticipated completion is June 30, 2025.
- Would you like to be notified of when the Draft Floodplain Management Plan for the City of Phoenix is ready for stakeholder and public review?
 - Yes.

Step 3: Coordinate - Stakeholder Outreach

Arizona State Land Department Outreach Meeting – 4/11/2025 at 10:00am

Mark Edelman; Manny Patel - ASLD

Matt Hann – Black & Veatch (on behalf of the City of Phoenix)

- Do you have any recent, ongoing, or future projects related to stormwater, flooding, or floodplains adjacent to or with the City of Phoenix?
 - Paradise Ridge – flood control project.
- Is there any data or information that can be shared related to the project(s)?
 - Working in direct partnership with City of Phoenix.
- What are/will be the completion date(s) of the project(s)?
 - Tentatively completing Paradise Ridge by end of 2027.
- Would you like to be notified of when the Draft Floodplain Management Plan for the City of Phoenix is ready for stakeholder and public review?
 - Yes.

Step 3: Coordinate - Stakeholder Outreach

Arizona Forward Outreach Meeting – 4/14/2025 at 4:00pm

Lori Singleton – Arizona Forward

Matt Hann; Zaria Sanchez – Black & Veatch (on behalf of the City of Phoenix)

- Do you have any recent, ongoing, or future projects related to stormwater, flooding, or floodplains adjacent to or with the City of Phoenix?
 - No.
- Is there any data or information that can be shared related to the project(s)?
 - N/A
- What are/will be the completion date(s) of the project(s)?
 - N/A
- Would you like to be notified of when the Draft Floodplain Management Plan for the City of Phoenix is ready for stakeholder and public review?
 - Yes.

Step 3: Coordinate - Stakeholder Outreach

AZ STORM Outreach Meeting – 4/15/2025 at 1:30pm

Josh Blakey – AZ STORM

Matt Hann – Black & Veatch (on behalf of the City of Phoenix)

- Do you have any recent, ongoing, or future projects related to stormwater, flooding, or floodplains adjacent to or with the City of Phoenix?
 - Ongoing public outreach projects for stormwater pollution and quality at different events around the Valley.
- Is there any data or information that can be shared related to the project(s)?
 - N/A
- What are/will be the completion date(s) of the project(s)?
 - N/A
- Would you like to be notified of when the Draft Floodplain Management Plan for the City of Phoenix is ready for stakeholder and public review?
 - Yes

Step 3: Coordinate - Stakeholder Outreach

Maricopa Department of Transportation Outreach Meeting – 4/16/2025 at 1:00pm

Bassem Naba - MCDOT

Matt Hann; Zaria Sanchez – Black & Veatch (on behalf of the City of Phoenix)

- Do you have any recent, ongoing, or future projects related to stormwater, flooding, or floodplains adjacent to or with the City of Phoenix?
 - No projects that are floodplain related.
- Is there any data or information that can be shared related to the project(s)?
 - N/A
- What are/will be the completion date(s) of the project(s)?
 - N/A
- Would you like to be notified of when the Draft Floodplain Management Plan for the City of Phoenix is ready for stakeholder and public review?
 - Yes.

Step 3: Coordinate - Stakeholder Outreach

Maricopa County Department of Emergency Management Outreach Meeting – 4/29/2025 at 9:30am

Chris Snell – Emergency Management Coordinator

Matt Hann; Zaria Sanchez – Black & Veatch (on behalf of the City of Phoenix)

- Do you have any recent, ongoing, or future projects related to stormwater, flooding, or floodplains adjacent to or with the City of Phoenix?
 - No, MCDEM does not, but there is an SRP project at Bartlett Dam
- Is there any data or information that can be shared related to the project(s)?
 - Just the publicly available information
- What are/will be the completion date(s) of the project(s)?
 - Expected Completion – Mid 2030's
- Would you like to be notified of when the Draft Floodplain Management Plan for the City of Phoenix is ready for stakeholder and public review?
 - Yes



APPENDIX C. MEETING DOCUMENTATION

DRAFT



City of Phoenix
Office of the City Engineer
Floodplain Management
200 West Washington Street, 5th Floor
Phoenix, Arizona, 85003

The City of Phoenix (City) administers the National Flood Insurance Program's (NFIP) Community Rating System for the City. As part of the program, the City is updating its 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.

You have been identified as an important participant in FMP Committee for the 2025 update. As a committee member, you will need to attend all meetings to provide a meaningful contribution by being aware of previous group discussions.

The meetings will be held in **Assembly Room A** at the **Phoenix City Hall, 200 W Washington St, Phoenix, AZ 85003**. Please plan to arrive early to allow time to pass through security and obtain a visitors' badge. There is paid public parking available at the public parking garage at the **305 Garage located at 29 South 4th Avenue** – bring your parking ticket into City Hall for reduced price validation:

Date/Time			Purpose
Wednesday	Jan. 15	9 a.m. – 11:00	Assess the hazard
Wednesday	Feb. 5	9 a.m. – 11:00	Assess the problem
Wednesday	Feb. 26	9 a.m. – 11:00	Set goals
Wednesday	Mar. 19	9 a.m. – 11:00	Review possible activities
Wednesday	Apr. 09	9 a.m. – 11:00	Draft an action plan

Please kindly note that if you are marked as “optional” on this invite, you are assigned as the backup attendee for your department/organization and your attendance is not required, unless the primary attendee is unable to attend.

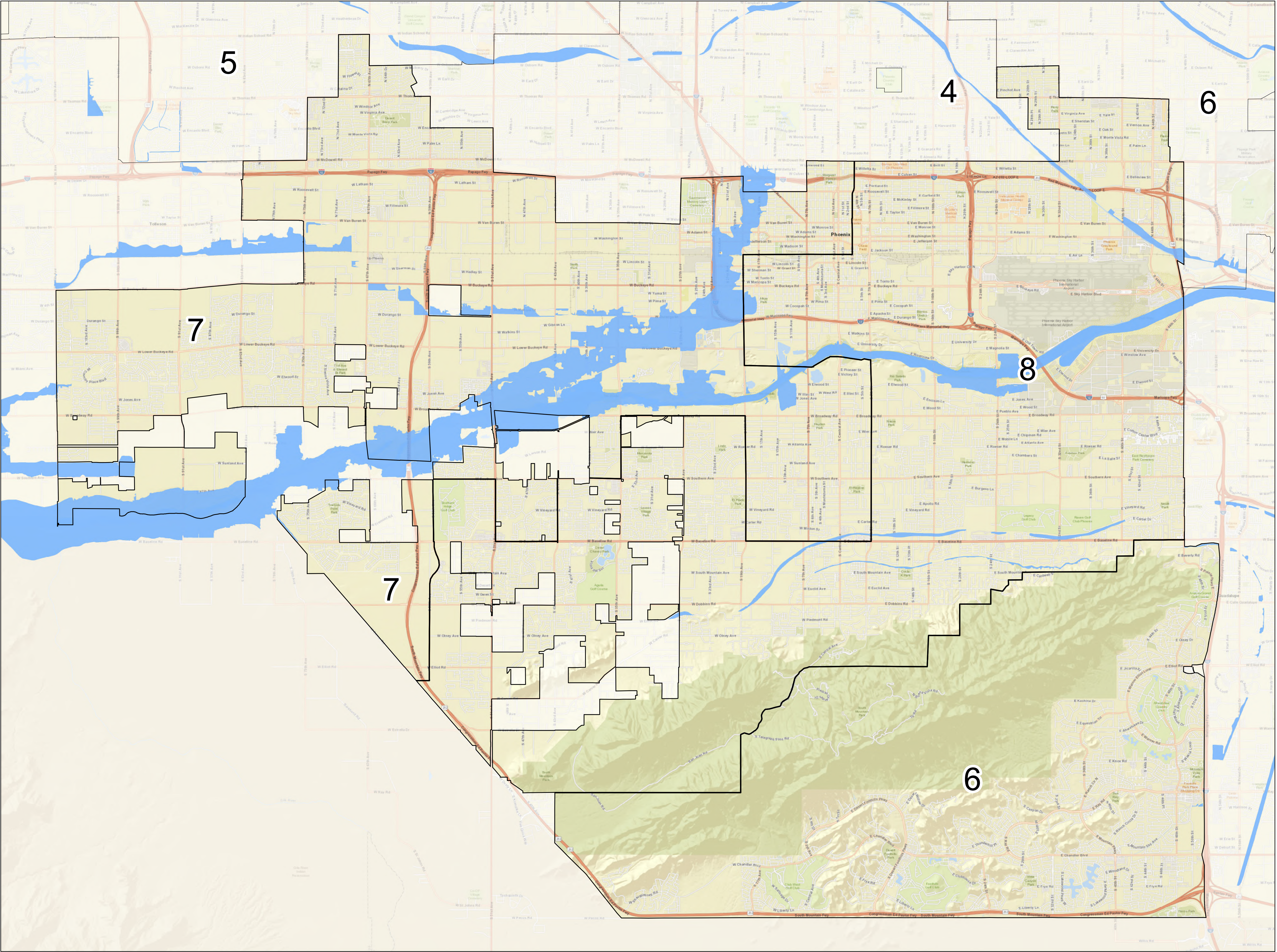
If you would like additional information on the plan update, you may reach me at 602-448-6360 or ryan.bentz@phoenix.gov.



City of Phoenix
Office of the City Engineer
Floodplain Management
200 West Washington Street, 5th Floor
Phoenix, Arizona, 85003

PARKING AND LOCATION MAP

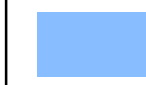




CITY OF PHOENIX
FLOODPLAIN MANAGEMENT
PLAN 2025

CITY COUNCIL
DISTRICTS
SOUTH 6, 7 AND 8

Legend

 FEMA SPECIAL FLOOD
HAZARD AREA

N

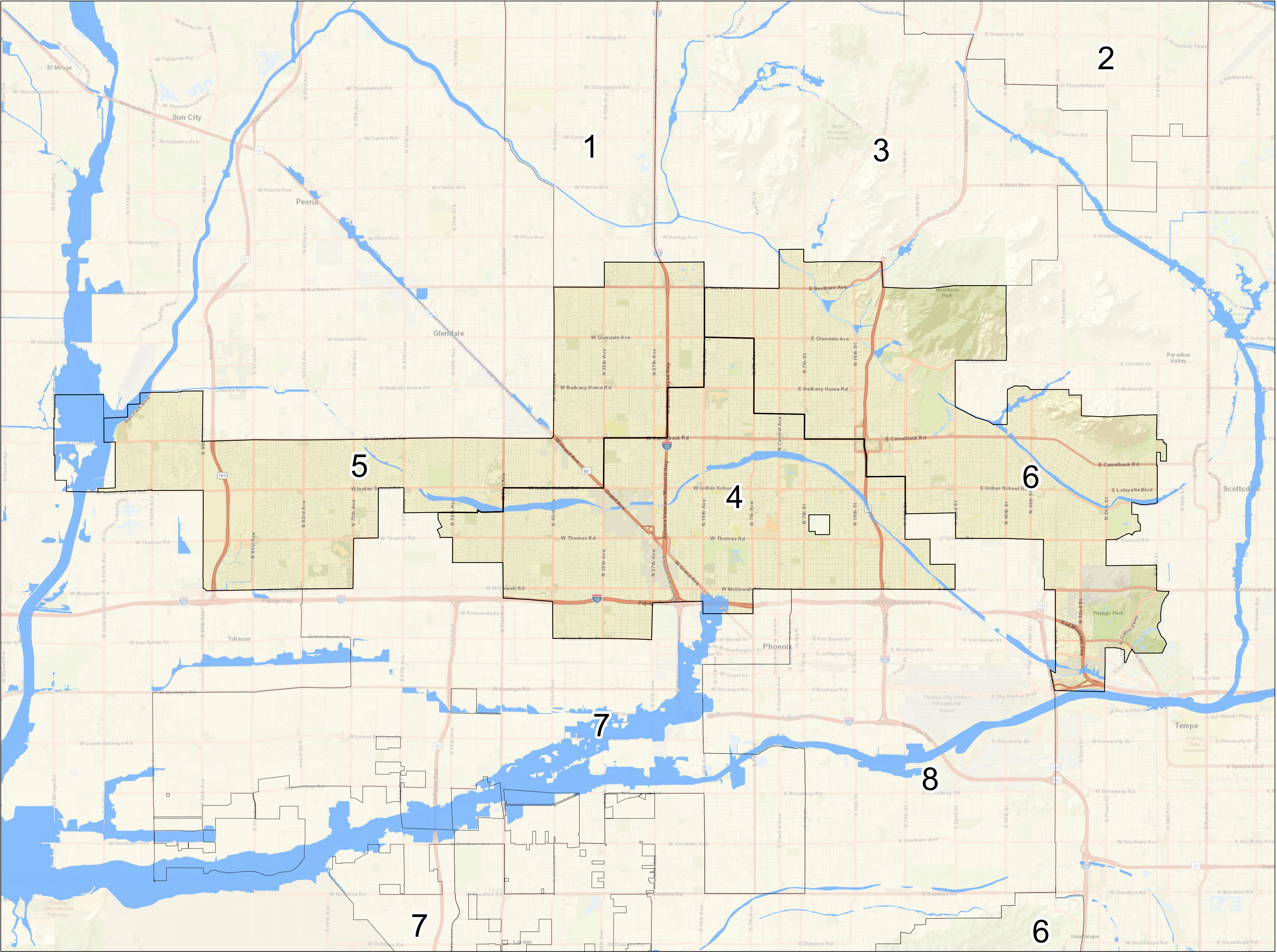
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FLOODPLAIN MANAGEMENT PLAN
2025

CITY OF PHOENIX PROJECT NUMBER
ST83140150

JANUARY 2025

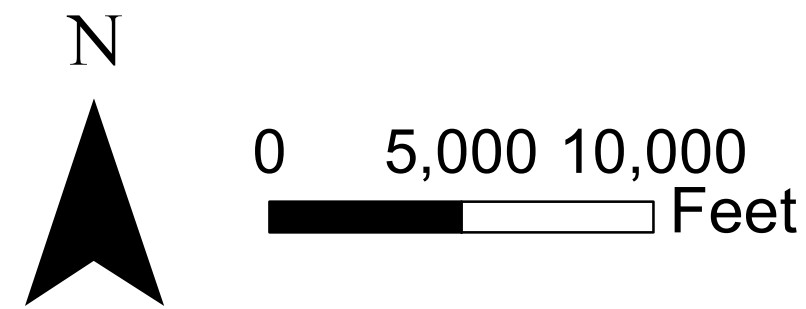


CITY OF PHOENIX
FLOODPLAIN MANAGEMENT
PLAN 2025

**CITY COUNCIL
DISTRICTS
4, 5, and 6 NORTH**

Legend

 FEMA SPECIAL FLOOD
HAZARD AREA



**FLOODPLAIN MANAGEMENT PLAN
2025**

CITY OF PHOENIX PROJECT NUMBER
ST83140150

JANUARY 2025

CITY OF PHOENIX
FLOODPLAIN MANAGEMENT
PLAN 2025

CITY COUNCIL
DISTRICTS
1, 2, AND 3

Legend

FEMA SPECIAL
FLOOD HAZARD
AREA

N

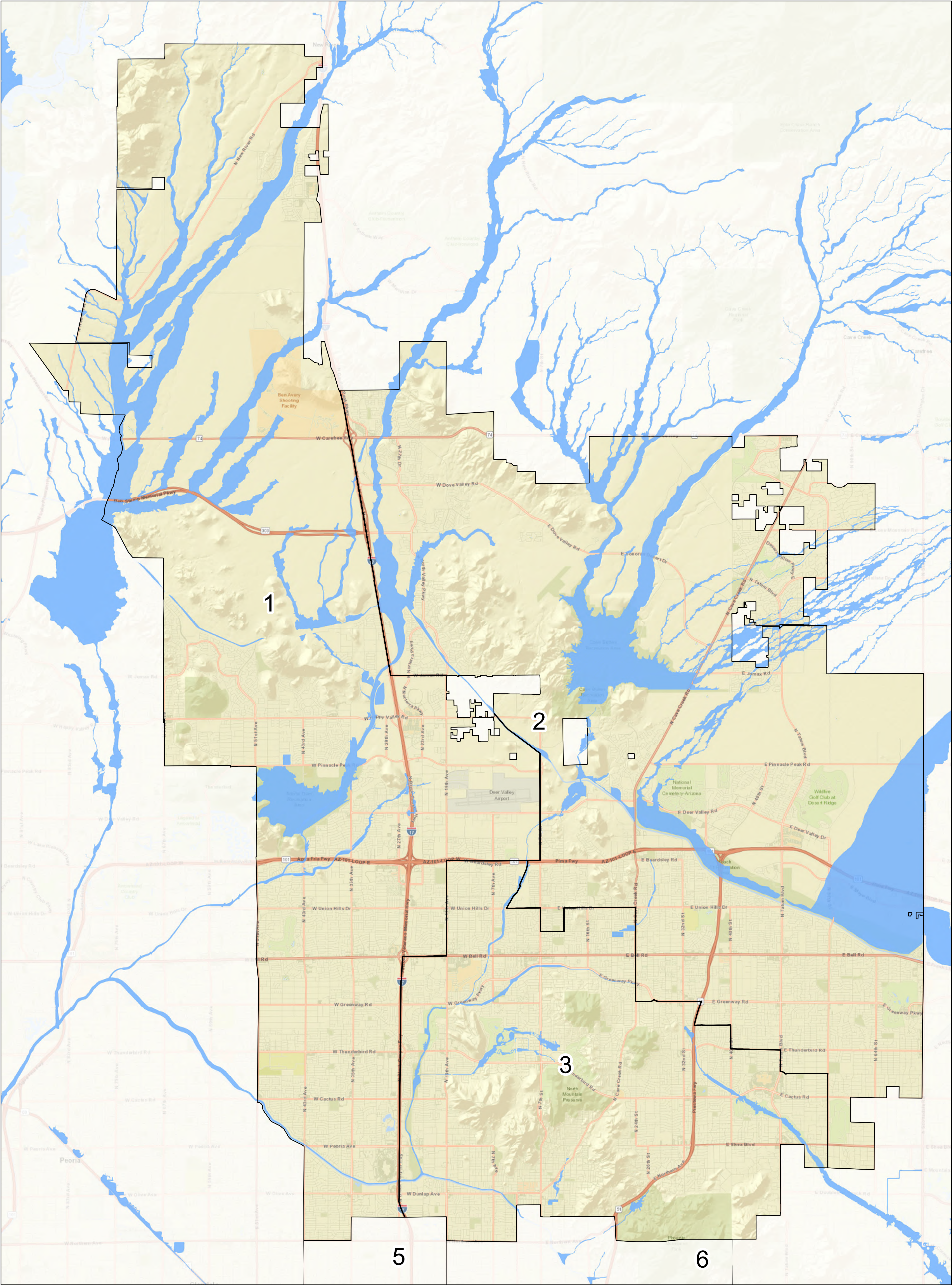
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FLOODPLAIN MANAGEMENT PLAN
2025

CITY OF PHOENIX PROJECT NUMBER: ST83140150

JANUARY 2025





City of Phoenix Floodplain Management Plan (FMP) 2025

FMP Committee Meeting #1

January 15, 2025



AGENDA

- Safety Moment
- Introductions
- City Engineer Welcome
- Overview of National Flood Insurance Program (NFIP)
- Overview of CRS Activity 510 – Floodplain Management Plan
- Overview of current FMP – 2016
- Where We Want to Be – FMP 2025
- Next Steps



SAFETY MOMENT – PSYCHOLOGICAL SAFETY

A BELIEF THAT IT IS SAFE TO TAKE INTERPERSONAL RISKS: THAT ONE WILL NOT BE PUNISHED OR HUMILIATED FOR SPEAKING UP WITH IDEAS, QUESTIONS, CONCERNS, OR MISTAKES.

- ANYONE CAN ASK QUESTIONS WITHOUT LOOKING STUPID.
- ANYONE CAN ASK FOR FEEDBACK WITHOUT LOOKING INCOMPETENT.
- ANYONE CAN BE RESPECTFULLY CRITICAL WITHOUT APPEARING NEGATIVE.
- ANYONE CAN SUGGEST INNOVATIVE IDEAS WITHOUT BEING PERCEIVED AS DISRUPTIVE.



INTRODUCTIONS



- NAME
- ORGANIZATION
- ROLE WITH FLOOD PLANNING, MITIGATION, AND/OR EMERGENCY MANAGEMENT



CITY ENGINEER WELCOME STATEMENT



NATIONAL FLOOD INSURANCE PROGRAM

- Mapping
- Flood Insurance
- Regulations
- Community Rating System (CRS)



COMMUNITY RATING SYSTEM (CRS)

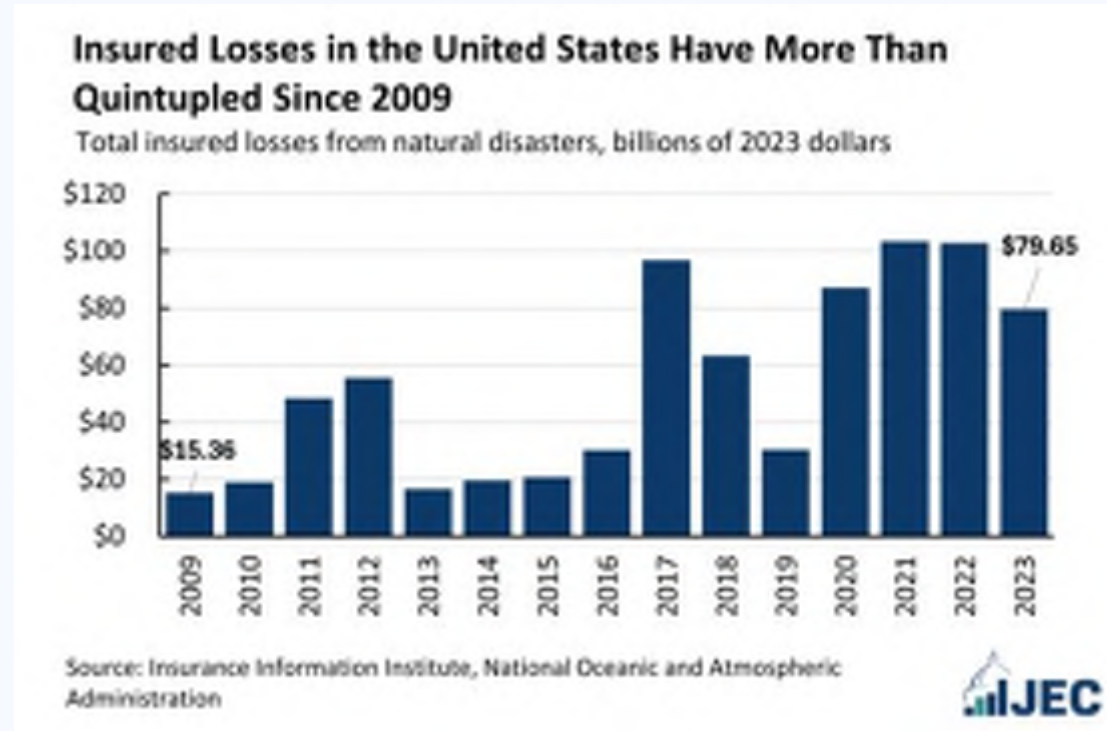
- Voluntary Incentive Program
- Above and beyond the NFIP minimum requirements
- Incentives for flood insurance premiums
 - Phoenix - Class 5 Community
 - Phoenix - Goal for Class 4



CRS Classes and Discount Table

CRS Class	10	9	8	7	6	5	4	3	2	1
CRS Discount (Premium Reduction)	0%	5%	10%	15%	20%	25%	30%	35%	40%	45%





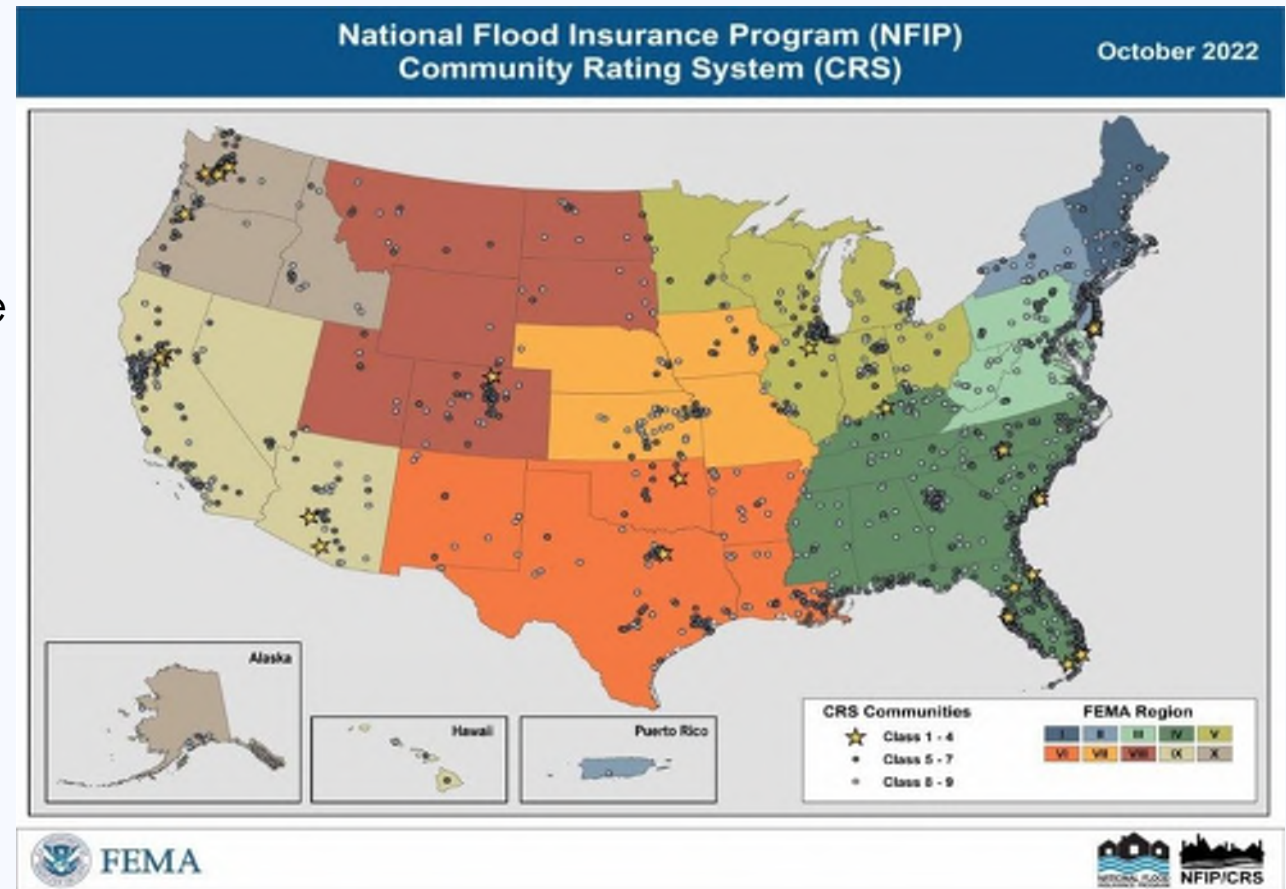
2020 Annual Average Home Insurance Premium	2024 Annual Average Home Insurance Premium	Change in Average Home Insurance Premiums from 2020 to 2024
\$1,255	\$1,554	+\$299 (+24%)



CRS PROGRAM PARTICIPATION

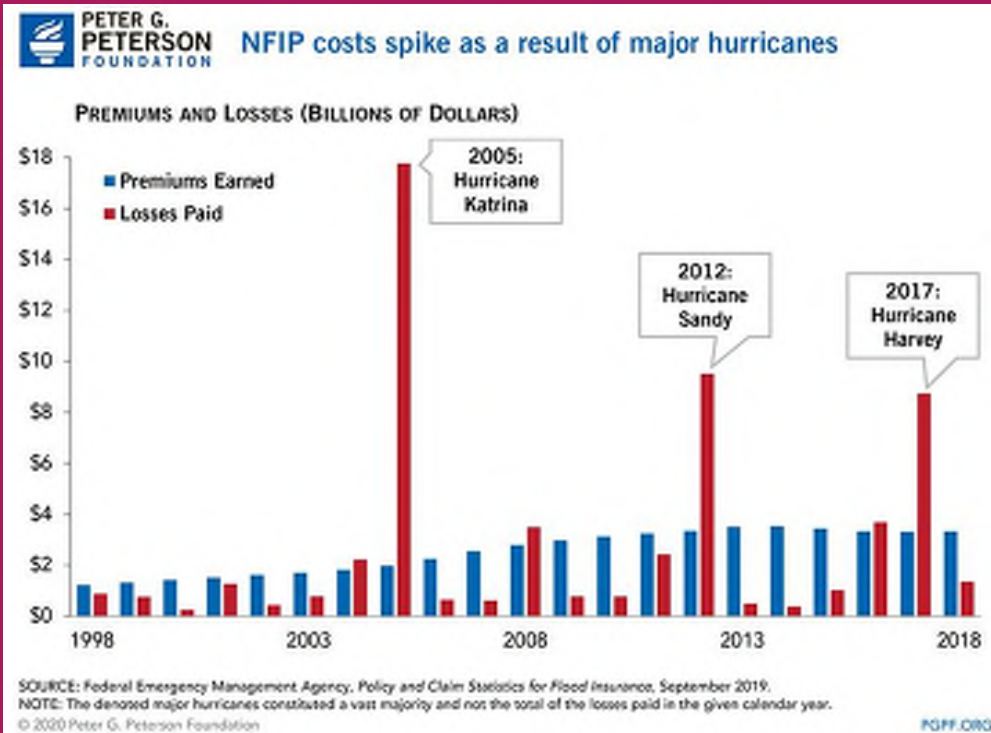
- 1,500+ Communities in CRS
- 22,000+ Communities in NFIP
- ~8% of NFIP participates in CRS
- More than 70% of all flood insurance policies are written in CRS Communities

Data as of October 2020



CRS BACKGROUND

- NFIP Supported Program
- Goals
 - Reduce & Avoid Flood Damage to Insurable Properties
 - Strengthen & Support the Insurance Aspects of the NFIP
 - Foster Comprehensive Floodplain Management
- 4 Series → 19 Activities → 90+ Elements
 - Public Information Activities (300 Series)
 - Mapping & Regulations (400 Series)
 - Flood Damage Reduction Activities (500 Series)
 - Warning & Response (600 Series)



300 Series: Public Information Activities

310 – Elevation
Certificates

320 – Map Information
Service

330 – Outreach
Projects

340 – Hazard Disclosure

350 – Flood Protection
Information

360 – Flood Protection
Assistance

370 – Flood Insurance
Promotion

400 Series: Mapping and Regulations

410 – Floodplain
Mapping

420 – Open Space
Preservation

430 – Higher Regulatory
Standards

440 – Flood Data
Maintenance

450 – Stormwater
Management

500 Series: Flood Damage Reduction

510 – Floodplain
Management Planning

520 – Acquisition and
Relocation

530 – Flood Protection

540 – Drainage System
Maintenance

600 Series: Warning and Response

610 – Flood Warning
and Response

620 – Levees

630 – Dams





Overview of CRS Activity 510 – Floodplain Management plan

- CRS Class 4 Prerequisites
- FMP Committee Participant Roles
- Review of FMP Committee Timeline
 - 5 Committee Meetings
 - At least one representative from each participating organization must be present at each of the 5 Committee Meetings



OVERVIEW OF CRS ACTIVITY 510 – FLOODPLAIN MANAGEMENT PLAN

- Step 1 – Organize
- Step 2 – Involve the Public
- Step 3 – Coordinate
- **Step 4 – Assess the Hazard (FMP Committee Meeting #1)** ← TODAY'S MEETING
- Step 5 – Assess the Problem (FMP Committee Meeting #2)
- Step 6 – Set Goals (FMP Committee Meeting #3)
- Step 7 – Review Possible Actions (FMP Committee Meeting #4)
- Step 8 – Draft an Action Plan (FMP Committee Meeting #5)
- Step 9 – Adopt a Plan
- Step 10 – Implement, Evaluate, and Revise



Current Phoenix FMP (2016)

1. Hazards Identified
2. Status of 2016 Goals & Plans
3. Lessons Learned



2016 HAZARDS IDENTIFIED

- Historic and Repetitive Flooding Areas
- Dam Failure
- Levee Failure
- Flooding
- Future Development Trends
- Earth Fissures
- Land Subsidence
- Other Hazards
 - Drought
 - Extreme Heat
 - Severe Wind
 - Wildfire



Goals and Action Items

1. Reduce Risks that Threaten Life and Property
 2. Protect Critical Infrastructure
 3. Promote Hazard Mitigation
 4. Increase Public Awareness of Hazards
- Administrative Action Items – 3 Total
 - Program Action Items – 9 Total
 - Public Information Action Items – 6 Total

	Action Item	Goal 1: Reduce risks that threaten life and property	Goal 2: Protect critical infrastructure	Goal 3: Promote Hazard Mitigation	Goal 4: Increase Public Awareness of Hazards	Chapter - Recommendation	Deadline
Administrative Actions							
1.0	Plan Adoption	X	X	X	X	Section 3.9	Oct-16
2.0	Monitoring and Reporting	X	X	X	X	Section 3.10	October - annually
3.0	Community Rating System	X	X	X	X	Section 1.2 & 3.10	CRS Recertification Visit
Program Action Items							
4.0	Dam Improvements	X	X	X		Section 3.4 (1b)	Continuous Activity
5.0	Levee Improvements	X	X	X		Section 3.4 (1a)	Continuous Activity
6.0	Drainage system maintenance	X	X			Section 3.4 (4a)	Continuous Activity
7.0	Drainage system improvements	X	X	X		Section 3.4 (4a)	Oct-16
8.0	Property protection funding	X	X	X		Section 3.4 (4a)	Oct-16
9.0	Regulatory review	X	X	X		Section 3.5e & 3.7	CRS Recertification Visit
10.0	NFIP administration	X	X			Section 3.7a	After CAC
11.0	Certified Floodplain Managers	X	X	X	X	Section 3.7a	Oct-16
12.0	Flood response plan	X	X	X	X	Section 3	Continuous Activity
Public Information Action Items							
13.0	Newspaper notifications	X		X	X	Section 3.7 (g)	Continuous Activity
14.0	City Notes articles	X		X	X	Section 3.7 (g)	Continuous Activity
15.0	City Website	X		X	X	Section 3.7 (g)	Oct-16
16.0	Technical References	X	X	X	X	Section 3.7 (1b)	CRS Recertification Visit
17.0	Public information projects	X		X	X	Section 3.7 (c & g)	Continuous Activity
18.0	Public information messages	X		X	X	Section 3.7 (g)	Continuous Activity



LESSONS LEARNED

1. Need for FMP Committee
 - a) Increased information on hazards and problems
 - b) Community-centered goals and action items
2. Additional Involvement with Public
 - a) Webpage to allow for following FMP progress
 - b) Public Survey to gather additional information
 - c) Public Meetings
3. Additional Involvement with Stakeholders
 - a) Separate, short interviews to gather more feedback outside FMP Committee meetings
4. Annual Tracking and Updates with Committee



Figure 11 – FEMA FIS FIGURE 1 FEMA - Figure 1. Looking downstream on the Salt River During the December 1965 flood (Sky Harbor International Airport runways are in the center.)



ASSESS THE HAZARD

BREAK OUT – 30 MINUTES

Group 1

City Council Districts
1, 2, and 3

Group 2

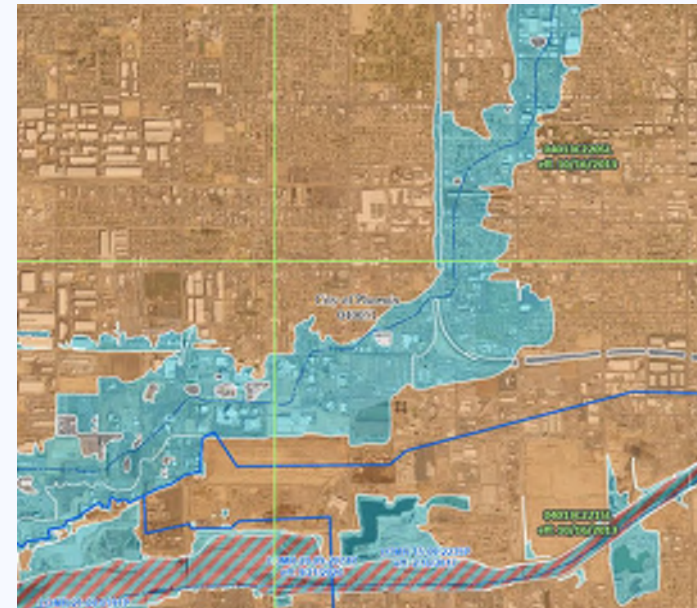
City Council Districts
4, 5, and 6 North

Group 1

City Council Districts
6 South, 7, and 8

Describe local flood hazard.

- a) How often it floods
- b) Locations of areas that flood
- c) Source or cause of flooding



ASSESS THE HAZARD REPORT BACK



ASSESS THE HAZARD

REPORT BACK

GROUP 1
CITY COUNCIL DISTRICTS
1, 2, AND 3



ASSESS THE HAZARD

REPORT BACK

GROUP 2
CITY COUNCIL DISTRICTS
4, 5, AND 6 NORTH



ASSESS THE HAZARD

REPORT BACK

GROUP 3
CITY COUNCIL DISTRICTS
6 SOUTH, 7, AND 8



WHERE WE WANT TO BE FOR 2025 FMP

- Update and identify hazards in Phoenix
- Understand the problems associated with the hazards
- Establish new goals and actionable timelines
- Evaluate potential actions and known challenges for new goals
- Prepare a five-year action plan with progress tracking metrics
- Adopt and Implement the plan
- Frequent monitoring of progress toward goals



NEXT STEPS:

- Collect and incorporate hazard and mitigation data
- Ongoing coordination with FMP Committee
- Conduct Public and Stakeholder Involvement – Specific Audiences
- Responsibilities of participants
 - Committee Members
 - City Representatives
 - Consultant Team





Questions?

Next FMP Committee Meeting | February 5, 2025 | 9am City of Phoenix City Hall





Phoenix Floodplain Management Plan 2025 (ST83140150)

Committee Meeting #1

January 15, 2025 at 9:00 AM – 11:00 AM

MEETING MINUTES

1. Safety moment – 3 min
2. Introductions – Around the room – 15 min
3. City Council Engineer Welcome Statement – 5 min
4. Overview of the National Flood Insurance Program (NFIP) – 10 min
 - a. What is the NFIP?
 - b. Community Rating System (CRS)
 - i. Need at least one rep from the organization.
 - ii. **Question:** What is the extra 5% discount? What does that amount to?
5. Overview of CRS Activity 510 – Floodplain Management Plan (FMP) – 5 min
 - a. Overview and purpose of FMP
 - i. **Manny Patel:** What specific activities are needed from the 300, 400, 500, etc. series to get class 4?
Matt Hann: We will need points from all categories. The City has other activities going on that contribute to the overall goal.
 - b. Review of FMP Committee Timeline and Expectations
 - i. **Manny Patel:** How were committee members selected?
Matt Hann: We chose organizations that are involved with floodplain management, emergency management, or impacted by it.
 - ii. **Manny Patel:** How often is the FMP updated?
Matt Hann: About every 5 years.
Bryan Cosson: Other Class 4 communities may be required to do 3 to 5-year cycles.
6. FMP Committee Members Roles and Responsibilities – 2 min
 - a. Attendance at each FMP Committee Meeting – at least one person from each organization
7. Overview of Current Phoenix FMP (2016) – 15 min
 - a. Identified Hazards & Problems
 - b. Status of 2016 Goals and Action Plan
 - c. Lessons Learned
8. Breakout For New/Updated Hazards – 30 min
9. Reporting From Breakouts – 20 min

GROUP 1 Potential Hazards (City Council Districts 1, 2, & 3):

Individual property owners have local drainage or flooding concerns.

The transition from mountains to urban landscape creates flooding/drainage issues.

The city does have project in these areas to address flooding and drainage problems.

We discussed subdivisions placed on fill in floodplain fringe that now have ground level issues.

Other factors include age of development, as earlier ones have higher risk of flooding than newer ones based on changes in development standards.

Matt Hann: Majority of the City of Phoenix and Maricopa County dams and levees are in Group 1. We'll have an inventory of levee and dams to document risks and elaborate on background in the plan.

GROUP 2 Potential Hazards (City Council Districts 4, 5, & 6):

Andrew Hagglund: Older homes, from 50s and 60s, with flood irrigated lots.

A lot of local flooding, canals that back up water on berms, the natural washes.

The infrastructure is under capacity and not maintained. Portions of the Salt River back up causing flooding along ADOT right of way. Flooding occurs in monsoon and winter.

GROUP 3 Potential Hazards (City Council Districts 6, 7, & 8):

Ryan Sauer: Floodplain delineation doesn't reflect hazards, South Mountain floodplains not mapped. We had a conversation on vegetation – private maintenance involves risk. Residents want vegetation and we need to make sure it's not impacting flows. We discussed Infill in south Phoenix, large developments in Ahwatukee and how might those impact flows.

G1: There are different standards for wash maintenance. The primarily flow line and adjacent part may be maintained differently, with different standards. One part may be clear cut and other areas may be vegetated. We don't have an even approach to wash maintenance.

Ryan Sauer: There needs to be a balance of what residents want, some want washes cleared, others want vegetated washes.

Ryan Sauer: We discussed that in the future, there may be less rain and peak flows may be different.

Matt Hann: Especially in unmapped hazard or older areas.

Question (G1): Pima is bringing in rules and standards for developments, does CRS give points for these types of standards?

Matt Hann: It's a component.

Ryan Sauer: 10-year, 100-year, different future storms are allocated different points.

Matt Hann: The County has started wanting to evaluate 500-year storms for Area Drainage Master Studies, these are less likely but higher risk.

Question (G1): how often is 100-year storm updated?

Ryan Sauer: NOAA updates the national precipitation values typically 15-20 years – but, they need to have enough new data to make the updates.

Kathryn Gross: Water studies are regional; storms may not be updated for smaller local storms.

Andrew Hagglund: The valley is microclimate, in a 1x1 mile intense storm it is hard to capture and model it.

Ryan Sauer: In 2014 storm, sediment and boulders made their way onto Dobson by South Mountain. Several City of Phoenix storm drain projects in the area.

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10. Next Steps – 5 min

- a. Collect and incorporate hazard and mitigation data for Maricopa County
- b. Ongoing coordination with FMP Committee
- c. Conduct Public and Stakeholder Involvement – Specific Audiences
- d. Public Survey & Website Updates

11. Adjourn

Next Meeting: Wednesday, February 5, 2025
Phoenix City Hall - 200 W Washington Street, 85003

Committee Meeting #2 – Assess the Problem	Wednesday, February 5, 2025
Committee Meeting #3 – Set Goals	Wednesday, February 26, 2025
Committee Meeting #4 – Review Possible Actions	Wednesday, March 19, 2025
Committee Meeting #5 – Draft an Action Plan	Wednesday, April 9, 2025



City of Phoenix Floodplain Management Plan (FMP) 2025

FMP Committee Meeting #2

February 05, 2025



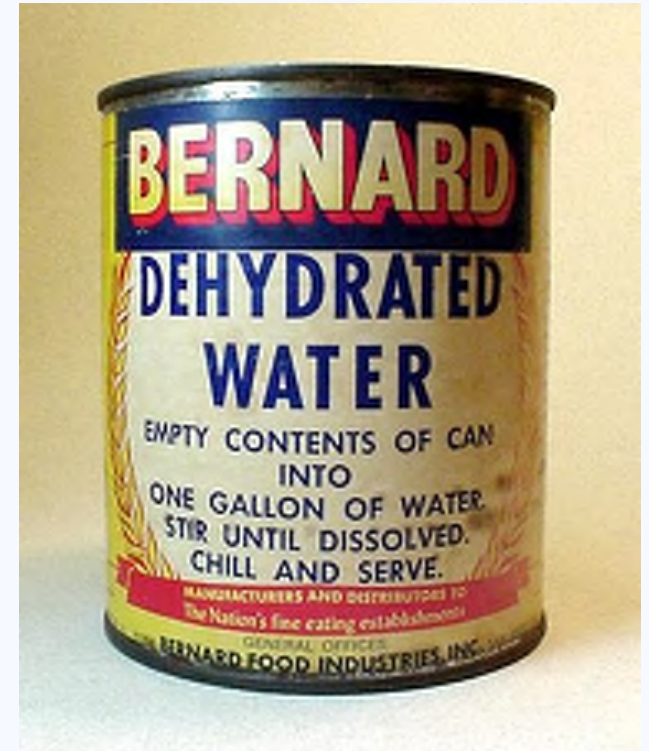
AGENDA

- Safety Moment
- Introductions (If Needed)
- Overview of FMP Mtg# 1: Flood Hazard Identification
- Impacts of Hazards – Assessing the Problem
- Group Breakout – Hazards and Problems Discussion
- Group Report Out and Discussion
- Next Steps



SAFETY MOMENT – OVERLOOKED WINTER HAZARDS

- DEHYDRATION
 - Drier, less humid air can exacerbate fluid loss
 - Hydrate early and often
- UV RAYS
 - Sun's rays are harmful even during summer
 - Cover up, wear sunglasses and broad-spectrum sunscreen
- CARBON MONOXIDE
 - Install/Test CO Detectors



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INTRODUCTIONS



- NAME
- ORGANIZATION
- ROLE WITH FLOOD PLANNING, MITIGATION, AND/OR EMERGENCY MANAGEMENT



OVERVIEW OF CRS ACTIVITY 510 – FLOODPLAIN MANAGEMENT PLAN

- Step 1 – Organize
- Step 2 – Involve the Public
- Step 3 – Coordinate
- Step 4 – Assess the Hazard (FMP Committee Meeting #1)
- **Step 5 – Assess the Problem (FMP Committee Meeting #2)** ← TODAY'S MEETING
- Step 6 – Set Goals (FMP Committee Meeting #3)
- Step 7 – Review Possible Actions (FMP Committee Meeting #4)
- Step 8 – Draft an Action Plan (FMP Committee Meeting #5)
- Step 9 – Adopt a Plan
- Step 10 – Implement, Evaluate, and Revise



2016 HAZARDS IDENTIFIED

- Historic and Repetitive Flooding Areas
- Dam Failure
- Levee Failure
- Flooding
- Future Development Trends
- Earth Fissures
- Land Subsidence
- Other Hazards
 - Drought
 - Extreme Heat
 - Severe Wind
 - Wildfire



2025 FMP Mtg #1: FLOOD HAZARD IDENTIFICATION

- Special Flood Hazard Areas
 - Riverine Flooding
 - Canal Embankments
- Alluvial Fan
 - Transition from Mountain to Urban Landscape
- Urban Flooding
 - Sheet Flow → Channelized Flow
 - Developments on Fill in Floodplain Fringe
 - Local Flooding
 - Age of Development and Infrastructure
 - Under Capacity Infrastructure
 - Un-Delineated Flood Hazards
 - Wash and Basin Vegetation Maintenance
 - Infill Development



Additional Hazards for Consideration



- Dam and Levee Failure
- Other Non-Flood Related Hazards
 - Climate Change
 - Wildfires
 - Drought
 - Funding



Impacts of Hazards & Assess the Problem



- Life Safety
 - Emergency Warning and Response
 - Evacuations
- Public Health
 - Health Hazards to Individuals – flood waters and mold
- Critical Facilities and Infrastructure
 - Airports, Water Treatment, Fire and Police, Utilities
 - Schools, Hospitals, Senior Care Facilities



Impacts of Hazards & Assess the Problem

- Economy
 - Impacts to Major Employers
- Natural Floodplain Functions
 - Areas Impacted
 - Environmental and Aesthetic Impacts
- Development, Redevelopment, and Population Trends
 - Future Impacts on community, watershed, and natural resources
- Future Flooding Conditions



ASSESS THE PROBLEM

BREAK OUT – 30 MINUTES

Group 1

City Council Districts
1, 2, and 3

Group 2

City Council Districts
4, 5, and 6 North

Group 3

City Council Districts
6 South, 7, and 8

Impacts Hazards on the following:

- Life Safety
- Public Health
- Critical Facilities and Infrastructure
- Economy
- Natural Floodplain Functions
- Development, Redevelopment, and Population Trends
- Future Flooding Conditions

Hazards Identified:

- Special Flood Hazard Areas
 - Riverine Flooding
 - Canal Embankments
- Alluvial Fan
 - Transition from Mountain to Urban Landscape
- Urban Flooding
 - Sheet Flow → Channelized Flow
 - Developments on Fill in Floodplain Fringe
 - Local Flooding
 - Age of Development and

Infrastructure

- Under Capacity Infrastructure
- Un-Delineated Flood Hazards
- Wash and Basin Vegetation Maintenance
- Infill Development
- Dam and Levee Failure
- Other Non-Flood Related Hazards
 - Climate Change
 - Wildfires
 - Drought
 - Funding



TAKE A BREAK! 10 MINUTES



IMPACTS OF HAZARDS DISCUSSION

- Description of impact hazards identified have on:
 - Life, safety and the need for warning and evacuation
 - Public health, including health hazards to individuals from flood waters and mold
 - Critical facilities and infrastructure
 - City's economy and major employers

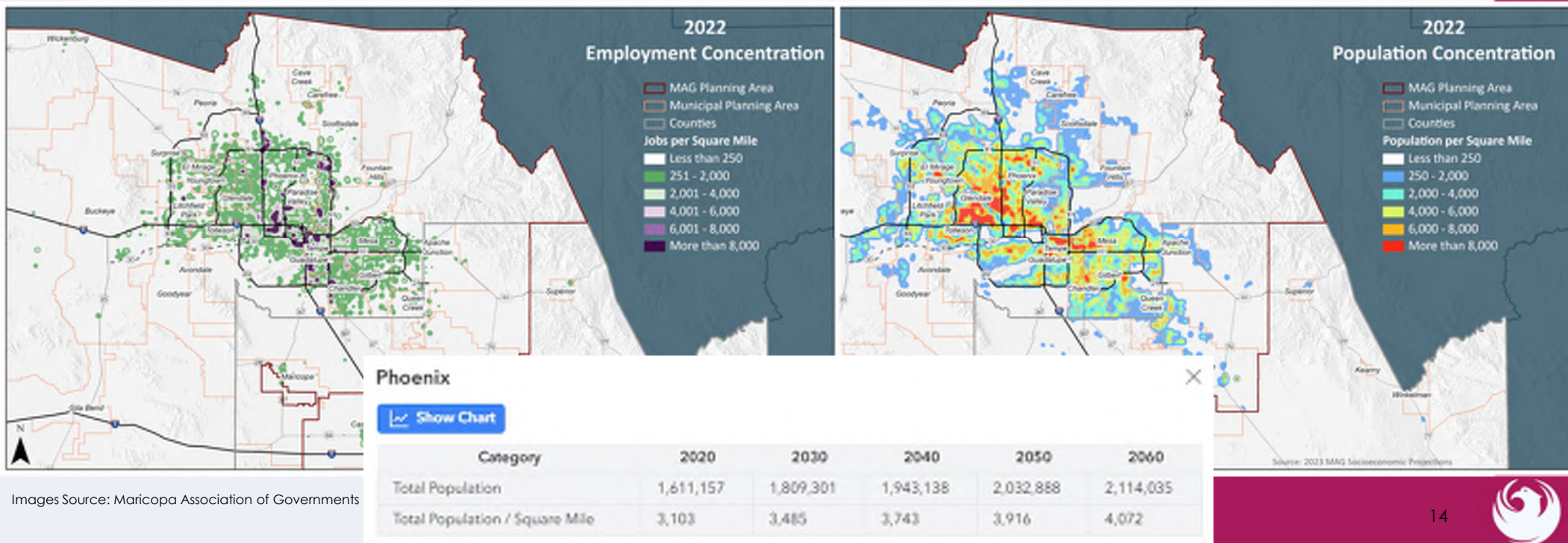


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IMPACTS OF HAZARDS DISCUSSION

- Areas that provide natural floodplain functions
- Description of development, redevelopment, population trends



IMPACTS OF HAZARDS DISCUSSION

- Impacts of future flooding conditions on people, property and natural floodplain functions from:
 - Changes in floodplain development and demographics
 - Development in the watershed
 - Climate change



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NEXT STEPS:

- Ongoing coordination with FMP Committee
- Public Survey
- Public Meetings
- **Next Meeting**
 - Wednesday, February 26, 2025 @ 9am – Set Goals
 - Phoenix City Hall - 200 W Washington Street, 85003





Questions?

Next FMP Committee Meeting | February 26, 2025 | 9am City of Phoenix, City Hall





FY2025 Phoenix Floodplain Management Plan (ST83140150)

Committee Meeting #2

February 5, 2025, at 9:00 AM – 11:00 AM

MEETING MINUTES

- 1. Safety moment – 3 min**
- 2. Overview of FMP Mtg #1: Flood Hazard Identification – 20 min**
 - a. Review CRS and Activity 510
 - b. Group Discussion of Flood Hazards
- 3. Impacts of Hazards – Assess the Problem – 15 minutes**
 - a. Life Safety
 - b. Public Health
 - c. Critical Facilities and Infrastructure
 - d. Economy
 - e. Natural Floodplain Functions
- 4. Impacts of Hazards During Storms - Assessing the Problem (Step 5) – 30 min**
 - a. Breakout Exercise – Groups to focus on each group's area
 - b. Mark up maps and use Worksheet to identify flooding problems
- 5. Break – 10 min**
- 6. Group Report Out and Discussion – 45 min**
 - a. Description of impact hazards identified have on:
 - i. Life, safety, health and the need for warning and evacuation
 - ii. Public health, including health hazards to individuals from flood waters and mold
 - iii. Critical facilities and infrastructure
 - iv. City's economy and major employers
 - b. Areas that provide natural floodplain functions
 - c. Description of development, redevelopment, population trends
 - d. Impacts of future flooding conditions on people, property, and natural floodplain functions from:
 - i. Changes in floodplain development and demographics
 - ii. Development in the watershed
 - iii. Climate change

Discussion:

South Phoenix Group

Description of impacts:

- Floodplains near South Mountain are not delineated.
- Golf courses in the area are being redeveloped and increasing impervious areas.
- Fire station #57 has had flooding along Dobbins
- Wildfires – The mountain has low brush and fires are typically easily contained.
- Future SR30 connection freeway may have potential impacts
- Local flooding
- County islands, there is a disconnect between city and county and infrastructure isn't always continuous.

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- Other fires along the Salt River as well.
- Sand and gravel pits
- Infill flooding
- A trend of funding being allocated for flooding issues in a reactive manner rather than proactive. Once the storm passes, there is no motive to allocate funding and it gets put towards more pressing issues.

Central Phoenix Group

Description of impacts:

- We identified places on the map where these problems occur.
- This area includes critical facilities, local flooding, most floodplains are delineated.
- The whole area is a sheet flow type area, some areas in alluvial fan off mountain range.
- Economic areas include Biltmore and central/midtown Phoenix area.
- This area has one levee but is downstream from several dams.
- A lot of this area was developed before 1980 before retention requirements and were using older building principles and codes.
- Much of the flooding is due to lack of infiltration, lack of retention, and small washes not being properly maintained.

North Phoenix Group

Description of impacts:

- Local flooding from high intensity storms.
- The age of the developments, south area developed before certain design standards.
- Mountain to urban landscape.
- Developments on natural flood plains
- Canal embankments, especially with the mountains north of the CAP Canal.
- Small pockets of un-delineated flood plains
- Maintenance is an issue.
- Dams and levees (Phoenix, Bureau of Reclamation, Reach 11, Flood Control District, Cave Creek, New River)
- Climate change, wildfires, drought, critical facilities, and funds impact most areas.

Additional Discussion:

- Above ground reservoirs that could fail and cause problems. Some are considered dams.
- Private maintenance is an issue. For example, drywells not properly maintained can cause flooding if they don't percolate correctly.
- Redevelopment, and connectivity between different developments.

7. Next Steps – 5 min

- a. Public Open Houses – Thursday, March 6 and Tuesday, May 6

8. Adjourn

Next Meeting: Wednesday, February 26, 2025 Phoenix City Hall - 200 W Washington Street, 85003

Committee Meeting #4 – Review Possible Actions Wednesday, March 19, 2025

Committee Meeting #5 – Draft an Action Plan Wednesday, April 9, 2025

Number of flood hazards checked “YES” per watershed by each Group			
	City Districts 1, 2, and 3	City Districts 4, 5, and 6	City Districts 6 South, 7, and 8
Flood Hazards	Group 1	Group 2	Group 3
Local Flooding			
Transition from Mountains to Urban Landscape			
Developments on Fill in Floodplain Fringe			
Age of Development			
Under Capacity Stormwater Infrastructure			
Flood Irrigate Lots			
Canal Embankments			
Un-delineated Floodplains			
Wash and Basin Vegetation Maintenance			
Infill Development			
Climate Change			
Dams			
Levees			
Additional			
Wildfires			
Drought			
Critical Facilities – Protect airports, canals, hospitals, utilities, water treatment, fire stations, and police			
Funding			



City of Phoenix Floodplain Management Plan (FMP) 2025

FMP Committee Meeting #3

February 26, 2025



AGENDA

- Safety Moment
- Overview of Committee Meeting #2
- Refining Identified Hazards and Problems
- Overview of 2016 FMP Goals
- Discuss & Finalize 2025 FMP Goals
- Next Steps
 - Public outreach efforts



SAFETY MOMENT

The increase in cellphone use presents many opportunities for distraction.

Distracted walking can lead to unintentional injuries from not paying attention to your surroundings, such as:

- Walking into fixed objects
- Being struck by moving vehicles
- Walking over an edge or into an open hole
- Tripping over an object
- Walking under a lifted load

Don't walk and text and try to use voice options when available.

Pause your conversation when crossing a street or entering a busy area.

Turn down the volume to avoid missing danger signs around you.

Discern which email or text can wait until you reach your destination.

Be courteous of others and don't text or call while they're driving or walking.



INTRODUCTIONS



OVERVIEW OF CRS ACTIVITY 510 – FLOODPLAIN MANAGEMENT PLAN

- Step 1 – Organize
- Step 2 – Involve the Public
- Step 3 – Coordinate
- Step 4 – Assess the Hazard (FMP Committee Meeting #1)
- Step 5 – Assess the Problem (FMP Committee Meeting #2)
- **Step 6 – Set Goals (FMP Committee Meeting #3)**
- Step 7 – Review Possible Actions (FMP Committee Meeting #4)
- Step 8 – Draft an Action Plan (FMP Committee Meeting #5)
- Step 9 – Adopt a Plan
- Step 10 – Implement, Evaluate, and Revise

← TODAY'S MEETING



ASSESS THE HAZARD

- Worksheet from last meeting →

General Hazard Categories

- Special Flood Hazard Areas
- Alluvial Fan
- Urban Flooding
- Dam and Levee Failure
- Other Non-Flood Related Hazards

Number of flood hazards checked "YES" per watershed by each Group			
	City Districts 1, 2, and 3	City Districts 4, 5, and 6 North	City Districts 6 South, 7, and 8
Flood Hazards	Group 1	Group 2	Group 3
Local Flooding	Y	Y	Y
Transition from Mountains to Urban Landscape	Y	Y	Y
Developments on Fill in Floodplain Fringe	Y	N	Y
Age of Development	Y	Y	Y
Under Capacity Stormwater Infrastructure	Y	Y	Y
Flood Irrigate Lots	N	Y	Y
Canal Embankments	Y	Y	Y
Un-delineated Floodplains	Y	N	Y
Wash and Basin Vegetation Maintenance	Y	Y	Y
Infill Development	Y	Y	Y
Climate Change	Y	Y	Y
Dams	Y	Y	Y
Levees	Y	Y	Y
Additional			
Wildfires	Y	N	Y
Drought	Y	Y	Y
Critical Facilities – Protect airports, canals, hospitals, utilities, water treatment, fire stations, and police	Y	Y	Y
Funding	Y	Y	Y





Assess the Problem

- Life Safety
 - Emergency Warning and Response
 - Evacuations
- Public Health
 - Health Hazards to Individuals – flood waters and mold
- Critical Facilities and Infrastructure
 - Airports, Water Treatment, Fire and Police, Utilities
 - Schools, Hospitals, Senior Care Facilities



ASSESS THE PROBLEM

- Economy
 - Impacts to Major Employers
- Natural Floodplain Functions
 - Areas Impacted
 - Environmental and Aesthetic Impacts
- Development, Redevelopment, and Population Trends
 - Future Impacts on community, watershed, and natural resources
- Future Flooding Conditions



DISCUSSION OF 2025 FMP 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.

Action Items are the specific tasks or activities necessary to achieve the stated goals by assigning responsibility to a specific action.



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OVERVIEW OF GOALS FROM 2023 ARIZONA HAZARD MITIGATION PLAN

Overarching goal: Increase resilience throughout the State of Arizona by reducing the vulnerability of people and property to natural and human- caused hazards.

Objectives:

1. Increase state, tribal, and local government awareness regarding Arizona's hazards and risks.
2. Promote hazard mitigation throughout Arizona.
3. Ensure the well-being of Arizona's residents, businesses, and visitors by lessening the impact of hazards and empowering them to reduce vulnerability through increased public awareness.
4. Reduce the vulnerability of critical facilities and infrastructure to natural and human-caused hazards.
5. Identify and pursue funding sources for hazard mitigation projects.
6. Identify and reduce the number of repetitive loss and severe repetitive loss properties.
7. Identify and reduce vulnerabilities to and from high hazard potential dams and potential consequences associated with dam incidents.



OVERVIEW OF 2016 FMP and 2009/2015/2021 MARICOPA COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN GOALS

Goals: Reduce or eliminate the risk to people and property from natural hazards.

Goals:

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



OVERVIEW OF 2020 MARICOPA COUNTY FMP GOALS

Overarching goal: Reduce or eliminate the risk to people and property from natural hazards.

Objectives:

1. Transportation and Low Water Crossing Mitigation.
2. Funding Evaluation of Process and Dedicated Resources
3. Education and Technical Resources
4. Managed Open Space
5. Regional Leadership



OVERVIEW OF 2020 MARICOPA COUNTY FMP GOALS

Overarching goal: Reduce or eliminate the risk to people and property from natural hazards.

Objectives:

1. Transportation and Low Water Crossing Mitigation.
 - a) 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, and pose safety risks due to flooding.
2. Funding Evaluation of Process and Dedicated Resources
 - a) 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
 - a) 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
 - a) 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. Regional Leadership
 - a) The Flood Control District of Maricopa County 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.



OVERVIEW OF 2025 PIMA COUNTY FMP GOALS

1. Identify, protect, and preserve watercourses and the natural floodplain function and riparian habitat associated with them, and restore and enhance them where they have been degraded.
2. Protect, preserve and enhance water resources.
3. Ensure that those who occupy areas within regulatory floodplain and erosion hazard areas are aware of the consequences of their actions within those areas.
4. Reduce the need for rescue and relief efforts.
5. Ensure the most effective expenditures of public money for flood control projects.



OVERVIEW OF 2025 PIMA COUNTY FMP GOALS (continued)

6. Prevent flood and erosion damages including ensuring the operability of critical facilities during flood events.
7. Ensure flexibility for adaptive floodplain management for changing climate circumstances.
8. Increase regional cooperation and offer interjurisdictional floodplain management services.
9. Increase beneficial use of stormwater including regional recharge and urban green spaces.
10. Ensure equitable access to flood mitigation services.
11. Prioritize neighborhood scale beneficial use of stormwater projects in vulnerable and underserved areas.



TAKE A BREAK! – 10 MINUTES



DISCUSSION: 2025 FMP GOALS

These goals must address all flood-related problems identified in Committee Meeting #2.

Impacts Hazards on the following:

- Life Safety
- Public Health
- Critical Facilities and Infrastructure
- Economy
- Natural Floodplain Functions
- Development, Redevelopment, and Population Trends
- Future Flooding Conditions

Hazards Identified:

- Special Flood Hazard Areas
 - Riverine Flooding
 - Canal Embankments
- Alluvial Fan
 - Transition from Mountain to Urban Landscape
- Urban Flooding
 - Sheet Flow → Channelized Flow
 - Developments on Fill in Floodplain Fringe
 - Local Flooding
 - Age of Development and

Infrastructure

- Under Capacity Infrastructure
- Un-Delineated Flood Hazards
- Wash and Basin Vegetation Maintenance
- Infill Development
- Dam and Levee Failure
- Other Non-Flood Related Hazards
 - Climate Change
 - Wildfires
 - Drought
 - Funding



GOALS REPORT OUT

NEXT STEPS:

- Public Meeting – Virtual
- Additional Coordination – Emails to be sent out next week to schedule
- **Next Meeting – Review Possible Actions**
 - Wednesday, March 19, 2025
 - Phoenix City Hall - 200 W Washington Street, 85003





Questions?

Next FMP Committee Meeting | March 19, 2025 | 9am City of Phoenix City Hall



FY2025 Phoenix Floodplain Management Plan (ST83140150)**Committee Meeting #3****February 26, 2025, at 9:00 AM – 11:00 AM****MEETING MINUTES**

- 1. Safety moment**
- 2. Overview of FMP Mtg #2: Assess the Problem**
 - a. Discussion of Identified Hazards and Problems (see PowerPoint presentation for further details)
- 3. Overview of 2016 FMP Goals**
 - a. Status of 2016 Goals and Action Plan (see PowerPoint presentation for further details)
- 4. Break**
- 5. 2025 FMP Discussion – Set Goals (Step 6)**
 - a. Discussion of Potential Goals
 - i. Ali Samiedal:
 1. Education for the public, public outreach, exercises to mimic situation after incident.
 2. Education to policy makers and leaders and ongoing education for decision makers
 3. Coordination with other jurisdictions since water doesn't stay within Phoenix.
 - a. Improve quality of coordination
 4. Funding, securing dedicated funding or looking for opportunities.
 5. Identifying project and allocations, including asset management principles and analysis to identify projects.
 - ii. Nazar Nabaty:
 1. The City's asset management program will get existing data of stormwater infrastructure data, will evaluate the conditions, and identify where immediate action is needed. Over the last 5 years Phoenix had multiple sink holes 9 safety concerns. So, the other goal is to evaluate capacity and old stuff in downtown, where it's all over capacity.
 - iii. Andrew Hagglund:
 1. Prioritize vulnerable communities.
 2. Ensure flood mitigation is available.
 3. Dedicated funding
 4. Protect natural resources.
 5. Proactive maintenance
 6. Increase safety and awareness.
 - iv. Kathryn Gross:
 1. Expand city maintenance plan
 2. Expand funding for flood hazards and mitigation.
 3. Take advantage of additional funding
 4. Educate and provide assistance to HOA and property owners.
 5. Increase/maintain interjurisdictional cooperation.

6. Identify flood hazards within communities.
7. Responsible development and re-development on flood related hazards.
- v. Nicholas Ramirez:
 1. Improve public notification, news, bills, or codes, mail letters, door hangers.
 2. Protecting critical infrastructure, business and residents
 3. Protect economy by life and property.
 4. Make sure funding of small project assistance funding, grants, are being used as needed.
 5. Natural flood functions
 6. Provide knowledge to homeowners and planners of development.
 7. Have HOA for city and make sure things are being mitigated.
 8. Reviewing plans for how natural water flow is going.
 9. Understand max water storage before approval.
 - a. Need water mitigation plan for 100 year or whatever instead of just natural areas.
- vi. Nazar Nataby:
 1. We need to make sure the goals are achievable for the next 5 years and are within the budget planned.
- b. Finalize Goals

6. Next Steps – 5 min

- a. Virtual Public Meeting – May 22, 2025

7. Adjourn**Next Meeting:****Committee Meeting #4 – Review Possible Actions****Wednesday, March 19, 2025****Phoenix City Hall - 200 W Washington Street, 85003****Committee Meeting #5 – Draft an Action Plan****Wednesday, April 9, 2025**



City of Phoenix Floodplain Management Plan (FMP) 2025

FMP Committee Meeting #4

March 19, 2025



AGENDA

- Safety Moment
- Overview of Phoenix General Plan
- Overview of Committee Meeting #3
- Refining and Finalizing Goals
- Identify Activities – Review Possible Actions
 - CRS Step 7
- Next Steps
 - Public Meeting
 - Outreach



ROAD TRIP SAFETY MOMENT

Prepare for your next road trip with the below safety tips:

- Be sure to check the weather conditions locally and your planned destination
- Inspect tires and torque down lug nuts
- Maintenance your vehicle before long trips
- Pack emergency essentials for people & pets
 - flashlight, jumper cables, reflective triangles, first aid kit, food, water, map, and device chargers
- Keep a blanket or pool towel under you back seat
- Tell family and friends your plans and schedule
- Get plenty of sleep before you trip
- Make sure to drive with a buddy and take turns driving



Photo by Ricky Esquivel



CITY OF PHOENIX 2025 GENERAL PLAN

PLANNING EQUITY THROUGH **3 COMMUNITY BENEFITS**



PROSPERITY

- Resident's connectivity to:
 - + Education
 - + Training
 - + Jobs
 - + Services
 - + Housing
 - + Arts and culture
 - + History
 - + Transportation options
- Progress in the areas of:
 - + Decreased cost of government
 - + Decreased cost of living



HEALTH AND WELL-BEING

- Resident's connectivity to:
 - + Parks, trails and recreation facilities
 - + Healthy food and sustainable nutrition
 - + Safe and welcoming neighborhoods
 - + Celebration of culture and diversity
 - + Health and social services
 - + Sense of belonging, inclusion, and participation
- Progress in the areas of:
 - + Increase % population at a healthy weight.
 - + Reducing health inequalities
 - + Increasing mental health and resilience
 - + Safety for all users and abilities



ENVIRONMENT

- Resident's connectivity to:
 - + Natural open space
 - + Mountains, rivers washes
 - + Clean air
 - + Clean water
 - + Clean soil
- Progress in the areas of:
 - + Access to natural open spaces
 - + Increased Preservation and Restoration of natural open spaces
 - + Lower nighttime temperatures
 - + Lower utility costs
 - + Reducing asthma rates





1. Create a Network of Vibrant Cores, Centers and Corridors

Core Value Policy Alignment: Downtown is the Core / Transit Oriented Communities / Arts, Culture and Entertainment / Infill Development / History and Local Business / Evolving Communities / Dynamic City / Mix of Housing / Connecting Neighborhoods to Village Cores / Opportunity Sites



2. Connect People & Places

Core Value Policy Alignment: Rio Reimagined / High-Capacity Transit / Active Transportation / Complete Streets / Road Safety / Public Transit / Parks / Canals and Trails / Access and Functional Needs Infrastructure / Knowledge Infrastructure



3. Strengthen Our Local Economy

Core Value Policy Alignment: Tech-Forward City / Resilient and Integrated Communities / Entrepreneurs and Emerging Enterprises / Manufacturing and Industrial Development / Highly Skilled Workforce / Airports / Tourism Infrastructure / Local and Small Business



4. Celebrate Our Diverse Communities & Neighborhoods

Core Value Policy Alignment: Historic and Cultural Resources / Certainty and Character / Safe Neighborhoods – (Police and Fire) / Evolving Neighborhoods / Welcoming Neighborhoods / Encourage Housing Options / Arts and Culture / Open Space



5. Build the Most Sustainable Desert City

Core Value Policy Alignment: Water Sensitive Planning / Cool Corridors / Desert Natural Landscape / Rivers, Washes and Waterways / Redeveloped Brownfields / Green Building / Healthy Local Food System / Energy Infrastructure / Community Shade / Waste Infrastructure /

5
CORE VALUES



7 STRATEGIC TOOLS FOR ACTION

The 7 Strategic Tools continue to guide and align various implementation resources and efforts for all City departments and community and business stakeholders to participate in making progress big and small towards the General Plan Vision, Core Values and Goals.



1. Plans

- A reference to an existing plan and a call to implement or update it
- Creation or adoption of new plans, studies or planning exercises



2. Codes

- Creation of new codes or regulations
- Update of an existing code or regulation



3. Operations

- Continuation or expansion of a current city program or practice
- Support for change to city program or practice



4. Financing

- Identification of a need for city financing for capital improvements
- Pursuit of philanthropic or other funding sources



5. Partnerships

- Identification and development of partnerships that could help achieve the goal.



6. Knowledge

- Creation of public awareness on a topic
- Enhancement of staff and community capacity



7. I PlanPHX

- Items that residents can do right now to implement the goal and play a direct role in shaping Phoenix's future.

2025 Five Core Values

Create Vibrant Cores, Centers, and Corridors

Connect People & Places

Strengthen Our Local Economy

Celebrate Our Diverse Communities and Neighborhoods

Build the Sustainable Desert City

Land Use	Circulation	Open Space	Growth Area	Environmental Planning	Cost of Development	Water Resources	Conservation	Recreation	Public Services	Public Buildings	Housing	Conservation, Rehabilitation & Redevelopment	Safety	Bicycling	Energy	Neighborhood Preservation & Revitalization
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17 Arizona Statutory Required Planning Elements



PLAN PHX

NEXT STEPS

The General Plan 2025 Update provide a blueprint for what we are going to do together next. The next three years will involve an effort to collaborate with the community to make measureable progress on our committments together. The following are some highlights of what is to come.

Step One

- Refine and Identify Metrics/Measures Updates.
- Identify Place Types at Village, Region, and City-wide (Cores, Centers and Corridors).
- Identify Village Character Plan Updates.
- Identify Land Use Map Updates.

Step Two

- Initiate adoption of Place Types, Character Plans, and Land Use Map Updates.
- Collaborate with community partners and city departments on further addressing Planning Equity and the Three Community Benefits.
- Collaborate with city departments and community partners on an implementation approach for updating other city-wide policies, plans and initiatives.



OVERVIEW OF CRS ACTIVITY 510 – FLOODPLAIN MANAGEMENT PLAN

- Step 1 – Organize
- Step 2 – Involve the Public
- Step 3 – Coordinate
- Step 4 – Assess the Hazard (FMP Committee Meeting #1)
- Step 5 – Assess the Problem (FMP Committee Meeting #2)
- Step 6 – Set Goals (FMP Committee Meeting #3)
- **Step 7 – Review Possible Actions (FMP Committee Meeting #4) ← TODAY'S MEETING**
- Step 8 – Draft an Action Plan (FMP Committee Meeting #5)
- Step 9 – Adopt a Plan
- Step 10 – Implement, Evaluate, and Revise



REVIEW FMP MEETING # 3 GOALS

- Public Information
 - Educate the public
 - Improve public notification
 - Educate homeowners and development planners
- Natural Floodplain Protection
 - Proactive maintenance
 - Protect natural floodplain functions
- Property Protection
 - Provide assistance to HOA & property owners
 - Identify flood hazards in communities
 - Protecting critical infrastructure
- Regulatory Standards
 - Max water storage, reviewing natural flows
 - Educating policy makers and leaders
- Funding
 - Expand funding for flood hazards and mitigation
 - Securing dedicated funding



FINALIZE GOALS

- Protect People, Property, and Natural Floodplain Functions
- Protect Critical Infrastructure and Facilities
- Proactive Maintenance and Preventative Measures
- Education Public, City Leaders, and Policy Makers
- Coordination with Other Jurisdictions
- Funding



STEP 7 – REVIEW POSSIBLE ACTIONS

- Review of a wide range of activities to ensure all possible measures are explored
- Not just the traditional approaches of flood control, acquisition, and regulation of land use
- Discuss Pros and Cons for Different Activities
- Brainstorm all possible activities



Action Item		Goal 1: Reduce risks that threaten life and property	Goal 2: Protect critical infrastructure	Goal 3: Promote Hazard Mitigation	Goal 4: Increase Public Awareness of Hazards	Chapter - Recommendation	Deadline
Administrative Actions							
1.0	Plan Adoption	X	X	X	X	Section 3.9	Oct-16
2.0	Monitoring and Reporting	X	X	X	X	Section 3.10	October - annually
3.0	Community Rating System	X	X	X	X	Section 1.2 & 3.10	CRS Recertification Visit
Program Action Items							
4.0	Dam Improvements	X	X	X		Section 3.4 (1b)	Continuous Activity
5.0	Levee Improvements	X	X	X		Section 3.4 (1a)	Continuous Activity
6.0	Drainage system maintenance	X	X			Section 3.4 (4a)	Continuous Activity
7.0	Drainage system improvements	X	X	X		Section 3.4 (4a)	Oct-16
8.0	Property protection funding	X	X	X		Section 3.4 (4a)	Oct-16
9.0	Regulatory review	X	X	X		Section 3.5e & 3.7	CRS Recertification Visit
10.0	NFIP administration	X	X			Section 3.7a	After CAC
11.0	Certified Floodplain Managers	X	X	X	X	Section 3.7a	Oct-16
12.0	Flood response plan	X	X	X	X	Section 3	Continuous Activity
Public Information Action Items							
13.0	Newspaper notifications	X		X	X	Section 3.7 (g)	Continuous Activity
14.0	City Notes articles	X		X	X	Section 3.7 (g)	Continuous Activity
15.0	City Website	X		X	X	Section 3.7 (g)	Oct-16
16.0	Technical References	X	X	X	X	Section 3.7 (b)	CRS Recertification Visit
17.0	Public information projects	X		X	X	Section 3.7 (c & g)	Continuous Activity
18.0	Public information messages	X		X	X	Section 3.7 (g)	Continuous Activity

This table relates 18 action items to the 4 goals of this plan. This table further shows the relationship between action items and the recommendations within Step 8. The reviews need to be completed in advance of the next CRS verification visit, which is currently scheduled for the third quarter of 2017.

2016 Phoenix FMP Action Items

- Administrative
- Program
- Public Information



2021 Maricopa County Hazard Mitigation Plan Action Plan

- Regulatory Standards
- Property Protection
- Protection of Natural Floodplain Function
- Emergency Services Activities
- Structural Projects
- Public Information Activities
- Fiscal Capabilities



MARICOPA AND PIMA COUNTY FMP ACTION ITEMS



TAKE A BREAK! – 10 MINUTES



REVIEW POSSIBLE ACTIONS

BREAK OUT – 30 MINUTES

Goals:

- Protect People, Property, and Natural Floodplain Functions
- Protect Critical Infrastructure and Facilities
- Proactive Maintenance and Preventative Measures
- Education Public, City Leaders, and Policy Makers
- Coordination with Other Jurisdictions
- Funding

Action Item Categories:

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





Review Possible Actions – Step 7

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



NEXT STEPS:

- Public Meeting – Virtual – May 22nd
- Outreach – Sunnyslope and Laveen
- **Next (& Last) Meeting**
 - Wednesday, April 9, 2025
 - Phoenix City Hall - 200 W Washington Street, 85003





Questions?

Next FMP Committee Meeting | April 9, 2025 | 9am City of Phoenix City Hall



FY2025 Phoenix Floodplain Management Plan (ST83140150)**Committee Meeting #4****March 19, 2025, at 9:00 AM – 11:00 AM****MEETING MINUTES**

- 1. Safety moment – Road Trip Safety**
- 2. Overview of Phoenix General Plan**
- 3. Overview of FMP Mtg #3: Set Goals**
 - a. Finalize Goals Language
 - i. Expand on funding and be more specific.
 - Funding should be proactive instead of reactive.
 - ii. Manny Patel – Add language that includes “present/future”.
 - iii. Nazar Nataby – change wording to “mitigation and planning” instead of protecting.
- 4. Step 7 – Review Possible Actions**
 - a. Previous Phoenix, Maricopa County, and Pima County Goals (See Presentation slides for details)
- 5. Break**
- 6. Breakout – Identify Possible Activities**
- 7. 2025 FMP Discussion - Identify Activities – Review Possible Actions (Step 7)**
 - a. **Group 1**
 - i. Educate the Public, Policy Makers, and City
 - Posting public meetings, informing the public of dangers and upcoming plans.
 - City members should attend HOA meetings.
 - ii. Coordination with Other Jurisdictions
 - Training and inviting other agencies.
 - Hosting joint public and agency meetings.
 - Make regulations more “friendly” and explain the why behind them.
 - iii. Protect People, Property and Natural Resources
 - Marking flood areas with survey equipment to install safety measures.
 - iv. Protect Critical Infrastructure and Facilities
 - Make sure critical facilities are protected.
 - v. Maintenance and Preventative Measures
 - Maintenance plans
 - Accountability
 - Pre vs Post failure costs and efforts
 - b. **Group 2**
 - i. Educate the Public, Policy Makers, and City
 - Flyers and websites
 - Develop vegetation management hazards.
 - Attend neighborhood meetings, and home and garden shows.
 - Educate council and encourage them to educate their constituents.

- ii. Coordination with Other Jurisdictions
 - Make sure agencies such as ADOT, CAP, FEMA, DEMA are on the same page and have the latest and greatest information.
- iii. Protect People, Property and Natural Resources
 - Use information as a way to protect.
 - Evaluate and update standards.
- iv. Protect Critical Infrastructure and Facilities
 - Maintain database of critical facilities.
- v. Maintenance and Preventative Measures
 - Continue and expand annual inspections and repairs and check that other agencies are performing their maintenance.
 - Letting people know how much city is maintaining.
- vi. Funding
 - Nonprofit assistance
 - Expand impact fee
- c. Group 3
 - i. Educate the Public, Policy Makers, and City
 - Overview of design flows, investigate where higher restrictions are needed.
 - Implement something for hill bottom developments where flooding is more likely.
 - Requirements for retaining more onsite.
 - ii. Protect People, Property and Natural Resources
 - Invest in green stormwater infrastructure and infiltration methods.
 - Implement ways to slow down flows.
 - Keeping natural washes functioning naturally.
 - iii. Maintenance and Preventative Measures
 - Proper maintenance of basins and retention ponds
 - Using natural vegetation to slow flows
 - iv. Funding
 - Dedicated funding
 - Tucson or Pima has a stormwater infrastructure funds.
 - The City should not rely on piecemeal funding, there needs to be permanent funding
- d. Group 4
 - i. Educate the Public, Policy Makers, and City
 - Community advocate
 - Advertising for elderly
 - ii. Protect People, Property and Natural Resources
 - Perform flood plain delineation study.
 - Letting people know they may be at risk.
 - iii. Maintenance and Preventative Measures
 - Maintenance on drywells and require HOAs to prove the drywells work.
 - Easy way to report maintenance issues.

8. Next Steps

- a. Virtual Public Meeting – May 22, 2025
- b. Stakeholder Outreach

9. Adjourn

Final Meeting:

Committee Meeting #5 – Draft an Action Plan

Wednesday, April 9, 2025

Phoenix City Hall - 200 W Washington Street, 85003



City of Phoenix Floodplain Management Plan (FMP) 2025

FMP Committee Meeting #5

April 9, 2025



AGENDA

- Safety Moment
- Overview of Meetings #1-4
- Evaluate Action Items
- Next Steps



SAFETY MOMENT – ALLERGY SEASON

Symptoms:

Sneezing, itchy eyes, congestion, shortness of breath, wheezing and coughing.

Common Allergens:

- Tree pollen, Grass pollen, Ragweed pollen, and Mold.

Some factors that can affect allergy season:

- Temperature, Rain, Locations with different allergy seasons

Reduce your exposure to allergy triggers:

- Monitor pollen counts and plan activities accordingly
- Wash clothes and shower after being outside
- Close doors and windows
- Air Filters (HEPA), portable air purifiers



OVERVIEW OF CRS ACTIVITY 510 – FLOODPLAIN MANAGEMENT PLAN

- Step 1 – Organize
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- Step 5 – Assess the Problem (FMP Committee Meeting #2)
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- **Step 8 – Draft an Action Plan (FMP Committee Meeting #5)**
- Step 9 – Adopt a Plan
- Step 10 – Implement, Evaluate, and Revise

← TODAY'S MEETING



FMP Mtg #1: Assess the Hazard

- Special Flood Hazard Areas
 - Riverine Flooding
 - Canal Embankments
- Alluvial Fan
 - Transition from Mountain to Urban Landscape
- Urban Flooding
 - Sheet Flow → Channelized Flow
 - Developments on Fill in Floodplain Fringe
 - Local Flooding
 - Age of Development and Infrastructure
 - Under Capacity Infrastructure
 - Un-Delineated Flood Hazards
 - Wash and Basin Vegetation Maintenance
 - Infill Development



Additional Hazards for Consideration



- Dam and Levee Failure
- Other Non-Flood Related Hazards
 - Climate Change
 - Wildfires
 - Drought
 - Funding



FMP Mtg #2: Assess the Problem



- Life Safety
 - Emergency Warning and Response
 - Evacuations
- Public Health
 - Health Hazards to Individuals – flood waters and mold
- Critical Facilities and Infrastructure
 - Airports, Water Treatment, Fire and Police, Utilities
 - Schools, Hospitals, Senior Care Facilities



FMP Mtg #2: Assess the Problem



- Economy
 - Impacts to Major Employers
- Natural Floodplain Functions
 - Areas Impacted
 - Environmental and Aesthetic Impacts
- Development, Redevelopment, and Population Trends
 - Future Impacts on community, watershed, and natural resources
- Future Flooding Conditions



FMP MTG #3 SET GOALS

- Educate Public, Policy Makers, and City Leaders on Stormwater and Floodplain Management and Risks
- Coordinate with Other Jurisdictions and Agencies to Mitigate Flooding Hazards and Improve Emergency Response
- Protect People, Property and Natural Resources from the Dangers of Flood Hazards
- Protect Critical Infrastructure and Facilities to Ensure Operation during and after Flood Events
- Establish Proactive Maintenance and Preventative Measures for Stormwater Infrastructure



EVALUATE ACTION ITEMS

Educate Public, Policy Makers, and City Leaders on Stormwater and Floodplain Management and Risks

1. Present annually at a City of Phoenix Council Meeting on state of City's stormwater and floodplain.
2. Create an annual stormwater and floodplain management workshop for City leaders, Councilmembers, and Neighborhood Services to help with education and outreach.
3. Develop flyers, CRS Annual Outreach Letter, and a CRS specific webpage for use by the public, City leaders, policy makers, and the City's Neighborhood Services department.
4. Post at least once per month a stormwater, floodplain, or flood insurance related topic on the City's social media platforms.
5. Provide stormwater section bi-annually within the City's water bill for stormwater and floodplain outreach and education purposes.
6. Attend/Present at four neighborhood associations meetings, festivals, or home & garden shows per year to provide information to the public on recent, current, and future stormwater and floodplain projects and the importance of flood insurance.
7. Place signage at City dams to educate the public of the presence of the structure, the need for the structure, and risks.
8. Annual outreach to repetitive loss areas.



EVALUATE ACTION ITEMS

Coordinate with Other Jurisdictions and Agencies to Mitigate Flooding Hazards and Improve Emergency Response

9. Hold annual dam safety and flood response exercises and invite other agencies to participate.
10. Coordinate with the National Weather Service and National Oceanic and Atmospheric Administration for updates to weather forecasting and warnings.
11. Send at least one City staff to a FEMA training/workshop annually for emergency response or floodplain management as credited by CRS Activity 360 – Advisor Training (TNG).
12. Establish a network of Continuously Operating Reference Stations (CORS) throughout the City to provide overlapping coverage to support increased detail in surveys for development and public infrastructure projects.



EVALUATE ACTION ITEMS

Protect People, Property and Natural Resources from the Dangers of Flood Hazards

13. Hold an annual webcast to provide recommendations for proper vegetation maintenance and flood preparedness.
14. Publicize the Flood Concerns Customer Self-Reporting on City's 311 App and Webpage.
15. Require new developments to preserve natural drainage corridors.
16. Promote Green Infrastructure and Low Impact Development to mitigate flooding risks.
17. Complete major projects within the current 5-year Capital Improvement Program – Paradise Ridge Drainage Improvements; Drainage Improvements: 20th Street between Winchcomb Drive and 19th Way; Storm Drain Replacement Study; Laveen Flood Mitigation; and Hohokam Drainage Program.



EVALUATE ACTION ITEMS

Protect Critical Infrastructure and Facilities to Ensure Operation during and after Flood Events

18. Identify and map critical infrastructure and facilities within the City of Phoenix.
19. Evaluate flood risks for critical infrastructure and facilities.
20. Provide flood fight materials at/near critical infrastructure and facilities based on flood risk.
21. Annually update database of critical infrastructure and facilities.
22. Establish or Update Emergency Action Plans to address flood response scenarios for City-owned critical infrastructure and facilities.
23. Update Emergency Action Plans annually for the City's flood control dams.
24. Require elevation or floodproofing of any new or improvements to existing critical infrastructure or facilities.



EVALUATE ACTION ITEMS

Establish Proactive Maintenance and Preventative Measures for Stormwater Infrastructure

- 25. Documentation of maintenance occurring at problematic areas throughout the year. (ST. Maint.)
- 26. Establish requirements and reporting on City-owned drywell maintenance. (ST Maint)
- 26. Publicize City's 311 App and Webpage for reporting maintenance issues.
- 27. Publicize the City's maintenance procedures and work completed each year (social media post and/or water bill).
- 28. Evaluate current stormwater and floodplain requirements, guidelines, regulations, codes, and design manuals for updates.
- 29. Evaluate and update Building Codes on a routine basis (at least every 5 years).
- 30. Develop a publicly facing vegetation maintenance guide for private use for wash corridors, storm drain inlets and outlets, and stormwater storage basins.
- 31. Evaluate and document City-owned stormwater infrastructure for maintenance responsibilities.



EVALUATE ACTION ITEMS

Utilize Public Funding in the Most Effective Manner for Stormwater and Floodplain Management

- 33. Utilize General Obligation Bond funding to mitigate flooding risks.
- 34. Apply for grants through state and federal agencies to reduce the burden on the City for stormwater and floodplain management projects.
- 35. Continue partnership with the Flood Control District of Maricopa County and the Small Projects Assistance Program.
- 36. Evaluate the need and practicality of a stormwater utility fee to establish a dedicated funding resource for the City's stormwater and floodplain needs.
- 37. Evaluate the need to expand impact fees.



ACTION PLAN (EXAMPLE LAYOUT)

Ref #	Action Items	FMP Activity Categories						Priority	Responsible Party	Funding Source	Deadline
		Preventative	Property Protection	Natural Resource Protection	Emergency Services	Structural Projects	Public Information				
FMP Goal 1: Educate Public, Policy Makers, and City Leaders on Stormwater and Floodplain Management and Risks											

NEXT STEPS:

- Review of Draft FMP – Late May through June 2025
- Public Meeting (virtual) – May 22nd
- Neighborhood Presentations – Laveen (April 23)
- FMP Implementation, Evaluation, and Revision (Step 10)

Thank you for your time
and support!





Questions?





FY2025 Phoenix Floodplain Management Plan (ST83140150)

Committee Meeting #5

April 9, 2025, at 9:00 AM – 11:00 AM

MEETING MINUTES

1. Safety moment – Allergy Season

2. Overview of Meetings 1 – 4.

a. Review of Hazards and Problems Identified

b. Review of Updated FMP Goals

- i. Educate Public, Policy Makers, and City Leaders on Stormwater and Floodplain Management and Risks
- ii. Coordinate with Other Jurisdictions and Agencies to Mitigate Flooding Hazards and Improve Emergency Response
- iii. Protect People, Property and Natural Resources from the Dangers of Flood Hazards
 1. Nazar Nabaty: Use reduce the risk instead of "protect" on the phrasing of goals.
 2. Nick Ramirez: Maybe "public safety awareness to mitigate or reduce risk"
- iv. Protect Critical Infrastructure and Facilities to Ensure Operation during and after Flood Events
- v. Establish Proactive Maintenance and Preventative Measures for Stormwater Infrastructure
- vi. Utilize Public Funding in the Most Effective Manner for Stormwater and Floodplain Management

3. Action Items Discussion (Step 8)

a. CRS Manual Action Item Categories

- i. Preventative
- ii. Property Protection
- iii. Natural Resource Protection
- iv. Emergency Services
- v. Structural Projects
- vi. Public Information

b. Group Discussion of Action Item by Goals

Goal 1: Educate Public, Policy Makers, and City Leaders on Stormwater and Floodplain Management and Risks

- These action items notify the same people a lot. The workshop should be held prior to the State of the State Address.
- Stating CRS specific webpage

- Action Items 4 & 6: Combine these and make it quarterly.
- Put social media information in water bill.
- Be more specific on the attendance at garden shows or festivals.
- Signage should be expanded beyond City dams.
- Use County's resources for new, radio and TV ads.
- Action Item 1: Add "program" at the end.
- Action Item 8: Add "provide" to the beginning.
- Action Item 2: This should be reworded; the workshops should include hands-on and educational sections.

Goal 2: Coordinate with Other Jurisdictions and Agencies to Mitigate Flooding Hazards and Improve Emergency Response

- Action Item 10: Make this more inclusive.
- Add clarification like "continue to participate" for things the City is already doing
- Action Item 11: State "have staff attend" instead of "send". Remove "as credited".
- Action Item 11: FEMA may not be funded, maybe do AFMA Conference. There need to be alternatives for the scenario where grants and funding are not available.
- Action Item 12: ADWR opened new stations, maybe city coordinates with them to use the COR station being developed. Maybe add a few more.

Goal 3: Protect People, Property and Natural Resources from the Dangers of Flood Hazards

- Action Item 13: Instead of webcast alone, it should be in person.
- Item 13 - encourage more than webcast, direct outreach, email, social media, media.
- Action Item 13: YouTube tutorial on maintenance
- Action Item 15 & 16: Combine these two items.
- Action Item 15: Use "evaluate" instead of "require" .
- Item 16 - include "promote, incentivize and encourage".
- Action Item 17: Update the public on the projects. Instead of "complete major projects" say "show major progression" or something similar. Use QR codes for people to sign up for project updates.

Goal 4: Protect Critical Infrastructure and Facilities to Ensure Operation during and after Flood Events

- Action Item 23: Review and determine if updates are needed.

Goal 5 & 6: Establish Proactive Maintenance and Preventative Measures for Stormwater Infrastructure & Utilize Public Funding in the Most Effective Manner for Stormwater and Floodplain Management

- Action Item 25: City should have an internal priority list.
- Action Item 26A: clarify the requirements.
- There are new MS4 post construction requirements for new drywells. There are more requirements related to confirming maintenance.
- Action Item 34: There may be no federal grants.
- Action Item 25: Include the cost of maintenance for justifying a project.
- Action Item 27: Put project updates on webpage.
- Action Item 27: Reword. City crew procedures should stay private. Maybe a separate public procedure for HOAs would be public. Clarify this item.
- Action Item 30: Clarify how this would be distributed. This may be an opportunity to coordinate with Army Corp.
- Action Item 31: Include evaluating and documenting recommended recurrence intervals for maintenance.

4. Next Steps

- a. Review of Draft FMP
- b. Public Meeting (virtual) – May 22nd
- c. Neighborhood Presentations – Laveen (April 23)
- d. FMP Implementation, Evaluation, and Revision (Step 10)

5. Adjourn



APPENDIX D. PUBLIC MEETINGS

DRAFT



VIRTUAL PUBLIC MEETING NOTICE

**Floodplain Management Plan
Thursday, May 22 at 6:00 PM**

Virtual (join by computer or phone)

This property address is located in or near a location that could be affected by flooding activity. The City of Phoenix is hosting an educational virtual meeting on May 22, 2025 at 6:00 p.m. to invite your input as the city updates its Floodplain Management Plan. Community input is key to providing a well-rounded plan to mitigate against flooding and protect people, property, and the natural environment. Learn more and register to attend the May 22, 2025 meeting by scanning the QR code.

AVISO DE REUNIÓN PÚBLICA VIRTUAL

**Plan de Gestión de Llanuras Inundables
Jueves 22 de mayo a las 6:00 PM**

Virtual (únase por computadora o teléfono)

La dirección de esta propiedad se encuentra en o cerca de una zona con riesgo de inundación. La Ciudad de Phoenix organizará una reunión virtual el 22 de mayo de 2025 a las 6:00 p.m. para solicitar su opinión mientras la ciudad actualiza su Plan de Gestión de Llanuras Inundables. La opinión de la comunidad es fundamental para desarrollar un plan integral para mitigar las inundaciones y proteger a las personas, las propiedades y el medio ambiente. Obtenga más información e inscribese para asistir a la reunión del 22 de mayo de 2025 escaneando el código QR.

WEBSITE/SITIO WEB: [Phoenix.gov/Streets/Meetings](https://phoenix.gov/streets/meetings)

If you require reasonable accommodations for this process, please contact the project hotline. This notice can be made available in an alternate format upon request by calling 602-262-6284.

Si necesita adaptaciones razonables para este proceso, comuníquese con la línea del proyecto. Este aviso puede estar disponible en un formato alternativo a pedido llamando al 602-262-6284.





City of Phoenix

Street Transportation Department
200 West Washington Street, 5th Floor
Phoenix, Arizona 85003

PRESORT
FIRST CLASS
U.S. POSTAGE
PAID
PHOENIX, AZ
PERMIT 968

Public Meeting promotion

- 3,757 postcards mailed to properties in flood risk boundary
- 5-6-25 1 post to NextDoor
- 5-11-25 1 each Instagram, Facebook and X posts
- 5-16-25 1 each Facebook and X posts
- 5-20-25 1 Instagram post



**City of Phoenix** 
Street Transportation Department · 6 May · Edited

Join the City of Phoenix Floodplain Management team for a presentation and updates to the Floodplain Management Plan, and stay for an insightful Q&A with the team.

The team is also launching a survey seeking Phoenix resident input on providing a well-rounded plan to mitigate against flooding and protect people, property, and the natural environment for years to come.

For more info and to register to attend this free virtual meeting, visit [Phoenix.gov/Streets/FMP](https://phoenix.gov/Streets/FMP).

22
May

Public Meeting: Floodplain Management Plan
6:00 PM ·



Posted to **Subscribers of City of Phoenix**

 **5**  **1** · 4,210 Impressions  

**Street Transportation Department**  **City of Phoenix** · 2w
Take the survey now at www.surveymonkey.com/r/QDP2WZ3!

 **1**  Reply  Share 



2025 FLOODPLAIN MANAGEMENT PLAN

Public meeting:
May 22, 2025



Floodplain Management

1

INTERPRETER

ESCUCHAR EN ESPAÑOL

Marque 602-534-1000,
luego el número de
reunión, 57271, y luego
apriete el #.

Floodplain Management

2

INTERACTING ON WEBEX





3

CITY ENGINEER WELCOME ERIC FROBERG





4

4

PROJECT TEAM

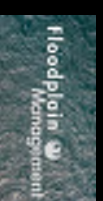
Nazar Nabaty – Project Manager, Floodplain Administrator, and

Floodplain Management Group Manager

Nick Ramirez – Principal Engineering Tech

Matt Hann – Consultant (Black & Veatch)

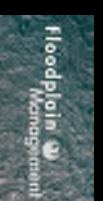
Zaria Sanchez – Consultant (Black & Veatch)



5

MEETING AGENDA

- National Flood Insurance Program
- Community Rating System
- What is the Floodplain Management Plan?
- Floodplain Management Plan Development
- Timeline
- How can you get involved?
- Q&A



6

6

NATIONAL FLOOD INSURANCE PROGRAM (NFIP)

- National Flood Insurance Act of 1968
 - Reducing future flood damage
 - Protecting property owners
- Mapping
- Flood Insurance
- Regulations
- Community Rating System (CRS)



7

7

COMMUNITY RATING SYSTEM (CRS)

- Voluntary Incentive Program
- Above and beyond the NFIP minimum requirements
- Incentives for flood insurance premiums
- Phoenix - Class 5 Community (25% Flood Insurance Premium Reduction)

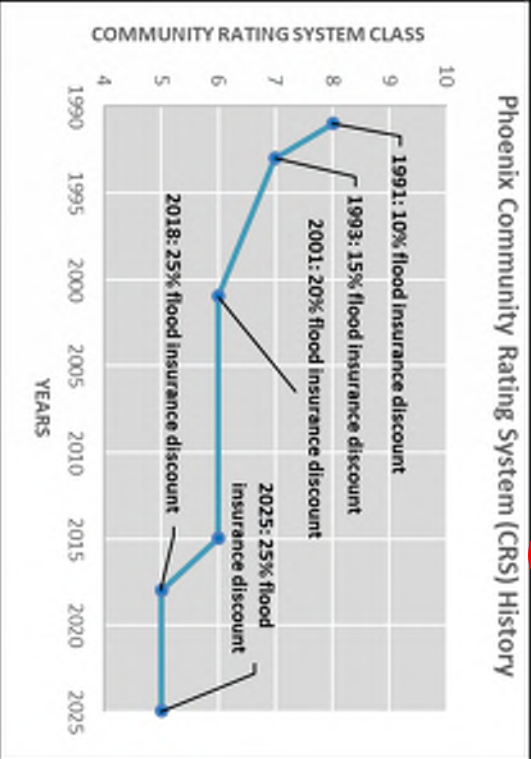
CRS Classes and Discount Table										
CRS Class	10	9	8	7	6	5	4	3	2	1
CRS Discount (Premium Reduction)	0%	5%	10%	15%	20%	25%	30%	35%	40%	45%



8

8

CRS Classes and Discount Table										
CRS Class	10	9	8	7	6	5	4	3	2	1
CRS Discount (Premium Reduction)	0%	5%	10%	15%	20%	25%	30%	35%	40%	45%



9

- Part of the Community Rating System (CRS)
- Identifies flood hazards
- Sets goals
- Provides recommendations to address the City's vulnerability to flooding
- Updates existing Floodplain Management Plan
 - As required by Community Rating System

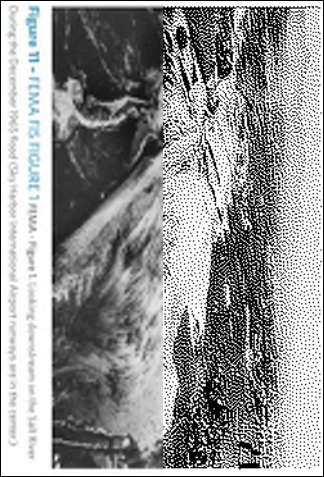


Figure 11 - FEMA FIS PROJECT 1 HMA, Figure 1: Linking downstream to the Salt River
During the December 1965 flood (City historian interviewed during summer and fall 1999)



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FLOODPLAIN MANAGEMENT PLAN (FMP) COMMITTEE

- Development partners:
 - Arizona Department of Transportation
 - Arizona Department of Water Resources
 - Arizona State Land Department
 - Flood Control District of Maricopa County
 - Maricopa County Department of Emergency Management
 - National Weather Service
 - City of Phoenix Residents



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FLOODPLAIN MANAGEMENT PLAN (FMP) DEVELOPMENT STEPS

- Step 1 – Organize
- Step 2 – Involve the Public
- Step 3 – Coordinate
- **Step 4 – Assess the Hazard (FMP Committee Meeting #1)**
- **Step 5 – Assess the Problem (FMP Committee Meeting #2)**
- **Step 6 – Set Goals (FMP Committee Meeting #3)**
- **Step 7 – Review Possible Actions (FMP Committee Meeting #4)**
- **Step 8 – Draft an Action Plan (FMP Committee Meeting #5)**
- Step 9 – Adopt a Plan
- Step 10 – Implement, Evaluate, and Revise



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2025 FLOODPLAIN MANAGEMENT PLAN (FMP) HAZARDS IDENTIFIED

- Special Flood Hazard Areas (Floodplains)
- Transitions from Mountain to Urban
- Dams and Levees
- Other Non-Flood Related Hazards
 - Wildfires
 - Drought
 - Funding

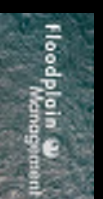


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13

2025 FLOODPLAIN MANAGEMENT PLAN (FMP) GOALS

- **Educate** public, policy makers, and City leaders on stormwater and floodplain management and risks
- **Coordinate** with other jurisdictions and agencies to mitigate flooding hazards and improve emergency response
- **Reduce the danger of flood hazards** to people, property, critical infrastructure/facilities, and natural resources



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2025 FLOODPLAIN MANAGEMENT PLAN (FMP) GOALS

- Enhance **proactive maintenance** and **preventive** measures for stormwater infrastructure
- Seek additional **public funding** opportunities to support stormwater and floodplain management



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2025 FLOODPLAIN MANAGEMENT PLAN (FMP) DRAFT ACTION ITEMS

- **Action items support the FMP Goals through the following categories:**
 - Preventive (Regulatory & Maintenance)
 - Property Protection
 - Natural Resource Protection
 - Emergency Services
 - Structural Projects (e.g., Storm drains, channels)
 - Public Information



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2025 FLOODPLAIN MANAGEMENT PLAN (FMP) EXAMPLE DRAFT ACTION ITEMS

- **Preventive (Regulatory & Maintenance)**
 - Continue frequent review of regulations and requirements for updates.
 - Evaluate City-owned storm drain infrastructure for maintenance, repair, and rehabilitation needs.

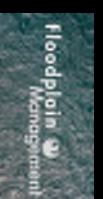


17

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2025 FLOODPLAIN MANAGEMENT PLAN (FMP) EXAMPLE DRAFT ACTION ITEMS

- **Property Protection**
 - Public outreach and education.
 - Provide additional information and guidelines for drainage infrastructure maintenance on private property.



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2025 FLOODPLAIN MANAGEMENT PLAN (FMP) DRAFT ACTION ITEMS

• Natural Resource Protection

- Promote the preservation of natural drainage corridors in new developments.
- Promote the use of Green Stormwater Infrastructure and Low Impact Development (examples: bioswales, infiltration basins, detention/retention systems).



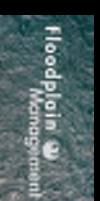
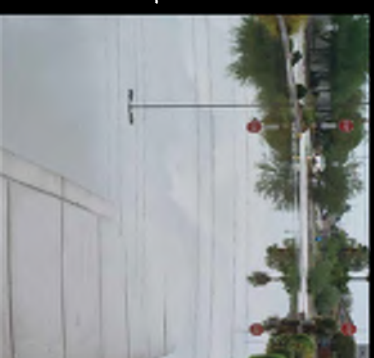
19

19

2025 FLOODPLAIN MANAGEMENT PLAN (FMP) DRAFT ACTION ITEMS

• Emergency Services

- Continue to conduct annual dam safety/flood response exercises.
- Continue ongoing coordination with other local and regional agencies for flood warnings and emergency response.



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2025 FLOODPLAIN MANAGEMENT PLAN (FMP) DRAFT ACTION ITEMS

- **Structural Projects (e.g., Storm drains, channels)**
- Complete stormwater and flood reduction projects within the current Capital Improvement Plan, General Obligation Bond, and American Rescue Plan Act (ARPA).



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2025 FLOODPLAIN MANAGEMENT PLAN (FMP) DRAFT ACTION ITEMS

- **Public Information**
- Annual stormwater and floodplain management workshop.
- Utilize social media to post about stormwater and floodplain management education.



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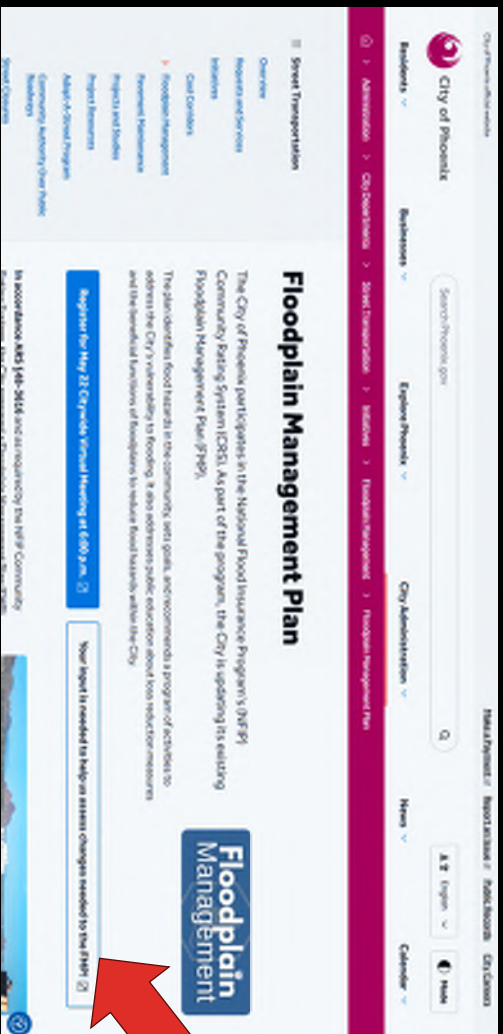


24



<https://phoenix.gov/streets/fmp>

PUBLIC SURVEY ACCESS



25

QUESTIONS...?



FMP Public Survey

<https://www.surveymonkey.com/r/QDP2WZ3>



City's FMP Webpage

<https://phoenix.gov/streets/fmp>



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Name	Wish to Speak?
Valerie Denny	No
Mary Hayes	No
Shelly Jamison	Yes
Joan Petersen	No
Donald Sterusky	
Evan Pochert	No
David Bell	No
Lisa Cooper	Yes
Stanley Gering	No
Carrie Cook	Yes
Ruben Sepulveda	
Lisa Knight	No
Annette Petzel	No
Antonio Payan	No
Julie Robbins	
Monica Sandoval	No
Jeffery Wardlaw	No
Stephen Rowe	No
Stephen Jennings	Yes
Fred Goldman	No
Kimberly Villabon	Yes
James Kahler	No
Rachel Hernandez	No
Luus Saenz	No
Maribel Mounts	Yes
Julian Espinosa	No
Ynez Chacon	No
Sarah Ocampo	No
Robert Medland	No
Susan Medland	No
Derek SHank	No
Julianne Birdt	
marilyn szabo	Yes
Peter Flynn	No
Christine Luksik	No
Alaina Montanaro	No
John Regester	No
Ted Crowley	No
Kevin C James	
Israel Elizalde	
Frances Navarro	Yes
Kathryn Gross	No
Norma Johnson	No
bob eichinger	No



APPENDIX E. PROGRESS REPORT TEMPLATE

DRAFT



EXAMPLE PROGRESS REPORT

City of Phoenix, Arizona Floodplain Management Plan Annual Progress Report

Reporting Period: *(Insert reporting period)*

Background: The City of Phoenix developed a floodplain management plan (2025 FMP) to reduce risk from flooding by identifying resources, information, and strategies for risk reduction. To prepare the 2025 FMP, the City organized resources, assessed risks from flooding, developed planning goals and objectives, reviewed mitigation alternatives, and developed an action plan to address probable impacts from floods. Stafford Act. The 2025 FMP can be viewed on-line at:

[INSERT WEBPAGE](#)

Summary Overview of the Plan's Progress: The performance period for the 2025 FMP began on ____, 2025, with the final approval of the plan by FEMA. The initial performance period will be 5 years, with an anticipated update to the plan to occur before ____, 2030. As of this reporting period, the performance period is considered to be __% complete. The 2025 FMP has targeted 79 floodplain management actions to be pursued during the 5-year performance period. As of the reporting period, the following overall progress can be reported:

- __ out of __ actions (__%) were reported as being in progress toward completion.
- __ out of __ actions (__%) were reported as being complete.
- __ out of __ actions (__%) were reported as ongoing capabilities that are now completed on a regular or annual basis.
- __ out of __ actions (__%) reported no action taken.

Purpose: The purpose of this report is to provide an annual update on the implementation of the action plan identified in the 2025 FMP. The objective is to ensure that there is a continuing and responsive planning process that will keep the 2025 FMP dynamic and responsive to the needs and capabilities of the City and stakeholders. This report discusses the following:

- Flood events that have occurred within the last year
- Changes in risk exposure within the City of Phoenix
- Mitigation success stories
- Review of the action plan
- Changes in capabilities that could impact plan implementation
- Recommendations for changes/enhancement.

The Floodplain Management Plan FMP Committee: The Floodplain Management Plan FMP Committee, made up of stakeholders within the City of Phoenix, reviewed and approved this progress report at its



annual meeting held on ____, 202__. It was determined through the 2025 FMP's development process that a FMP Committee would remain in service to oversee maintenance of the 2025 FMP. At a minimum, the FMP Committee will provide technical review and oversight on the development of the annual progress report. It is anticipated that there will be turnover in the membership annually, which will be documented in the progress reports. For this reporting period, the FMP Committee membership is as indicated in Table E-1.

Table E-1. FMP Committee Members

Name	Title	Jurisdiction/Agency

Flood Events: During the reporting period, there were __ flood events in the City of Phoenix that had a measurable impact on people or property. A summary of these events is as follows:

- _____
- _____

Changes in Risk Exposure: *(Insert brief overview of any flood event in the City of Phoenix that changed the probability of occurrence of flooding as presented in the FMP2020)*

Mitigation Success Stories: *(Insert brief overview of mitigation accomplishments during the reporting period)*

Review of the Action Plan: Table E-2 reviews the action plan, reporting the status of each action. Reviewers of this report should refer to the 2025 FMP for more detailed descriptions of each action and the prioritization process.

Address the following in the "status" column of the following table:

- Was any element of the action carried out during the reporting period?



- ### Table E-2. Action Plan Matrix

Completion status legend:
✓= Project Completed
O = Action ongoing toward completion
X = No progress at this time



Changes That May Impact Implementation of the Plan: *(Insert brief overview of any significant changes in the City of Phoenix that would have a profound impact on the implementation of the 2025 FMP. Specify any changes in technical, regulatory, and financial capabilities identified during the plan's development)*

Recommendations for Changes or Enhancements: Based on the review of this report by the Floodplain Management Plan FMP Committee, the following recommendations will be noted for future updates or revisions to the 2025 FMP:

- _____
- _____
- _____
- _____
- _____
- _____

Public Review Notice: The contents of this report are considered to be public knowledge and have been prepared for total public disclosure. Copies of the report have been provided to the City of Phoenix governing board and to local media outlets and the report is posted on the City's floodplain management plan website. Any questions or comments regarding the contents of this report should be directed to:

Insert Contact Info Here



APPENDIX F. FLOODPLAIN MANAGEMENT PLAN CREDIT CHECKLIST

DRAFT

**510 FLOODPLAIN MANAGEMENT PLANNING**

Insert Name of Plan

512.a Floodplain Management Planning (FMP)

Credit Points: Enter the section or page number in the plan where each credited item can be found. Add notes on AW-510-4.

CRS Step	Section/Page	Score	Total
1. Organize to prepare the plan. (15 Max)			
a. Involvement of Office Responsible for Community Planning (4)			
b. Planning committee of department staff (9)			
c. Process formally created by the community's governing board (2)			
2. Involve the public. (120 Max)			
a. Planning process conducted through a planning committee (60)			
b. Public meetings held at the beginning of the planning process (15)			
c. Public meeting held on draft plan (15)			
d. Other public information activities to encourage input (Up to 30)			
3. Coordinate with other agencies. (35 Max)			
a. Review of existing studies and plans (required) (5)			
b. Coordinating with communities and other agencies (Up to 30)			
4. Assess the hazard. (Max 35)			
a. Plan includes an assessment of the flood hazard (REQUIRED) with:			
(1) A map of known flood hazards (5)			
(2) A description of known flood hazard (5)			
(3) A discussion of past floods (5)			
b. Plan includes assessment of less frequent floods (10)			
c. Plan includes assessment of areas likely to flood (5)			
d. The plan describes other natural hazards (REQUIRED FOR DMA) (5)			
5. Assess the problem. (Max 52)			



- a. Summary of each hazard identified in the hazard assessment and their community impact (REQUIRED) (2)
 - b. Description of the impact of the hazards on: (Max 25)
 - (1) Life, safety, health, procedures for warning and evacuation (5)
 - (2) Public health including health hazards to floodwaters/mold (5)
 - (3) Critical facilities and infrastructure (5)
 - (4) The community's economy and tax base (5)
 - (5) Number and type of affected buildings (5)
 - **c. Review of all damaged buildings/flood insurance claims (5)
 - ** RL Category: (Insert A, B or C)
 - d. Areas that provide natural floodplain functions (5)
 - e. Development/redevelopment/Population Trends (7)
 - f. Impact of future flooding conditions outlined in Step 4, item c (8)
6. Set goals. (required) (2)
7. Review possible activities. (Max 35)
- a. Preventive activities (5)
 - b. Floodplain Management Regulatory/current & future conditions (5)
 - c. Property protection activities (5)
 - d. Natural resource protection activities (5)
 - e. Emergency services activities (5)
 - f. Structural projects (5)
 - g. Public information activities (5)
8. Draft an action plan. (Max 60)
- a. Actions must be prioritized (required)
 - 1. Recommendations for activities from two of the six categories (10)
 - 2. Recommendations for activities from three of the six categories (20)



- 3. Recommendations for activities from four of the six categories (30)
- 4. Recommendations for activities from five of the six categories (45)
 - b. Post-disaster mitigation policies and procedures (10)
 - c. Action items for mitigation of other hazards (5)
- 9. Adopt the plan. (2) (Insert date of adoption)
- 10. Implement, evaluate and revise. (Max 26)
 - a. Procedures to monitor and recommend revisions (required) (2)
 - b. Same planning committee or successor committee that qualifies under Section 511.a.2 (a) does the evaluation (24)

FMP=

Notes/Comments: Note if step 5c is missed, or if score is capped at 50 points, reference FEMA approval



APPENDIX G. FLOODPLAIN MANAGEMENT PLAN ADOPTION

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