City of Alamogordo Hazard Mitigation Plan

XXX 2018

Encompassing the Jurisdictions of:
City of Alamogordo, New Mexico

Prepared by:

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Executive Summary

The City of Alamogordo Hazard Mitigation Plan is being developed to update and revise hazard mitigation activities for City of Alamogordo, New Mexico. The City of Alamogordo Mitigation Planning Committee (MPC) will evaluate mitigation measures to be undertaken and outline a strategy for implementation of mitigation projects. This plan covers one jurisdiction, the City of Alamogordo.

Formal adoption and implementation of a hazard mitigation plan may present many benefits to City of Alamogordo. By identifying problems and possible solutions in advance of a disaster, City of Alamogordo will be in a better position to obtain pre- and post-disaster funding from the Federal Emergency Management Agency (FEMA).

This document aims to produce the following strategic outcomes:

1) Reduce loss of life and decrease property losses to City of Alamogordo due to natural disasters; and
2) Provide the framework and coordination to encourage government, and both public and private sector organizations at all levels, to undertake mitigation to minimize potential disasters and to employ mitigation strategies in the recovery following disasters.

Specifically, these strategic outcomes will be brought about through the following planning process:

1) Identify, describe and characterize the hazards to which City of Alamogordo are susceptible
2) Assess the risk of each hazard, including probability, frequency, exposure and vulnerability
3) Examine feasible mitigation opportunities appropriate for the identified hazards, and prioritize those opportunities
4) Implement mitigation actions to reduce loss of lives and damage to property
5) Identify mitigation opportunities for long-term planning consideration

Acronyms

BFE – Base Flood Elevation
BPS – Bold Planning Solutions
DFIRM – Digital Flood Insurance Rate Map
DMA 2000 – Disaster Mitigation Act of 2000
EMS – Emergency Medical Services
EMA – Emergency Management Agency
EOP – Emergency Operations Plan
FEMA – Federal Emergency Management Agency
FIRM – Flood Insurance Rate Map
FMA – Flood Mitigation Assistance Grant Program
FP&S – Fire Prevention and Safety Grants
FOUO – For Official Use Only
GIS – Geographic Information System
HMGP – Hazard Mitigation Grant Program
HMP – Hazard Mitigation Plan
MPC – Mitigation Planning Committee
ICS – Incident Command System
I/CFs – Infrastructure and Critical Facilities
AEPC – Local Emergency Planning Committee
MPC – Mitigation Planning Committee
MTDES – New Mexico Disaster and Emergency Services
MTDNRC – New Mexico Department of Natural Resources Conservation
NEHRP – National Earthquake Hazards Reduction Program
NEIC – National Earthquake Information Center
NFHL – National Flood Hazard Layer
NFIP – National Flood Insurance Program
NOAA – National Oceanic and Atmospheric Administration
NCEI – National Center for Environment Information
NWS – National Weather Service
OEM – Office of Emergency Management
HMP – Hazard Mitigation (Plan)
POC – Point of Contact
RFP – Request for Proposal
SS – Severe Storms
SOP – Standard Operating Procedure
SRL – Severe Repetitive Loss
SSURGO – Soil Survey Geographic Database
USACE – United States Army Corps. Of Engineers
USDA – United States Department of Agriculture
USGS – United States Geological Survey
WID – Watershed Improvement District
WS – Winter Storm
WUI – Wildland Urban Interface

Introduction to Mitigation

The Emergency Management Cycle & Mitigation

Understanding this cycle is the first step in effectively planning and operating in relation to all disaster-related activities. The emergency management cycle is an open-ended and ongoing process. The four phases in the process are mitigation, preparedness, response and recovery. Each phase of the cycle can last years, or only moments in length, while different paths can exist simultaneously.

Mitigation planning is the process of determining how to reduce or eliminate loss of life and damage to property resulting from natural disasters.

It is carried out as any sustained action to reduce or eliminate long-term risk to life and property from a hazard event. Mitigation encourages long-term reduction of hazard vulnerability. As is the goal of emergency management, so is the goal of mitigation to save lives and reduce property damage.

The Disaster Mitigation Act of 2000 (DMA 2000)

In the past, federal legislation has provided funding for disaster relief, recovery, and some hazard mitigation planning. The Disaster Mitigation Act of 2000 became law on October 30, 2000 and amends the Robert T. Stafford Disaster Relief and Emergency Assistance Act (the “Stafford Act”) (Public Law 93-288, as amended). Regulations for this activity can be found in Title 44 of the Code of Federal Regulations Part 206, Subpart M.

This legislation reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur. This act establishes a hazard mitigation program and new requirements for the national post-disaster Hazard Mitigation Grant Program.

Section 322 of the act specifically addresses mitigation planning at the state, local, and tribal levels. It identifies new requirements that allow HMGP funds to be used for mitigation planning activities and increases the amount of HMGP funds available to states that have developed a comprehensive, enhanced mitigation plan prior to a disaster. States and communities must have an approved mitigation plan in place prior to receiving post-disaster HMGP funds. Local and tribal mitigation plans must demonstrate that their proposed mitigation measures are based on a sound planning process that accounts for the risk to and the capabilities of the individual communities and identifiable gaps.

DMA 2000 is intended to facilitate cooperation between state and local authorities, prompting them to work together. It encourages and rewards local and state hazard planning and promotes sustainability as a strategy for disaster resistance. This enhanced planning network will better enable local and state governments to articulate accurate needs for mitigation, resulting in faster allocation of funding and more effective risk reduction projects. To implement the new DMA 2000 requirements, FEMA prepared an interim final rule, published in the Federal Register on February 26, 2002, at 44 CFR Parts 201 and 206, which establishes planning and funding criteria for states and local communities.

On October 31, 2007, FEMA subsequently published an Interim Rule in the Federal Register, which ensures the Flood Mitigation Assistance (FMA) program planning requirements are consistent with the

mitigation planning regulations as cited in the Code of Federal Regulations (CFR) at Title 44, Chapter 1, Part 201 (44CFR Part 201).

This interim rule established that local communities must comply with mitigation planning requirements to be eligible to apply for FEMA mitigation project grant funding, including Flood Mitigation Assistance Grant Program and FEMA's Severe Repetitive Loss (SRL) Program. Meeting the requirements of the regulations cited above ensures participating jurisdictions in the planning area will be eligible to receive disaster assistance, including hazard mitigation grants available through the Robert T. Stafford Disaster Relief and Emergency Assistance Act, P.L. 93-288, as amended.

City of Alamogordo has the responsibility to coordinate activities relating to hazard evaluation and mitigation, and to prepare and submit to FEMA a local hazard mitigation plan, following the criteria established in 44 CFR 201.6 and Section 322 of the DMA 2000 (Public Law 106- 390).

Section 1 – Planning Process

Planning Process
- Plan Development
- Stakeholder Participation
- Community Involvement

Local Procedures & Resources

Planning Area

Hazard Risk Assessment

Mitigation Strategy

1.1 – Plan Introduction

The City of Alamogordo hazard mitigation plan is a single jurisdictional plan. Planning team members actively participated in meetings, solicited input from community members, and ensured that all jurisdiction information was reflected in the plan.

If a planning team member could not attend a meeting they were called via telephone, and all documentation which was presented at the meeting was delivered to the team member. The phone call consisted of a brief overview of the meeting along with time for the planning team member to make his or her suggestions or comments. A detailed description of the planning process, including a list of contributions from each jurisdiction, is provided in Section 1.3.2 Jurisdictions while a complete list of planning team participation is in section 1.4 – Stakeholder Participation.

1.2 – Plan Update

The City of Alamogordo hazard mitigation plan has undergone significant revision and upgrading since its last edition. Not only has the city made significant efforts to improve the functionality and effectiveness of the plan itself but it has significantly improved its hazard mitigation program. The level of analysis and detail included in this risk assessment is far greater than the previous edition of the plan. This grants the cities improved and robust hazard mitigation program a better base to further mold and improve its mitigation strategy over the next five years.

As part of this planning effort, each section of the previous mitigation plan was reviewed and analyzed. The sections were reviewed against the following elements:

- Compliance with the current regulatory environment
- Completeness of data
- Correctness of data
- Capability differentials
- Current state environment

Based on the above criteria, each section of the previous hazard mitigation plan was reviewed and revised, as required. In addition to data revisions, the format and sequencing of the previous plan was updated for ease of use and plan clarity.

1.3 – Plan Development

1.3.1 – Plan Drafting Stage

City of Alamogordo's revision process began in 2015, when the City of Alamogordo applied for a planning grant via the State of New Mexico Department of Homeland Security Emergency Management. The City was awarded the grant to begin the process of updating their previously approved Hazard Mitigation Plan (HMP). Following the funding commitments, International Consulting Associates, LTD was hired to update the plan. Due to unforeseen circumstances, the plan write-up was stalled.

City of Alamogordo then contracted with BOLDplanning to complete the process. BOLDplanning's hazard mitigation plan process was initiated on December 14, 2017. BOLDplanning is editing the previously started project and completing the HMP. Based upon BOLDplanning the circumstances (editing an already started plan), the HMP team decided to use the previous community involvement meetings.

September 23, 2014 was the kick-off meeting for plan stakeholders and was attended by community members and stakeholders. During this meeting the HMP purpose and goals were explained to the community. Input on potential hazards was solicited from community members and stakeholders. The initial HMP team was instructed to solicit interested persons from their community to participate on the planning team.

Three other planning events were held throughout the planning process and attendance included citizens from the City, City Departments, and stakeholders for facilitating a public discussion on the publics concerns for natural hazards within the city.

The final meeting (hearing) was held on August 28, 2017 with written notification for those who could not be in attendance soliciting input from the public. This was done in conjunction with an on-line questionnaire to ensure that all residents and stakeholders were provided an opportunity to participate in the discussions.

Throughout the HMP process, the public was provided with opportunities to review HMP drafts, ask questions, and provide input on hazards. The public was invited to provide feedback on mitigation project prioritization, hazard identification, and hazard ranking. Local Emergency Planning Committee (LEPC) meetings addressed the plan's progress and purpose at each monthly meeting. Details and documentation of the LEPC's and the public's participation can be found in Appendix A – Public Participation.

Planning Process Summary

1) City of Alamogordo appointed a jurisdictional representative along with other stakeholders and the BOLDplanning Mitigation department.

2) The City of Alamogordo engaged BOLDplanning to provide staff support in facilitating the planning process and preparing the plan.

3) Meetings were held with team members to understand and agree on planning processes and steps required including organizing resources, assessing hazards, developing a mitigation plan, implementing the plan, and monitoring progress.

1.3.2 - Jurisdictions

The following table lists the participating jurisdictions of City of Alamogordo, their lead representative contact during the HMP's development, and their MPC contributions by development phase.

Table 1: Jurisdictional Contribution by Planning Phase

Table 1 - Jurisdictional Contribution by Planning Phase				
Jurisdiction & Representative	**Planning Process**	**Risk Assessment**	**Mitigation Strategy**	**Plan Maintenance**
City of Alamogordo Chief Jim LeClair, Fire Chief of the Alamogordo Fire Department, Emergency Manager for the City of Alamogordo	• Participated in MPC • Provided information on critical facilities, hazards, POCs • POC and lead jurisdiction for the MPC	• Completed hazard history documentation • Completed risk assessment questionnaire • Reviewed risk assessment	• Provided mitigation projects and actions history • Proposed mitigation projects • Prioritizing mitigation projects using STAPLE+E	• Will participate in the AEPC as prescribed in Section 2 – Plan Maintenance

1.3.3 – Major Mitigation Planning Meetings

The City of Alamogordo MPC held various public meetings to discuss the mitigation plan update process as well as gain public support and input for the plan. The following is a brief synopsis of those meetings. Proof of meetings, sign in sheets, and public notification documentation can be found in Appendix A – Public Participation.

Mitigation Planning Committee Kick-Off Meeting
23 September 2014
International Consulting Associates, ITD met with the MPC to conduct an initial kick-off meeting. The hazard mitigation process was defined, the purpose of an HMP was explained, the MPC discussed how to get the community involved, and what hazards they thought should be included in the plan.

Stakeholder and Public Kick-Off Meeting
14 May 2015
A public announcement was made by International Consulting Associates, ITD in partnership with the City of Alamogordo. ITD met with stakeholders and the public to conduct a kick-off meeting. The hazard mitigation process was defined, the purpose of an HMP was explained and a discussion was had on what hazards the city thought should be included in the plan.

Stakeholder Kick-Off Meeting
26 May 2015
A public announcement was made by International Consulting Associates, LTD in partnership with the City of Alamogordo. They met with stakeholders and the public to conduct a kick-off meeting. The hazard mitigation process was defined, the purpose of an HMP was explained and a discussion was had on what hazards the stakeholders thought should be included in the plan.

Plan Review Meeting
20 August – 24 August 2018
The Hazard Mitigation Plan Draft was posted on the City of Alamogordo website so that the public could review and comment on the draft of the plan. Fire Chief Jim LeClair also made himself and the plan physically available on August 22, 2018 at the Fire House so that the public had the opportunity to read and comment in person. BOLDplanning's Hazard Mitigation Plan writer, Brittney Whatley, was available by phone for any questions or comments the public may have had.

Hazard Mitigation Plan Adoption Signing
To be Determined
The City of Alamogordo Hazard Mitigation Plan adoption letters will be disseminated and signed by the City. The signing of this resolution codifies the adoption of the HMP by the participating stakeholders.

1.4 – Stakeholder Participation

The City of Alamogordo MPC is made up of stakeholders working together for the development and ongoing maintenance of this plan. The participants are grouped into actively participating representatives from the participating communities within City of Alamogordo.

Mitigation Planning Committee
This group consists of planners from the city of Alamogordo to include the Fire department, the city manager's office, the Police department, the Hazard mitigation department, the GIS Department, representatives from the state of New Mexico, and BOLDplanning.

The public
FEMA requires this planning effort to be open to constant input from interested citizens in compliance with the Sunshine Laws. In New Mexico, public meetings must comply with the New Mexico Open Meetings Law unless established by statutory exemption. Therefore, any citizen who wishes to be involved in this effort to mitigate future disasters is encouraged to attend the MPC meetings and to solicit relevant comments to be included in the draft sections of the written plan.

The following table (Table 2) details the stakeholders and MPC members who participated in the hazard mitigation planning process. This list contains all relevant local and state agencies involved in hazard mitigation activities, agencies that have the authority to regulate development, and any appropriate neighboring communities. Due to employee turnover and departmental changes, the table below also contains new MPC members. These members were not a part of previous planning meetings. However, they have filled positions of the former MPC members. For consistency we have denoted MPC members who no longer work for the city and we have also added the new members. New members have been an integral part of this plan update and they will also be key partners in the updates moving forward.

Table 1: Stakeholders and MPC Members

Table 1 - Stakeholders & MPC Members			
Name	**Organization**	**Position**	**Collaboration/Invitation**
Principal Plan Developers			
Brittney Whatley	BOLDplanning	Mitigation Planner	Project Manager and Mitigation Specialist
Cassandra Wolff	BOLDplanning	GIS Analyst	GIS coordinator
Local Governments			
Jim LeClair	City of Alamogordo	Fire Chief / Emergency Manager	Represented jurisdiction and provided input
Brian Cesar	City of Alamogordo	Assistant City Manager	Provided additional support and input
Tony Pistilli	City of Alamogordo	GIS Technician	Provided additional support and input
*Marc South	City of Alamogordo	City Planner	Provided additional support and input
Nancy Beshaler	City of Alamogordo	Project Manager / Flood Plain Manager	Provided additional support and input
*Nancy Jacobs	City of Alamogordo	City Clerk	Provided additional support and input
*Mikel Ward	City of Alamogordo	Fire Chief	Provided additional support and input
*Jim Stahle	City of Alamogordo	City Manager	Provided additional support and input
*Robert Duncan	City of Alamogordo	Police Chief	Provided additional support and input
J Armstrong	City of Alamogordo	Executive Administrator for the Alamogordo Fire Department	Provided additional support and input
*Julia Garza	City of Alamogordo	Executive Assistant to City Manager	Represented jurisdiction and provided input
*Ruben Segura	City of Alamogordo	City Planner	Provided additional support and input
State & Federal Agencies			
Kevin Dodge	State of New Mexico		Provided additional support and input
New MPC Members			
Darron Williams	City of Alamogordo	City Planner	Provided additional support and input
Rachel Hughs	City of Alamogordo	City Clerk	Provided additional support and input
Maggie Paluch	City of Alamogordo	City Manager	Provided additional support and input
Brian Peete	City of Alamogordo	City Police Chief	Provided additional support and input
Cheryl Otero – Baker	City of Alamogordo	Executive Assistant to City Manager	Provided additional support and input

**Denotes employee no longer works for the city, positions have been filled by employees listed under the New MPC Members list*

1.5 – Community Involvement

The City of Alamogordo MPC provided opportunities for neighboring communities, agencies, businesses, academia, nonprofits and other interested parties to be involved in the planning process. The public was notified of open meetings via City of Alamogordo's website, letters and emails. BOLDplanning and the City of Alamogordo invited all non-covered jurisdictions, including school districts, to participate in the plan. Any jurisdiction or school district not covered in this HMP is either covered under another plan or declined to participate. Emergency managers from neighboring counties were invited to attend the public draft review meeting. For two weeks prior to each public meeting, an announcement was placed on the City of Alamogordo website and sent via letters. Please see Appendix A – Public Participation for documentation.

At the first public planning meeting, attendees ranked and identified hazards and completed a risk assessment questionnaire. During this meeting and the last public review hearing, concerned citizens and other parties were invited to review the most current draft, provide any input or feedback, and ask any relevant questions of the City of Alamogordo MPC and BOLDplanning.

Relevant federal, regional, state, local, and tribal governments, as well as any private and non-profit organizations were invited to provide input and technical expertise. The entities, who volunteered, either in person or by providing hazard data, are listed in the following table.

Table 2: Partner Involvement by Entity

Table 2 - Partner Involvement by Entity		
Entry Classification	**Entity**	**Entity Input**
Federal Agencies	National Parks, NOAA	Provided weather data, land use data and geological data
State Agencies	NM DHSEM	Provided oversight and technical assistance.
Local Governments	City of Alamogordo and Participating Municipalities	MPC members, principle subjects. Provided input.
Private Organizations	BOLDplanning	Directed planning effort, principle planners. Provided input from various interests.

Section 2 – Local Procedures & Resources

2.1 – Available Resources

2.1.1 – Documentation Resources

The MPC conducted a comprehensive review of City of Alamogordo to determine the availability of existing emergency management and preparedness information.

City of Alamogordo Critical Facilities List
The MPC compiled a list of critical facilities and pertinent information on those facilities. This list is used throughout the plan and is the basis for the vulnerability assessments and loss estimates. The complete list is posted in Appendix D.

City of Alamogordo Local Emergency Operations Plan (LEOP)
The City of Alamogordo OEM/DES has developed a city-wide LEOP. Using a commercial template to follow "best practices" methodology, this plan was completed in 2006 and is constantly being developed, tested, and updated. Relevant information regarding what was pulled from the LEOP was integrated into this plan.

City of Alamogordo Hazard Mitigation Plan
City of Alamogordo is currently covered by a FEMA approved local hazard mitigation plan. The current HMP plan has been reviewed and is incorporated throughout this plan per FEMA requirements.

City of Alamogordo CEMP
City of Alamogordo provided a document describing the planning and zoning practices for the city. b

2.1.2 – Fiscal Resources

The MPC assessed their available funding options. The following is a list of federal, state and local funding sources that are either available or relevant to the City of Alamogordo HMP.

Fire Prevention and Safety Grants (FP&S)
These grants are administered by FEMA to enhance safety of the public and firefighters from fire and related hazards. The primary goal is to target high-risk populations and reduce injury. Fire departments, local governments, and recognized community organizations are eligible to receive this funding.

Flood Mitigation Assistance Program (FMA)
The FMA program is designed to aid in the buyout of Repetitive Loss (RL) and Severe Repetitive Loss (SRL) properties as well as assist in the funding of flood mitigation projects and activities.

Hazard Mitigation Grant Program (HMGP)
The HMGP is managed by FEMA and administered by New Mexico Department of Emergency Management. City of Alamogordo does not have any HMGP funds available for mitigation planning.

Local Revenues & Budgets
Recognizing the importance of hazard mitigation planning, City of Alamogordo has self-funded the 25% in-kind match required by the FEMA HMP grant.

Hazard Mitigation Grant Program (HMGP)
HMGP is managed by FEMA and is a nationally competitive grant program. The development of this plan has been funded by a HMGP grant at a 75% match.

2.1.3 – Technical Resources

The City of Alamogordo MPC employed a variety of technical resources in its plan development. These technical resources were instrumental in completing an accurate vulnerability and risk assessment.

BOLDplanning
With over 14 years of experience in hazard mitigation planning, BOLDplanning's Hazard Mitigation Department was the principle plan writer.

ESRI ArcGIS v10
All maps developed for this plan, along with the HAZUS® model, were developed using ESRI's ArcGIS v10.

FEMA DFIRM – Map Data Center
FEMA's National Flood Hazard Layer (NFHL) data was instrumental in mapping floodplain locations and estimating potential flood impacts and loss estimates.

NOAA/NCEI
Weather data and historical events were primary provided by NOAA's NCEI (formerly NCDC).

University of Wisconsin – Madison SILVIS Labs
SILVIS Labs collects and distributes the raw Wildland Urban Interface (WUI) information used in calculating City of Alamogordo wildfire risk.

2.2 – Continued Public Involvement

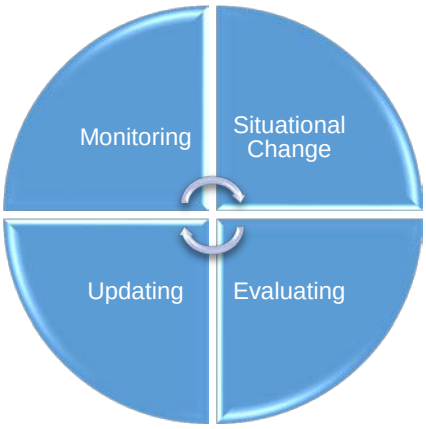
City of Alamogordo is dedicated to involving the public in the continual shaping of its HMP plan and the development of its mitigation projects and activities.

The City of Alamogordo MPC will continue to keep the public informed about its hazard mitigation project and activities through its website. Additionally, it will provide a "comments/suggestions" option for the public to submit input through the website.

The public will also be invited to participate in annual MPC meetings to review and discuss the HMP events of the past year.

Copies of the City of Alamogordo Hazard Mitigation Plan will be available on the city's website and distributed to the participating jurisdiction.

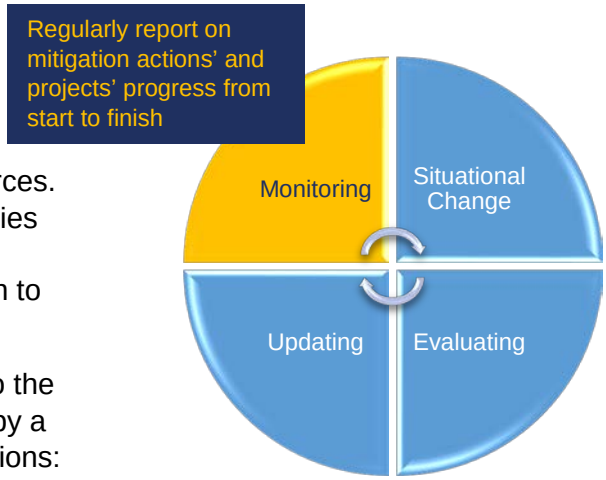
2.3 – Plan Maintenance Process



The City of Alamogordo MPC has developed a method to ensure monitoring, evaluation, and updating of its HMP. Upon adoption of the City of Alamogordo HMP, City of Alamogordo will utilize its AEPC to provide HMP updates, revisions, and data collection for future HMP planning purposes. The AEPC Chair will form a subcommittee for proposed mitigation projects comprised of City of Alamogordo's Emergency Manager and city representatives from the MPC. The chair of the subcommittee will be determined by a vote in the sub-committee. Additional members may be added based on necessity. The sub-committee will submit a quarterly report to the AEPC which in turn will submit an annual report to the City Manager. Please see the City of Alamogordo HMP Quarterly Report form at the end of this section.

The City of Alamogordo City Manager may request a non-scheduled report on the monitoring, evaluation, or updating of any portion of the HMP due to irregular progress on mitigation actions and or projects, in the aftermath of a hazard event, or for any reason deemed appropriate.

2.3.1 – Plan Monitoring



Plan monitoring can be defined as the ongoing process by which stakeholders obtain regular feedback on the progress being made towards achieving their goals and objectives. In the more limited approach, monitoring may focus on tracking projects and the use of the agency's resources. In the broader approach, monitoring involves tracking strategies and actions being taken by partners and non-partners and figuring out what new strategies and actions need to be taken to ensure progress towards the most important results.

A monitoring report will be written and submitted for review to the AEPC and after the annual MPC meeting or when triggered by a situation change. The monitoring report answers these questions:

- Is the mitigation project under, over, or on budget?
- Is the mitigation project behind, ahead of, or on schedule?
- Are there any changes in City of Alamogordo's capabilities which impact the HMP?
- Are there any changes in City of Alamogordo's hazard risk?
- Has the mitigation action been initiated or its initiation planned?
- Is the current process of prioritizing mitigation actions and projects appropriate and accurate?
- Has the current method of incorporating mitigation actions and projects yielded a comprehensive action and project strategy to address seen and unforeseen hazards?
- If applicable, has participation in a mitigation action's collaboration been regular?
- Was a negative result caused directly or indirectly by insufficient levels of public outreach?
- If any, what plan updates occurred, why they occurred, and what is their impact?

The plan maintenance process is cyclical and maintenance items can operate simultaneously within the process.

2.3.2 – Plan Evaluating

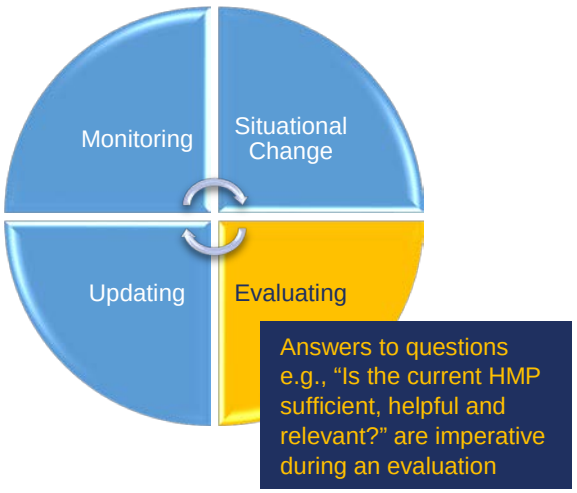
A plan evaluation is a rigorous and independent assessment of either completed or ongoing activities to determine the extent to which they are achieving stated objectives and contributing to decision making.

An evaluation report (see example on the next page) will be written and submitted to the AEPC when the situation dictates. The following situations are typical examples of when an evaluation will be necessary.

- Post hazard event
- Post training exercise
- Post tabletop or drill exercise
- Significant change or completion of a mitigation project
- Significant change or completion of a mitigation action

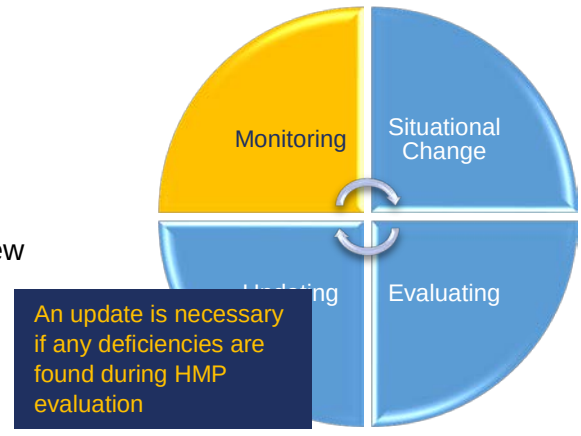
An evaluation report will ask the following questions in response to the previously listed events.

- Do the mitigation objectives and goals continue to address the current hazards?
- Are there new or previously unforeseen hazards?
- Does a change in hazard vulnerability demand a change of or addition of mitigation actions or projects?
- Does a change in the mitigation strategy demand a change of or addition of mitigation actions or projects?
- Are current resources appropriate for implementing a mitigation project?
- Was the outcome of a mitigation action/project expected?
- Are there implementation problems?
- Was the public engaged to the point where they were satisfied with current engagement strategies?
- Did the public participate in a number that produced a positive yield on the plan, action, or project?
- Are there coordination problems?



2.3.3 – Plan Updating

Typically, an HMP update is initiated upon the completion of a plan evaluation and even then, only when the evaluation determines an update is appropriate. Additionally, when new hazard data becomes available it will be added to the HMP. New data will be confirmed or denied at annual MPC meetings.



For whatever reason, an HMP update can be written anytime it is deemed necessary by the City of Alamogordo OEM.

City of Alamogordo will begin its update process under the direction of the City of Alamogordo Emergency Manager three years from this plan’s adoption according to FEMA DMA 2000 guidelines on local mitigation plan updates.

City of Alamogordo Local Emergency Planning Committee
City of Alamogordo Hazard Mitigation Plan

Evaluation Report

Hazard Mitigation Plan Sub-Committee Chair: _____
Meeting Date: _____
Plan Approval Date:_____
Plan Expiration Date: _____

Have there been any disasters or training events since the last report? If so, list them below:

Disaster Number/ Training Event	Hazard Type(s)	Was the hazard expected or unforeseen?	Is a plan update required?
Example: DR-1000	*Volcanic Eruption*	*Unforeseen*	*Yes*
Example: Annual Training	*Flash Flooding*	*Expected*	*No*

Mitigation Projects:

Mitigation Project	Participating Jurisdiction(s)	Proposed/Scheduled/In Progress/Completed	Behind/Ahead/On-Schedule	Estimated Completion Date
Example: Tornado Safe Room	*Cash*	*In Progress*	*On-Schedule*	*1/1/2016*

Public Engagement and Outreach Notes:

Miscellaneous Notes:

Section 3 – Planning Area

Alamogordo is the county seat and economic center of Otero County in south-central New Mexico, United States. A city in the Tularosa Basin of the Chihuahua desert, it is bordered on the east by the Sacramento Mountains and to the west by White Sands National Monument. It is the city nearest to Holloman Air Force Base. The population was 301,403 as of the 2016 census. Alamogordo is known for its connection with the Trinity test, the first explosion of an atomic bomb, and for the Atari video game burial of 1983.

Humans have lived in the Alamogordo area for at least 11,000 years. The present settlement established in 1898 to support the construction of the El Paso and Northeastern Railroad is an early example of a planned community. The city was incorporated in 1912. Tourism became an important economic factor with the creation of White Sands National Monument in 1934. During the 1950-60s, Alamogordo was an unofficial center for research on pilot safety and the developing United States' space program.

Alamogordo is a charter city with a commission-manager form of government. City government provides many recreational and leisure facilities for its citizens including a large park in the center of the city, many smaller parks scattered through the city, a golf course, Alameda Park Zoo, a network of walking paths, Alamogordo Public Library, and a senior citizens' center. Gerald Champion Regional Medical Center is a nonprofit shared military/civilian facility which is also the hospital for Holloman Air Force Base.

Table 3: Critical Facilities Summary

Table 3 - Structural Summary		
Jurisdiction	**Commercial**	**Government**
City of Alamogordo	$301,283,000	$299,183,000
	Total:	**$314,683,000**

Table 4: Critical Facilities Summary

Table 4 - Populations Summary		
Jurisdiction	**Housing Units**	**Population**
City of Alamogordo	11,909	31,248

**The data is from the U.S. Census Bureau.*

3.1 – Demographics

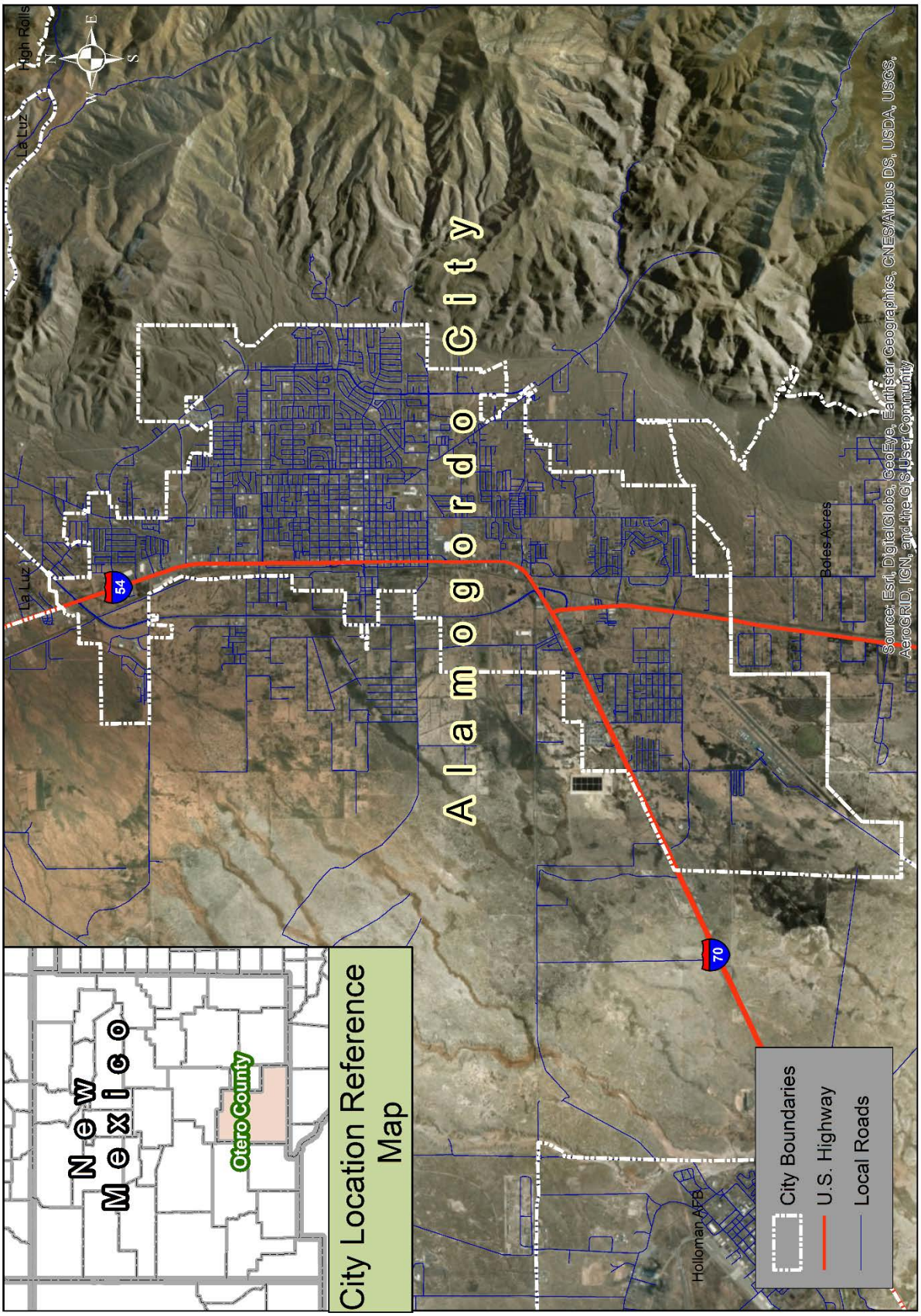
The population of the City of Alamogordo is on average declining. Between 2000 and 2010 the total population of City of Alamogordo decreased by 17.03%. The U.S. Census Bureau estimates as of 2017, City of Alamogordo had a total of 31,248 people residing within its boundaries. Since 2000 the city has decreased in growth by 13.87%. The table below details the City of Alamogordo's demographic information. Increases in populations are highlighted in green and decreasing populations highlighted in red.

Table 5: Community Demographics

Table 5 – Community Demographics							
Jurisdiction	**Size (Sq. Mi)**	**Population**			**% Population Change**		
		2000	**2010**	**2017**	**2000-2010**	**2010-2017**	**2000-2017**
City of Alamogordo	19.3	35,582	30,403	31,248	-17.03%	2.7%	-13.87%

**The data is from the U.S. Census Bureau.*

Map 1: City of Alamogordo, Community Profile



3.2 – Land Use & Development Trends

The City of Alamogordo has seen a gradual decrease in population throughout the planning area. Although there was a minor increase between the years 2000 and 2017, the average population for City of Alamogordo has been declining. Due to this, it is unlikely the whole planning area has a significantly changing hazard vulnerability, and thus, no significant changes to City of Alamogordo's Hazard Mitigation Plan are necessary. Municipalities with stagnant growth or low, sustainable growth can seize an opportunity to focus its mitigation efforts on its current vulnerabilities by continuing to enforce and inspect its zoning, ordinances, and building codes. Similarly, these methods can be used in the growing communities to ensure hazard resiliency through new construction.

For hazards that affect the entire planning area, increased population growth increases a jurisdiction's overall vulnerability while decreased population growth decreases it. It is difficult to quantify the exact change in vulnerability in either direction but can be depicted as generally directly proportional to the population change itself. For more information on each hazards' effect on the entire planning area, see Section 4 – Hazard Risk Assessment.

For hazards with easily measured extents, changes in vulnerability are more difficult to calculate. Over the past three years, dramatic improvements in available geographic data and improvements in risk assessment methodology make this plan update's risk assessment far superior to the previous plan. However, the downside of utilizing improved methodologies and data is that they are incapable of being directly compared to the previous plans methods and data. For instance, the previous plan does not geographically and accurately depict the locations of the WUI or the WUI intermix. Without knowing where they existed in 2010 the current methodology does not allow for a comparison of vulnerability.

For the sake of having a comparison, although not as accurate as desired, this plan considers any positive population growth rate. In this case, the city has a population decrease overall. Therefore, the vulnerability to hazards has decreased within the City of Alamogordo.

A hazard specific analysis, as it pertains to land use and development trends, is covered under each hazard in Section 4 – Hazard Risk Assessment.

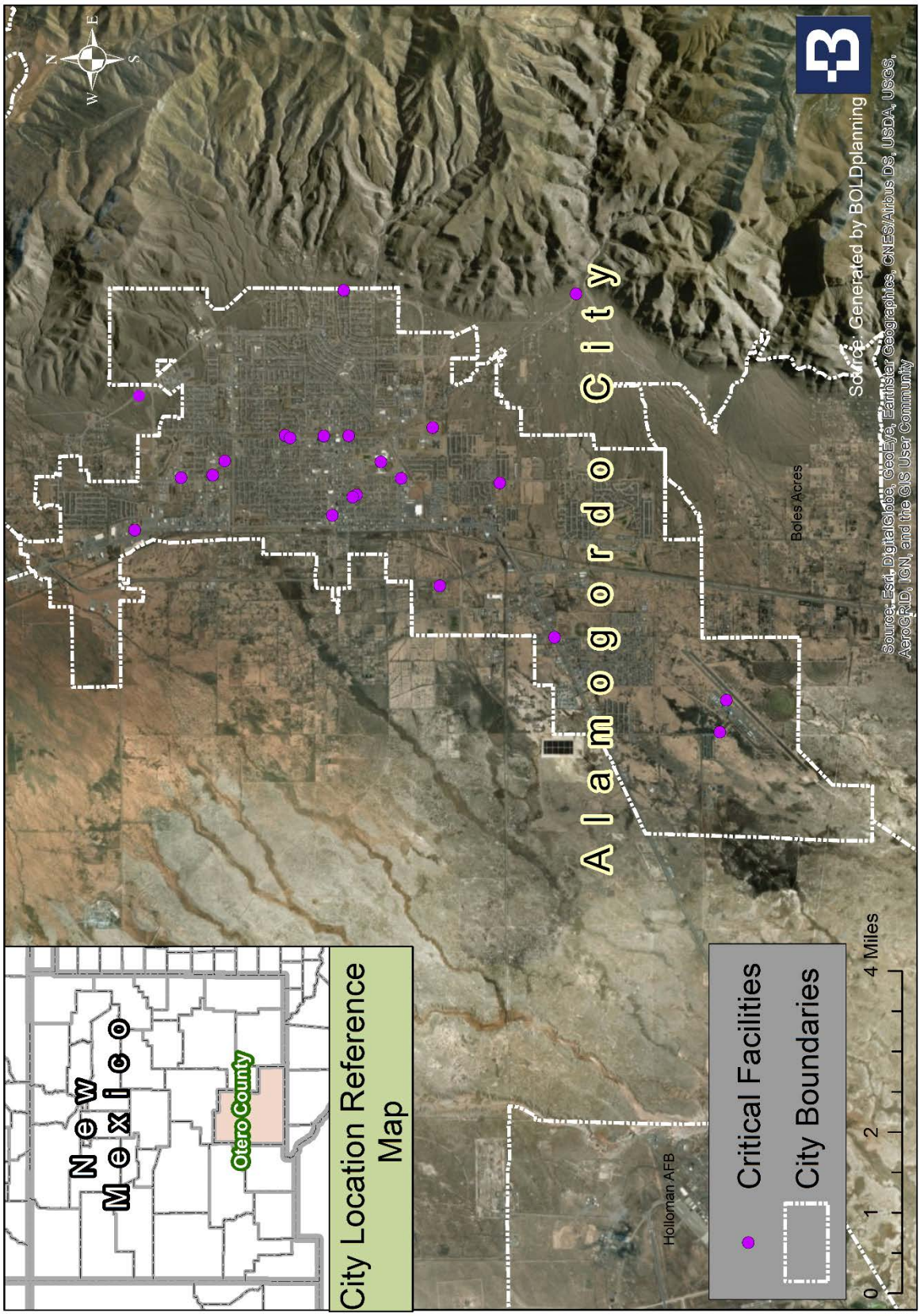
3.3 – Critical Facilities

Certain facilities have a net positive value on the community, that is, they contribute to the public good by facilitating the basic functions of society. These facilities maintain order, public health, education, and economic function. Additionally, there are infrastructure and facilities integral to disaster response and recovery operations. Conversely, some infrastructure and facilities are of extreme importance due to the negative externalities created when they are impacted by a disaster. What fits these definitions will vary slightly from community to community, but the definitions remain as a guideline for identifying infrastructure and critical facilities. For the City of Alamogordo the table below summarized their identified infrastructure and critical facilities. A complete list can be found in Appendix B.

Table 6: Critical Facilities Summary

Table 6 – Critical Facilities Summary		
Jurisdiction	**Commercial**	**Government**
City of Alamogordo	2	21

Map 2: City of Alamogordo, Critical Facilities



The goal of mitigation is to reduce the impact of hazards including property damage, disruption to local and regional economies, and the amount of public and private funds spent to assist recovery. To be done correctly, mitigation decision making should be based on risk assessment.

A risk assessment consists of three components: hazard profiling, exposure, and vulnerability assessment. The process entails past hazard events, probability of future events, asset lists, loss estimation, and other sections where appropriate.

A history of declared disasters helps capture an overview of the hazards facing City of Alamogordo. Since 1953, City of Alamogordo has suffered from one declared disaster. This disaster declaration was due to flooding, severe storms, and mudslides. A list of the declared disasters occurring in City of Alamogordo since 1953 is presented in the table below. These disaster declarations affected the county of Otero which is where the planning area resides in. Smaller disasters are more frequent and are not reflected in the table.

Table 7: Presidential Disaster Declarations, City of Alamogordo

Table 7 - Presidential Disaster Declarations, City of Alamogordo

Designation	Declaration Date	Incident Type
EM – 3229	09/07/2005	Severe Storm, Flooding
DR – 1659	08/30/2006	Severe Storm, Flooding
DR – 1783	08/14/2008	Severe Storm, Flooding
DR – 1962	04/28/2011	Winter Storm, Cold
DR – 4152	08/24/2012	Severe Storm, Flooding
DR – 4197	10/06/2014	Severe Storm, Flooding
DR - 4199	10/29/2014	Severe Storm, Flooding

4.1 – Identified Hazards

The first step in developing a hazard assessment is identifying the hazards with reasonable potential to strike City of Alamogordo. Identification allows appropriate and well-planned action to mitigate the extent and impact of a hazard event as well as facilitating emergency response and recovery operations. Not all disaster contingencies can be planned for. By using an all-hazards approach to planning, the mitigation process yields increased awareness and preparedness for unforeseen hazard events.

Table 9 (below) lists the 12 natural and human-caused hazards profiled in the State of New Mexico Multi-Hazard Plan and Statewide Hazard Assessment. Research indicates seven of these hazards—dam failure, earthquake, expansive soil, high winds, landslides, tornadoes and volcanoes—pose no reasonable risk to City of Alamogordo. As such, they are excluded from this plan. An analysis of why these hazards have been excluded can be found in Section 4.5 – Excluded Hazards. Five of the State-identified hazards do pose some level of risk to the planning area. These are drought (including extreme heat), flooding (including thunderstorms), severe winter weather and wildfire. Details for each of these hazards, and their potential impact on City of Alamogordo are in Section 4.3.

Note: *Extreme heat is included in the drought profile. Thunderstorms are included in the flood profile.*

Table 8: State of New Mexico Identified Hazards

Table 8 - State of New Mexico Identified Hazards			
Hazards in State/Previous HMP	**Previous Inclusions**	**Included/Excluded**	**Justification**
Dam Failure	State Plan	Excluded	Manmade risk
Drought	State Plan	Included	Disaster History
Earthquakes	State Plan	Excluded	No Reasonable risk
Expansive Soils	State Plan	Excluded	No Reasonable risk
Extreme Heat	State Plan	Included - Drought	Combined with Drought
Flood	State Plan	Included	Disaster History
High Winds	State Plan	Excluded	No Reasonable risk
Landslides/Subsidence	State Plan	Excluded	No Reasonable risk
Severe Winter Storms	State Plan	Included	Disaster History
Thunderstorms	State Plan	Included - Flood	Combined with Flood
Tornadoes	State Plan	Excluded	No Disaster History
Volcanoes	State Plan	Excluded	No Reasonable Risk

4.2 – Profiling Hazards

Hazard profiles are outlined in the proceeding sections of the City of Alamogordo Hazard Mitigation Plan.

4.3.1 – Hazard Description

This section describes the general characteristics of the specified hazard.

4.3.2 – Location & Extent

This section contains information about the location, i.e., the geographic area(s) within the planning area that are affected by the hazard, along with the extent (strength and magnitude) of the specific hazard.

4.3.3 – Previous Occurrences

This section contains a history of previous hazard events for the profiled hazard.

Methodology: Most of the historical data used in the risk assessment originates from NOAA. In most instances, the hazard affects a large geographic area and thus the hazard data is reported at the county level. This is the best available data for these hazards. The calculations for Previous Occurrences and the Probability of Future Events are based on county-level data.

4.3.3A – Probability of Future Events

Contains the likelihood of the hazard occurring.

Table 9: Probability Categories

Table 9 - Probability Categories	
Category	**Range (Per Year)**
Rare	0% - 25%
Not Likely	25% - 50%
Likely	50% - 75%
Highly Likely	75% - 100%

4.3.4 – Vulnerability & Impact

Describes the potential impacts of the hazard for each participating jurisdiction and provides an overall summary of each jurisdiction's vulnerability to the hazard through structures, systems, populations, and community assets that are susceptible to damage and loss from the hazard.

4.3.4A – Infrastructure & Critical Facilities

When appropriate, this section details the infrastructure and facilities pertinent to the hazard.

4.3.4B – Land Use & Development Trends

Provides a general description of land use and development trends within the jurisdiction(s).

4.3.4C – Unique & Varied Risk

Assesses each jurisdiction's risk where it varies from the risks facing the entire planning area.

4.3.4D – Repetitive Loss Structures

If applicable to the profiled hazard, a description of the location types, along with estimates for the number of repetitive loss properties, will be provided in this section.

4.3.5E – HAZUS Models

HAZUS was not used for this plan write up, therefore will not be referenced throughout the plan.

4.3(D) – Drought

4.3.1 – Hazard Description

Photo Courtesy of Las Cruces Sun-News

Drought is a normal recurrent feature of climate; it occurs in all climatic zones. Drought originates from a deficiency of precipitation over an extended period of time. This deficiency results in a water shortage for some activity or environmental sector. Drought should be considered relative to some long-term balance, timing and effectiveness between precipitation and evaporative- transpiration.

- Agricultural: When the amount of moisture in the soil no longer meets the needs of previously grown crops.
- Hydrological: When surface and subsurface water levels are significantly below their normal levels.
- Meteorological: When there is a significant departure from the normal levels of precipitation.
- Socio-Economic: When the water deficiency begins to significantly affect the population.

When severe to exceptional drought occurs, there is a significant consequence to the water supply, i.e., water used for drinking and agriculture uses, water quality, fighting wildfire and recreation. Drought also creates conditions that make wildfires more likely. When a drought begins agriculture is usually first to be affected because of its heavy dependence on stored moisture in the soil. Soil moisture can be rapidly depleted during extended dry periods.

Droughts are regularly monitored by multiple federal agencies using several different indices. Typically, they are seasonal occurring in the late spring through early fall. Drought monitoring focuses on precipitation and temperature. When precipitation is less than normal and natural water supplied begins to decrease, a drought is occurring.

Drought affects the entire jurisdiction and is a hazard that cannot be eliminated. Drought is cyclical and will always remain a potential problem.

The City of Alamogordo is located in the southwest and falls within what is called the Chihuahua Desert. Water in this part of the country is a precious commodity. Several water systems are used in the City. Alamogordo is situated at the foot of the Sacramento Mountains where water flows directly to reservoirs.

When below average, little or no rain falls, soil can dry out and plants can die. If unusually dry weather persists and water supply problems develop, the time period is defined as a drought. Human activity such as over farming, excessive irrigation, deforestation, and poor erosion controls can exacerbate a drought's effects. It can take weeks or months before the effects of below average precipitation on bodies of water are observed. Depending on the region droughts can happen quicker, noticed sooner, or have their effects naturally mitigated. The more humid and wet an area is, the quicker the effects will be realized. A naturally dry region, which typically relies more on subsurface water will take more time to actualize its effects.

The City also has ten wells that provide 4,925 gallons per minute that supplement adjacent surface water surfaces. There are also three reservoirs with a total capacity of 180,000,000.00 gallons. Eight water tanks are located throughout the system with a total capacity of 22,000,000.00 gallons.

The annual demand for water for the City of Alamogordo is approximately 1,562,520,000 gallons. The population has been increasing since 1898, even though from 2000 to 2017 we have seen a gradual decline in population. It is estimated that by the year 2040 the population is expected to increase from 31,500 to 56,137 over 56 percent. This increase will increase the demand of water from 1,562,520,000 gallons to approximately 2,731,545,050.

The City of Alamogordo has water rights that exceed 13,348.9 -acre feet per year but may only realize approximately 9,794-acre feet per year (firm yield). The difference between water rights and wet water demand, leads to the goal of procuring or otherwise developing additional water sources. It should be noted that a total of 4,795-acre feet is produced annually due to demand.

Periods of drought can have significant environment, agricultural, health, economic, and social consequences. The effects vary depending on vulnerability and regional characteristics. Droughts can also reduce water quality through a decreased ability for natural rivers and streams to dilute pollutants and increase contamination. The most common effects are diminished crop yield, increased erosion, dust storms, ecosystem damage, reduced electricity production due to reduced flow through hydroelectric dams, shortage of water for industrial production, and increased risk of wildfires.

4.3.2 – Location & Extent

Extended periods without enough rainfall can and do occur across City of Alamogordo affecting the entire planning area, causing damage to lawns, gardens, flora and fauna. The events, when they do occur, occur on a massive geographic scale often affecting multiple counties, regions, and states. Severe drought can cause enormous economic consequences, not only in the county but in the region and nation as well. There is no set speed of onset or warning period. A drought may begin in as short of period as a week or it may take months to reach an official declared drought.

When a drought begins, and ends is difficult to determine. Rainfall data alone won't tell if an area is in a drought, how severe the drought may be, or how long the area has been in drought. However, one can identify various indicators of drought, such as rainfall, snowpack, stream flow, and more, and track these indicators to monitor drought. Researchers have developed several tools to help define the onset, severity and end of droughts. Drought indices take thousands of bits of data on rainfall, snowpack, stream flow, etc., analyze the data over various time frames, and turn the data into a comprehensible big picture. A drought index value is typically a single number, which is interpreted on a scale of abnormally wet, average, and abnormally dry. There are three primary drought indices that are all used to determine the onset and the severity of a drought: The Standard Precipitation Index, the Palmer Drought Severity Index, and the Crop Moisture Index. During a drought event, City of Alamogordo can expect to see a range anywhere from 0.0 to – 4.0 on the Palmer Drought Severity Index (PDSI) or a -1.0 to -2 on the Standard Precipitation Index. Please see below and the following page for descriptions and tables of the primary drought indices.

Crop Moisture Index (CMI)

A derivative of the PDSI is the CMI. It looks at moisture supply in the short term for crop producing regions. The CMI monitors week-to-week crop conditions, whereas the PDSI monitors long-term meteorological wet and dry spells. The CMI was designed to evaluate short-term moisture conditions across major crop-producing regions. Because it is designed to monitor short-term moisture conditions affecting a developing crop, the CMI is not a good long-term drought monitoring tool. The CMI's rapid response to changing short-term conditions may provide misleading information about long-term conditions. The CMI uses the same index as the PDSI, but in its own redefined context.

The Palmer Drought Severity Index (PDSI)

The PDSI has been used the longest for monitoring drought. The PDSI allows for a categorization of various levels of wetness and dryness that are prominent over an area. The PDSI is calculated based on precipitation and temperature data as well as the local Available Water Content (AWC) of the soil. Palmer values may lag emerging droughts by several months, are less well suited for mountainous land or areas of frequent climatic extremes, and are complex—has an unspecified, built-in time scale that can be misleading.

Table 10: Palmer Drought Severity Index

Table 10 - Palmer Drought Severity Index	
Extremely Wet	4.0 or more
Very Wet	3.0 to 3.99
Moderately Wet	2.0 to 2.99
Slightly Wet	1.0 to 1.99
Incipient Wet Spell	0.5 to 0.99
Near Normal	0.49 to -0.49
Incipient Dry Spell	-0.5 to -0.99
Mild Drought	-1.0 to -1.99
Moderate Drought	-2.0 to -2.99
Severe Drought	-3.0 to -3.99
Extreme Drought	-4.0 or less

The Standard Precipitation Index (SPI)

The SPI shows the actual precipitation compared to the probability of precipitation for various time frames. The SPI is an index based on precipitation only. It can be used on a variety of time scales, which allows it to be useful for both short-term agricultural and long-term hydrological applications. A drought event occurs any time the SPI is continuously negative and reaches an intensity of -1.0 or less. The event ends when the SPI becomes positive. Each drought event, therefore, has a duration defined by its beginning and end, and intensity for each month the event continues. The positive sum of the SPI for all the months within a drought event can be termed the drought's magnitude.

Table 11: Standard Precipitation Index

Table 11 - Standard Precipitation Index	
Extremely Wet	2.0+
Very Wet	1.5 to 1.99
Moderately Wet	1.0 to 1.49
Near Normal	-.99 to .99
Moderately Dry	-1.0 to -1.49
Severely Dry	-1.5 to -1.99
Extremely Dry	-2 and less

4.3.3 – Previous Occurrences

Comprehensive data on droughts, drought impacts, and drought forecasting is extremely limited and often inaccurate. Due to the complexity of drought monitoring, the complexity of agricultural and livestock market pricing, and the large areas droughts impact, the USDA and USGS have difficulty quantifying and standardizing drought data. Each of these contributing drought factors has confounding variables within them.

Photo Courtesy of Las Cruces Sun-News

The USGS partners with the USDA for drought monitoring by mean of ground water and aquifer measurement. Since ground water and aquifer levels are highly variable from year to year, this indicator is useful for reporting whether there is a current shortage or surplus but is unhelpful in forecasting future events. Additionally, ground water and aquifer levels correlate only in a lagged model to climatic conditions further compounding their usefulness in predicting future droughts.

Drought's primary impact is on agriculture and livestock. However, there are many factors it can affect: most notably livestock count, crop prices, crop losses, livestock size, and livestock by products such as milk. Absent a drought, these factors vary significantly from season to season. Prices vary with international market factors influenced by conditions across the globe. Crop yields vary with other climate conditions such as too much rain during planting season or insect abundance, and even marketing campaigns developed to sell more meat from one type of livestock. Drought is only one factor in an equation of many variables.

The USDA monitors these conditions and aggregates the data to create its drought monitor. However, due to the reasons discussed, it is limited in its ability to quantify how severe a drought was over a specified period and for a specific jurisdiction.

The City of Alamogordo has no recorded deaths of injuries from droughts. The City of Alamogordo has not recorded any property or crop damage from drought events.

4.3.3A Probability, Droughts

In Table 13 below, you will find a list of previous drought events located in or affecting Otero County. The City of Alamogordo falls within the county lines of Otero. This search was completed from 1950 to 2018. Only the years 2004-2018 are charted below due to having zero recorded events from 1950 to 2012. The City of Alamogordo can expect a drought event with a 261.76% probability per year, or 2.61 events per year.

Table 12: Probability, Droughts

Table 12 - Probability, Drought	
Event Year	**Event Count**
2004	0
2005	0
2006	0
2007	0
2008	0
2009	0
2010	0
2011	0
2012	58
2013	66
2014	50
2015	0
2016	0
2017	0
2018	4
Total Recorded Events =	178
Total Years =	68
Yearly Probability =	**261.76%**

**The data is from NOAA, NCDC, Storm Events Database*

4.3.4 – Vulnerability & Impact, Drought

City of Alamogordo has recorded 178 drought events since 1950, of which the range and magnitude was between “slightly dry” and “extremely dry.” Based on the future probability in Table 13, City of Alamogordo can expect 2.61 drought events per year which can range anywhere below 0 and -4 on the Palmer Drought Severity Index and 0 to -2 on the Standard Precipitation Index.

Table 13: Historical Impacts, Drought

Table 13 - Historical Impacts, Drought	
Count of Events	178
Impacts Per Year	2.61
Average Magnitude	-
Magnitude Range	-
Average Cost	$0
Magnitude of Cost	$0 - $0
Total Recorded Cost	$0
Average Fatalities	0.00
Total Fatalities	0
Average Injuries	0.00
Total Injuries	0

** The data is from NOAA, NCDC, Storm Events Database*

Vulnerability of Facilities

Drought does not pose any risk to City of Alamogordo facilities.

Vulnerability of Population

Drought itself poses no direct risk of injury or death to City of Alamogordo population.

Vulnerability of Systems

Drought can have a significant effect on a jurisdiction’s agriculture and tourism economies. If the precipitation level is below normal, farmers and ranchers will struggle to grow their crops and feed their livestock. If rivers, streams, and lakes dry up, tourist will be less likely to enjoy a jurisdiction’s amenity resources.

4.3.4A – Infrastructure & Critical Facilities

Drought does not pose any risk to City of Alamogordo’s infrastructure and critical facilities. A complete list of infrastructure and critical facilities can be found in Appendix B.

4.3.4B – Land Use & Development Trends

Currently, there are no significant development projects in City of Alamogordo. Additionally, City of Alamogordo populations are decreasing slightly.

4.3.4C – Unique & Varied Risk

The entire planning area is at equal risk to droughts.

4.3.4D – Repetitive Loss Structures

Not applicable.

4.3(FL) – Flooding

4.3.1 – Hazard Description

Photo Courtesy of Alamogordo Daily News

Flooding is the most prevalent and costly disaster in the United States. Flooding occurs when water, due to dam failures, rain, or melting snows, exceeds the absorptive capacity of the soil and the flow capacity of rivers, streams or coastal areas. At this point, the water concentration hyper extends the capacity of the flood way and the water enters the floodplain. Floods are most common in seasons of rain and thunderstorms. Floods can be associated with other natural phenomenon such as earthquakes and rapidly melting snow.

Alamogordo is located at the foot of the Sacramento Mountains in the flood path of several arroyos. The City is built on a series of alluvial fans which were formed by drainage from these arroyos. There are four major and several smaller watersheds contributing to flood flow. The major watersheds from the north to the south are the Dry, Beeman, Marble and Alamo Canyons. The Beeman and Marble Canyon alluvial fans flow into the central part of the City.

Two types of flooding appear to be of the most concern in the planning area: flash flooding and storm water drainage. A flash flood is a very dynamic event in which a large volume of water moves through an area at high velocity in a very short time. This type of flooding can be very difficult to predict and can occur with little or no warning. In many cases, flash floods can move through an area miles from where rain has occurred, thereby increasing the danger to persons within the flood's path. Flash floods are created as a result of rainfall. As rainwater runs into small arroyos, it begins to collect. As these arroyos merge together, the amount of water along with the velocity and force increase.

This collection becomes a wall of water that can wash vegetation, structures and other debris. The debris then increases the amount of force available and increases its destructive power. In addition to the amount of water that creates a flash flood, other factors also affect the dynamics of this type of flood including slope, width, and vegetation along the banks of the waterway.

The slope of a flash flood traverse is related to the overall speed the water travels. The steeper the incline, the faster the water travels. The incline affects the width of the flooding area. As a rule of thumb, the faster the water moves, the arroyos are narrower. When the water flows on a shallower slope, the water tends to spread out more, which can decrease its potential to cause mass damage, although must still be considered dangerous. The type of vegetation located along the flood path can prevent further erosion of the arroyo banks.

Intense rainfall, accompanying the large thunderstorms in City of Alamogordo may result in water flowing rapidly from higher elevations into valleys, collecting in, and sometimes overtopping the low-lying streams which creates off stream flooding. Various types of floods can happen quickly in the form of a flash flood or accumulate seasonally over a period of weeks as is the case in a riverine flood. Flooding can occur anytime throughout the year but is typically associated with the spring season.

4.3.2 – Location & Extent

A variety of factors affect the severity of flash and riverine flooding within the planning area. These include topography, weather characteristics, development, and geology. Intense flooding will create havoc in any jurisdictions affected. The predicative magnitude of flash and riverine floods varies greatly.

Photo Courtesy of Alamogordo Daily News

Flash Flooding

Flash flooding is unpredictable and can occur anywhere throughout the entire planning area. City of Alamogordo does not have any centralized or identified recurring locations that are more likely to experience flash flooding than other areas, based on previous events and historical documentation. The reviewed historical documentation repeatedly mentions roads and ditches being flooded, but no specific areas continually experiencing flash flooding. Additionally, when property damage occurred, none of the locations were repeatedly mentioned.

Riverine Flooding

Intense and widespread flooding can trap people and entire communities without basic goods or services. Any amount of damage can render a structure unusable for as long as recovery operation would take depending on the level of damage.

The following maps show effective Flood Insurance Rate Map (FIRM) floodplains identified by FEMA to depict the location of 100 and 500-year floodplains throughout City of Alamogordo. The FEMA FIRM maps are located in Appendix E.

Table 15: Flood Zone Classifications

Table 15 - Flood Zone Classifications	
Zone	**Description**
A	No Base Flood Elevations Determined
AE	Base Flood Elevations determined
AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined
AO	Flood depths of 1 to 3 feet (usually sheet flow on stopping terrain); average depths determined for areas of alluvial fan flooding, velocities also determined
Shaded X	Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood. An area inundated by 0.2% annual chance flooding.

For the following FEMA NFHL maps the A and AE zones have been combined as they are both considered 100-year floodplains.

4.3.3 – Previous Occurrences

The City of Alamogordo planning area resides within Otero County. Table 16 below depicts the occurrences of flooding within Otero County. Since 1950, NOAA has recorded one (1) riverine flood impact in the City of Alamogordo. The City has not recorded any loss of life or injury from riverine flooding. These events have caused $25,000 in property damage.

Since 1950, NOAA has recorded 88 flash flood impacts in the planning area. The City of Alamogordo has recorded 0 (zero) fatalities and 0 (zero) injuries related to flash flooding. These events have cost the planning area 3.525 million dollars in property damage.

Photo Courtesy of Alamogordo Daily News

4.3.3A – Probability of Future Events

The City of Alamogordo can expect a flash flood event with 129.41% probability per year or 1.29 events per year.

Table 16: Probability, Flash Floods

Table 16 - Probability, Flash Floods	
Event Year	**Event Count**
1999	3
2000	2
2001	1
2002	1
2003	0
2004	0
2005	1
2006	10
2007	1
2008	3
2009	3
2010	1
2011	1
2012	0
2013	6
2014	4
2015	3
2016	0
2017	2
2018	0
Total Recorded Events =	88
Total Years =	68
Yearly Probability =	**129.41%**

**The data are from the NOAA/NCEI Storm Events Database*

4.3.4 – Vulnerability & Impact, Flooding

Flooding Impacts

Based on the FIRM maps in Appendix E the City of Alamogordo is exposed to 100-year floodplains and can expect 0.014 riverine floods per year. The probability of flash is equal throughout the planning area and is as depicted in Section 4.3.3A at 1.29 events per year.

Photo Courtesy of After Wildfire

Vulnerability of Facilities

Flooding can cause minimal or complete damage to facilities taking them offline for days to years depending on the resources available after an event.

The City of Alamogordo has incurred property damage from flooding. Facilities have the potential to be damaged from these quick onset floods. Please see the table 17 (below) for a breakdown of these values by type of flooding.

Table 17: Vulnerable Structures, Flash Floods

Table 17 – Vulnerable Structures in FEMA Flood Zones		
Jurisdiction	**Commercial**	**Government**
City of Alamogordo		
Zone X	1	1
Zone AE	0	1
Zone A	0	1
Zone AH	0	18
Zone A0	0	0
Total =	1	21

**The data are from FEMA's HAZUS CDMS Database.*

Vulnerability of Population

If evacuation is not heeded or flood waters rise quickly, citizens of the planning area can be swept away by floodwater currents, become trapped on rooftops or points of high elevations, and even sustain injury or death. Depending on conditions, this could expose them to elements and deprive them of basic needs and services.

As described in Vulnerability of Facilities, water that's slow to drain will encourage growth of mold and other bio-hazardous material, rendering a facility unusable. Extra care, assessment, and sanitization are required before citizens can re-inhabit a facility or they may face serious health concerns. Long term care facilities housing vulnerable populations can take longer to evacuate.

Additionally, the potential presence of mold after a flood requires extra care to be taken before their population can re-inhabit a long-term care facility.

The City of Alamogordo has 0 (zero) recorded fatalities from riverine floods and 0 (zero) fatalities from flash flood events. The population total of the planning area is 31,248. Of the 31,248, all are considered vulnerable and at risk to flash flooding.

Vulnerability of Systems

Critical facilities and infrastructure can be rendered unusable or permanently destroyed, having a significant impact on a jurisdiction's ability to conduct its day to day or current flood event operations. Significant damage to residential and or commercial structures can irrevocably damage a community and its economy creating refugees and economic hardship.

4.3.4A – Infrastructure & Critical Facilities

All infrastructure and critical facilities are equally at risk to flash flooding since it indiscriminately can affect the entire planning area. A complete list of infrastructure and critical facilities can be found in Appendix B.

4.3.4B – Land Use & Development Trends

Currently, there are no significant development projects in the City of Alamogordo. Additionally, the population has a slight decrease. Therefore, vulnerability has decreased due to land use, growth, or development trends.

4.3.4C – Unique & Varied Risk

Flash flooding has ability to affect a portion of or the entire planning area. Unfortunately, there is no accurate method of predicting the location or extent of a flash flood's impact. That being said, if it were to occur it will affect the planning area.

Additionally, it is not possible to predict varying probability in the planning area except for varying risk as it is proportionate to the area's demographics. Logically, areas with a greater population are at a higher risk than areas with a lower population.

Table 19: Unique & Varied Risk, Riverine Flooding

Table 19 - Unique & Varied Risk, Riverine Floods	
Jurisdiction	**Risk Characteristics**
City of Alamogordo	The jurisdiction is in the 100-year floodplain

4.3.4D – Repetitive Loss Structures

There is only one repetitive loss structure that has not been mitigated according to the City of Alamogordo flood plain manager.

4.3(WF) – Wildfire

4.3.1 – Hazard Description

Photo Courtesy of After Wildfire

A wildfire is an uncontrolled fire in an area of combustible vegetation that occurs in the countryside or a wilderness area. Other names such as brush fire, bush fire, forest fire, desert fire, grass fire, hill fire, peat fire, vegetation fire, and wildfire may be used to describe the same phenomenon depending on the type of vegetation being burned.

A wildfire differs from other fires by its extensive size, the speed at which it can spread from its original source, its potential to change direction unexpectedly and its ability to jump gaps such as roads, rivers and fire breaks. Wildfires are characterized in terms of the cause of ignition, their physical properties such as speed of propagation, the combustible material present, and the effect of weather on the fire.

Alamogordo is located at the foot of the Sacramento Mountains and has been subjected to the effects of numerous historical wildfires located within the Alamogordo region. This region encompasses the Lincoln National Forest to the North and East as well as other undeveloped or natural habitat. Although wildfire may not directly present an immediate threat to the community, there lays the propensity for ephemeral and long-term effects and impact to the Community, resulting in a cascade effect.

An expansive area where the community derives its water is attributed as part of a watershed prone to wildfire. Contributory to the increased frequency of wildfire is a combination of low moisture, persistent drought, winds and warm weather in southern New Mexico.

The potential for wildfire is significate to the planning jurisdiction. The probability of another wildfire in affecting the planning area is highly likely. They can occur naturally, by human accident, and on rare occasions by human action. Typically, their point of origin is far from human development except for roads, power lines, and similar infrastructure. There is a constant threat to hikers, campers, and other people engaging in outdoor activities. Significant danger to life and property occurs when human development meets and becomes intertwined with wildland's vegetation. The threat of wildfire increases in areas prone to intermittent drought or are generally arid or dry.

Population de-concentration in the U.S. has resulted in rapid development in the outlying fringe of metropolitan areas and in rural areas with attractive recreational and aesthetic amenities especially forests, communities bordering forests and prairies where fires branch off. This demographic change is increasing the size of the wildland-urban interface (WUI), defined as the area where structures and other human development meet or intermingle with undeveloped wildland. Its expansion has increased the likelihood that wildfires will threaten life and property.

Rampant destruction can be mitigated by fire services regularly engaging in preventative burns and land use measures such as creating defensible spaces for residential land owners to minimize the spread of wildland and brush fires. These modifications may reduce the threat to property and can become a critical component of a residential building that can survive without firefighters.

4.3.2 – Location & Extent

The expansion of the WUI in recent decades has significant implications for wildland or brush fire management and its impact. The WUI creates an environment in which fire can move readily between structural and vegetation fuels. Two types of WUI are mapped: intermixed and interface. Intermix WUI are areas where housing and vegetation intermingle; interface WUI are areas with housing near dense, contiguous wildland vegetation.

The duration of a wildland depends on the weather conditions, how dry it is, the availability of fuel to spread, and the ability of responders to contain and extinguish the fire. Historically, some wildfires have lasted only hours while other fires have continued to spread and grow for an entire season. They spread quickly and can go unnoticed until they have grown large enough to be seen by their dense smoke. If fuel is available, and the high wind speeds hit, a wildland or brush fire can spread over a large area in a very short amount of time. These factors make the difference between small upstart fires easily controlled by local fire services to fires destroying thousands of acres requiring multiple state and federal assets for containment and suppression.

Given the WUI and Intermix depictions in Maps 6 and 7, all participants have a theoretical exposure to wildfires. Based on historical events, the planning area should be prepared for rank 0 events on the Burn Severity Index, shown below, but be prepared for a wildfire up to rank 3.

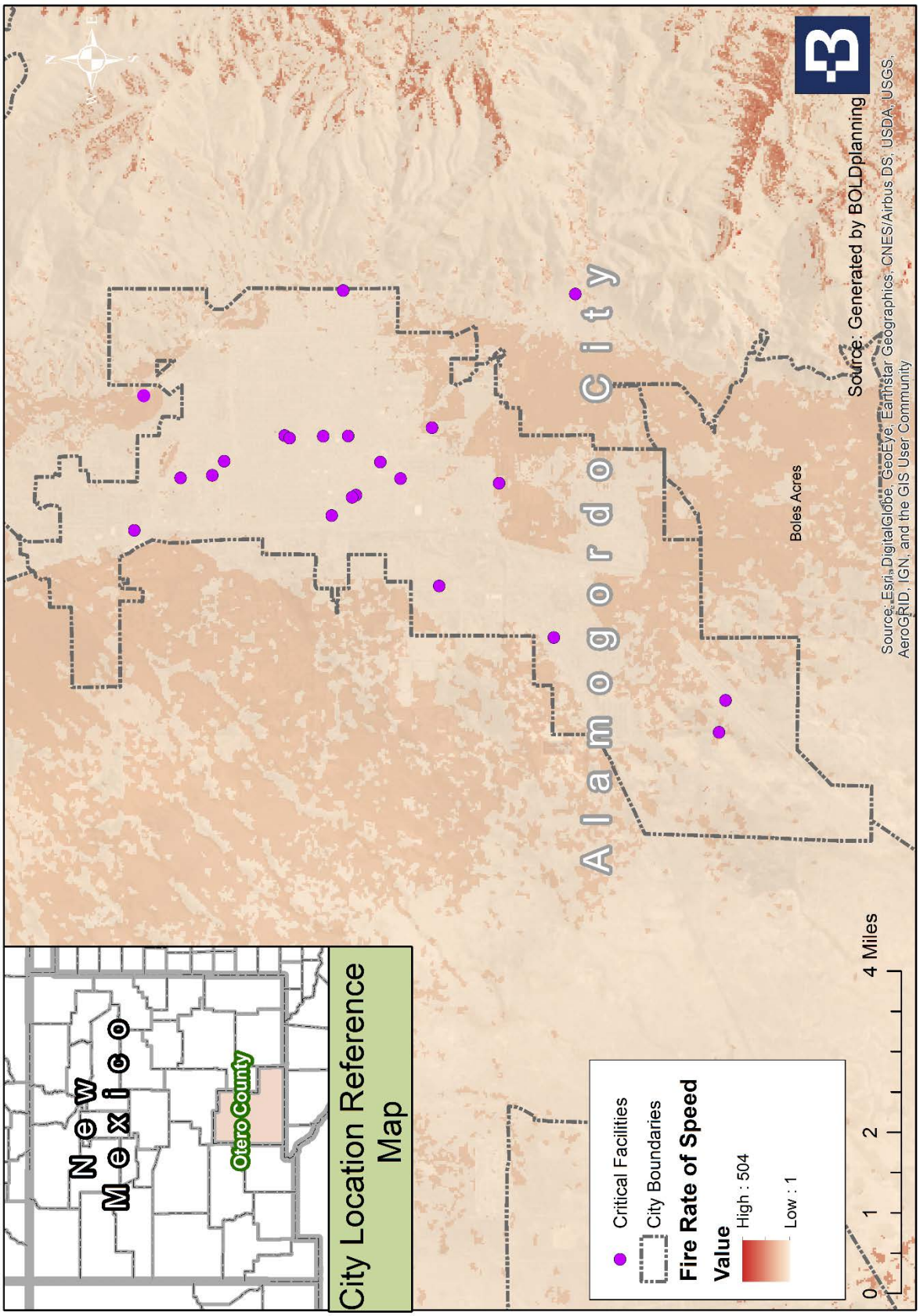
The table shown below details the range of wildfire damages. The severity of the wildfire depends on several quickly changing environmental factors. It is impossible to strategically estimate the severity of a wildfire as the quickly changing factors, drought conditions and wind speed have such a great influence on the wildfire conditions. The exposed participating jurisdiction(s) could experience a wildland or brush fire ranging anywhere from 0 to 4 on the Burn Severity Index.

Table 18: Burn Severity Index

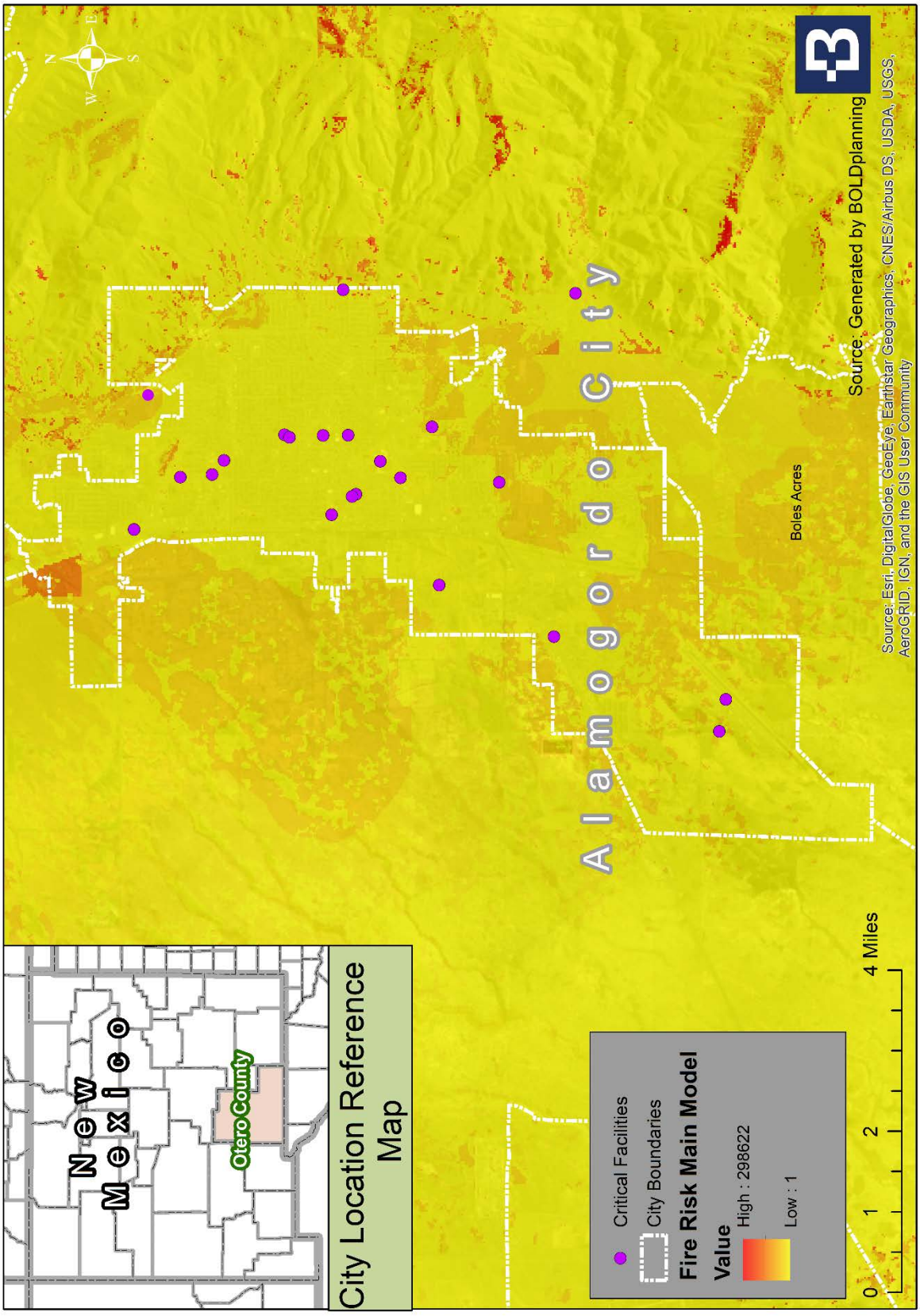
Table 18 - Burn Severity Index

Rank	Burn Severity	Description	Characteristics
0	Unburned	Fire extinguished before reaching microsite.	• Leaf litter from previous years intact and uncharred • No evidence of char around base of trees and shrubs • Pre-burn seedlings and herbaceous vegetation present.
1	Low Severity Burn	Surface fire which consumes litter yet has little effect on trees and understory vegetation.	• Burned with partially consumed litter present • Evidence of low flame heights around base of trees and shrubs • No significant decreases in overstory & understory basal area, diversity or species richness from pre-burn assessments • Usually burning below 80° C
2	Medium-Low Severity Burn	No significant differences in overstory density and basal area, & no significant differences in species richness. However, understory density, basal area, and species richness declined.	• No litter present and 100% of the area covered by duff • Flame lengths <2m • Understory mortality present, little or no overstory mortality
3	Medium-High Severity Burn	Flames that were slightly taller than those of Medium-low intensity fires, but these fires had occasional hot spots that killed large trees with significant reduction in the understory.	• Soil exposure on l-50% of the area • Flame lengths <6m • High understory mortality with some overstory trees affected
4	High Severity Burn	Crown fires, usually a stand replacing burn with relatively high overstory mortality.	• Soil exposure >50% • Flame lengths >6m • Higher overstory mortality >20% • Usually burning above 800° C

Map 6: City of Alamogordo, WUI, Fire Rate of Speed with Critical Facilities



Map 7: City of Alamogordo, WUI, Fire Risk Main Model with Critical Facilities



4.3.3 – Previous Occurrences

According to the National Center for Environmental Information, the City of Alamogordo has zero recorded previous occurrences of wildfires from 1950-2018.

Although historical fires in the planning area are limited, climatic conditions can change over the next five years and City of Alamogordo needs to be aware of the vulnerability.

Photo Courtesy of Alamogordo Daily News

4.3.3A – Probability of Future Events

Given the lack of historical evidence of wildfires, it is difficult to quantify the probability of future events. Based on surveys completed by citizens, the probability of future wildfires is “likely”. It is difficult to make assumptions based on very limited historical evidence.

4.3.4 – Vulnerability & Impact, Wildfire

Wildfire & Brush Fire Impacts

Given the data deficiency described in Section 4.3.3, the current impacts of wildland and brush fires throughout the planning area are unknown but are expected to be severe. The City of Alamogordo will seek out this data as soon as it can be made available and update this portion of the plan with that information.

Vulnerability of Facilities

A wildfire burning near a jurisdiction may cover it in soot, cause secondary fires from traveling coals, or directly engulf facilities burning them to the ground. Facilities can be protected by creating defensible spaces or buffer zones, maintaining a fuel free environment, and structural modifications to prevent the growth of a wildfire.

City of Alamogordo and its participating jurisdiction(s)’ structures are valued at $314,683,000. A GIS analysis puts all but three critical facilities in vulnerable areas for wildfires. However, due to the unpredictable nature of wildfires, we categorized the three critical facilities left over in the Low WUI category in Table 19 (below).

Table 19: Vulnerable Structures, Wildfire

Table 19 – Vulnerable Structures, Wildfire		
Jurisdiction	**Commercial**	**Government**
City of Alamogordo		
Low WUI	1	3
Medium WUI	1	5
High WUI	0	10
Municipal Total =	2	18

*The data is compiled from the 1990-2010 Wildland-Urban Interface (WUI) of the conterminous United States - SILVIS Lab geospatial data

Vulnerability of Population

A jurisdiction populations' greatest vulnerability is an inability to properly evacuate. They can be caught off guard due to improper warning systems and become trapped in a growing wildland or brush fire. No injuries or deaths have occurred due to wildland fires. The City of Alamogordo's population has had a slight decrease, which means the populations vulnerability has also decreased slightly.

Vulnerability of Systems

In the event a wildland or brush fire begins to burn and grow, evacuation routes may become blocked by the fire or by other people attempting to evacuate. The impingement of the local transportation system makes appropriate warning and information paramount in mitigating City of Alamogordo systems vulnerability to wildland and brush fires.

4.3.4A – Infrastructure & Critical Facilities

The following table breaks down the critical facilities and infrastructure that are at risk to wildland and brush fires based on their location in the WUI.

A complete list of infrastructure and critical facilities can be found in Appendix B.

Table 20: Infrastructure & Critical Facilities, Wildland & Brush Fires

Table 20 - Critical Facilities and Infrastructure, Wildfires	
Jurisdiction	**Risk Characteristics**
Low WUI	Fire Prevention (1), Medical (1), Municipal (1)
Medium WUI	Fire Prevention (1), Hospital (1), Long-Term Care (1), Municipal (1), Shelter (3)
High WUI	Long-Term Care (3), Municipal (1), School (1)

4.3.4B – Land Use & Development Trends

Currently, there are no significant development projects in City of Alamogordo. Additionally, the City has a decrease in population from 2000 to 2017.Therefore, they have a decreased hazard vulnerability due to land use, growth, or development trends.

4.3.4C – Unique & Varied Risk

Table 21: Unique & Varied Risk, Wildland & Brush Fires

Table 21 - Unique & Varied Risk, Wildfires	
Jurisdiction	**Risk Characteristics**
City of Alamogordo	Low and medium risk WUI identified.

4.3.4D – Repetitive Loss Structures

There are no repetitive loss structures due to wildfire within City of Alamogordo.

4.3(WS) – Winter Storms

4.3.1 – Description

Photo Courtesy of Alamogordo Daily News

Freezing, or solidification, occurs when liquid turns into a solid when its temperature is lowered below its freezing point. Crystallization consists of two major events, nucleation and crystal growth. Nucleation is the step wherein the molecules start to gather into clusters, on the nanometer scale, arranging in a defined and periodic manner that defines the crystal structure. The crystal growth is the subsequent growth of the nuclei that succeeds in achieving the critical cluster size. Frost is known to damage crops or reduce future crop yields, therefore farmers in those regions where frost is a problem, often invest substantial means to prevent it forming. Damages are not limited to crop production but extend to certain infrastructure areas that are susceptible to frost and freeze. The infrequent occurrence of an event is often accompanied by severe intensity.

The probability that frost/freeze or extreme cold/wind chill events will occur in planning jurisdiction historically has been somewhat infrequent. In recent years this event frequency has increased and the probability of a future severe winter storm event to the entire planning area has become likely.

Winter storm events within the City of Alamogordo planning area are typically short-lived but resulting in an increased disruptive impact to city infrastructure and services. The entire planning area is vulnerable to severe winter storms with wind and light snow or ice. The severity of winter storms may vary from mild impacts to an extremely dangerous storm that can bring wind, snow and ice creating hazardous conditions and impacts to structures and infrastructure. While higher elevations may be more adapted to colder temperatures, severe winter storms generally affect the planning area with equal severity.

Severe winter storms have occurred infrequently in the past. However, given the recent past increase in frequency recurrence of extreme cold events and the increased impact of this type of event the overall vulnerability is likely.

4.3.2 – Location & Extent

Photo Courtesy of Double Nickel Farm

As winter storms occur intermittently throughout the City of Alamogordo, they often affect the entire planning area. These events occur on a massive geographic scale often affecting multiple counties, regions, and states.

Winter storms typically form with warning and are often anticipated. Like other large storm fronts, the severity of a storm is not as easily predicted and when it is, the window of notification is up to a few hours to under an hour. Although meteorologists estimate the amount of snowfall a winter storm will drop, it is not known exactly how many feet of snow will fall, whether it will form an ice storm, or how powerful the winds will be until the storm is already affecting a community.

Winter storms can range from moderate snow over a few hours to blizzard conditions with high winds, freezing rain or sleet, heavy snowfall with blinding wind-driven snow, and extremely cold temperatures that last several days.

Historically, according to NOAA, the planning area will typically receive an average of 10 inches during a winter storm, but in the most extreme cases can see up to 10 to 15 inches throughout the city. City of Alamogordo has recorded snow storm events. Based on these historical values, City of Alamogordo should be prepared to experience an ice storm with accumulation of up to 15 inches of snow.

4.3.3 – Previous Occurrences

City of Alamogordo has a record of zero injuries and zero fatalities due to winter storms.

Since 1950, NOAA has recorded eight (8) winter storm events in the county of Otero, where the planning area resides. City of Alamogordo has recorded $15,000 of property damage from these winter storms.

4.3.3A – Probability of Future Events

City of Alamogordo can expect a winter storm with a 11.76% probability per year, or 0.117 events per year.

Table 22: Probability, Winter Storms

Table 22 - Probability, Winter Storms	
Event Year	**Event Count**
2015	8
Total Recorded Events =	8
Total Years =	68
Yearly Probability =	**11.76%**

4.3.4 – Vulnerability & Impact, Winter Storms

Winter Storm Impacts

City of Alamogordo has recorded eight (8) winter storm events since 1950, of which the magnitude can be any combination of winter storms but always be considered severe. Based on the future probability in Table 38, City of Alamogordo can expect 0.117 winter storms per year which could impact in the form of heavy accumulated snow, accumulated ice, extreme and prolonged cold temperatures, or any combination of the three.

Photo Courtesy of Alamogordo Daily News

Vulnerability of Facilities

Structural vulnerability to winter storms is the same throughout City of Alamogordo. Heavy snow accumulation can cause roofing to collapse on old or poorly constructed facilities. Ice storms will coat a facility's exterior but is unlikely to cause anything more than superficial damage. Prolonged, extremely cold temperatures can cause significant damage to poorly insulated or heated facilities. The cold temperatures can cause a facility's water pipes and plumbing systems to freeze. As the water in these systems turns to ice it expands and eventually will cause pipes to burst.

City of Alamogordo structures are valued at $314,683,000. Since winter storms threaten the entire planning area equally, all municipal structures are considered exposed and vulnerable. Please see the table below for a breakdown of these values.

Table 23: Vulnerable Structures, Winter Storms

Table 23 – Vulnerable Structures, Winter Storms		
Jurisdiction	**Commercial**	**Government**
City of Alamogordo	$301,283,000	$299,183,000
	Total:	**$314,683,000**

Vulnerability of Population

City of Alamogordo populations are equally vulnerable throughout the planning area. City of Alamogordo citizens are at risk from prolonged, cold temperatures if they fail to be sheltered in an adequately heated structure or are unable to reach shelter. Some structures are dependent on electricity for their heating, making them vulnerable if a winter storm causes power outage. Additionally, if a winter storm restricts travel, people may become immobile on roadways and be at the mercy of their vehicle's gas supply. Exposure from winter storms in any of these cases can lead to frostbite and hypothermia. Both conditions, if untreated, can lead to death.

City of Alamogordo has a total population of 31,248 in 11,909 housing units all of which are highly vulnerable and at risk to winter storms.

Historically, there has been zero recorded fatalities and zero injuries relating to winter storms across region wide fronts in City of Alamogordo.

Vulnerability of Systems

City of Alamogordo's asset and system vulnerability to winter storms is the same throughout the

planning area. Winter storms create havoc on roads impacting travel from decreased speeds and traffic jams to an ice storm or blowing snow drifts making any travel impossible or extremely dangerous. Additionally, ice storms and snow accumulation can directly bring down power lines or bring down vegetation onto power lines. From these scenarios, City of Alamogordo can suffer power outages making it difficult to heat structures and exposing its citizens to prolonged cold temperatures.

4.3.4A – Infrastructure & Critical Facilities

All infrastructure and critical facilities are equally at risk, since winter storms indiscriminately affect the entire planning area. A complete list of infrastructure and critical facilities can be found in Appendix B.

4.3.4B – Land Use & Development Trends

Currently, there are no significant development projects in City of Alamogordo. Additionally, the planning area has a decrease in population from 2000 to 2017. Therefore, the hazard vulnerability rating has decreased for the entire planning area and does not have a significant enough change in rate to denote a reasonable increase in their hazard vulnerability due to land use, growth, or development trends.

4.3.4C – Unique & Varied Risk, Winter Storms

Winter storms have the potential to affect a portion of the entire planning area. Unfortunately, there is no accurate method of predicting the location or extent of a winter storm's impact. If it will affect the planning area it will affect the entire planning area. Logically, the planning areas with a greater population are at a higher risk.

Although this plan addresses vulnerability to winter storms, without the possibility of being able to calculate all components of risk at a jurisdictional level, each jurisdiction's individual risk to winter storms is not possible to determine.

4.3.4D – Repetitive Loss Structures

Not applicable

4.4 – Hazard Risk Summary

The following table (Table 24) outlines the planning area's general risk to this plan's profiled hazards. The rankings are based on a composite evaluation of this plan's risk assessment, namely, a hazard's probability of occurring in the future, the vulnerability of a jurisdiction to a specific hazard, the intensity of past hazard impacts, and a joint evaluation of local experts and stakeholders.

Table 24: Hazard Risk Summary

Table 24 – Hazard Risk Summary				
Jurisdiction	**Drought**	**Floods**	**Wildfire**	**Winter Storm**
City of Alamogordo	Highly Likely	Highly Likely	Likely	Rare

4.5 – Excluded Hazards

Dam Failure

For the City of Alamogordo hazard mitigation plan, only natural hazards are included. Therefore, manmade structures like dams are not included in the hazard vulnerability section.

Earthquakes

Earthquake does not pose a threat to the City of Alamogordo in a risk area that would constitute reasonable threat or risk to be included in the hazard mitigation plan.

Landslides

The State of New Mexico Hazard Mitigation Plan (2013) does not identify City of Alamogordo as at risk from landslides. Additionally, the USGS's landslide risk database corroborates this claim.

Volcanic Eruption

The State of New Mexico Hazard Mitigation Plan (2013) does not identify City of Alamogordo as at risk from a volcanic eruption. Further, there is no evidence or documentation from USGS that says the planning area is at any risk, reasonable or otherwise, to a volcanic eruption.

Windstorm

The previous City of Alamogordo Hazard Mitigation Plan lists windstorm as a hazard. Upon further research and decision made by the MPC, it was decided the hazard was ranked so low that is not considered a threat to the city.

Note: *Human-caused hazards, though identified in the State of New Mexico Multi-Hazard Mitigation Plan and Statewide Hazard Assessment are not included in the City of Alamogordo Hazard Mitigation Plan. These include: Communicable Disease, Hazardous Materials Incidents, and Terrorism.*

Section 5 – Mitigation Strategies

5.1 Mitigation Capabilities

The stakeholder provides a set of capabilities, in some cases broad and in some cases narrow, by which they can increase the planning area's resiliency.

City and Municipal Governments

The broadest form of mitigation capabilities come from the city and municipal governments. Their inherent legal authority allows them to institute the greatest regulatory and developmental changes.

Institutional Capability

City of Alamogordo is a whole community that can implement the strategies identified herein. In addition, they can promote the mitigation process and educate the public about the hazards prevalent to their area, as well as implementing mitigation processes necessary to mitigate those hazards. The City of Alamogordo values that ability to mitigate and recover from hazards that affect the planning area. One way to assist this goal is to have subject matter experts working for the City. Among the many subject matter experts, the City has land use planners, engineers and an emergency manager who are familiar with the hazards that affect the planning area, personnel skilled in geographic information systems, and grant writers.

In an emergency, the cities response is an extraordinary extension of responsibility and action, coupled with normal day-to-day activity. Normal governmental duties will be maintained, with emergency operations carried out by those agencies assigned specific emergency functions under the City of Alamogordo Emergency Operations Plan. In addition to the emergency operation plan, the City also has a disaster recovery plan, evacuation plan, and continuity of operations plan.

Political Capability

During the process of the development of this plan, opposition to mitigation measures was not evident in City of Alamogordo. In fact, the community political capability is ranked as very willing. The primary limiting factor is funding, which is made more difficult by the current situation in the local, state, and national economy.

The city and their partnerships with the participating agencies are well-organized and responsive to community needs. Leadership is informed and remains up-to-date on the hazards that threaten the area. Citizens who did participate in the public meetings and presentations showed an interest in doing things to promote a safer county. Therefore, the city (the governing board, staff, and citizen population) appear willing to promote the economic efficiency and social utility of the mitigation measures contained in this plan, if appropriate funding can be identified. If some of these cannot be met during or after a disruption, the City has partnering arrangements and intergovernmental agreements.

Technical Capability

The participating stakeholders have the basic technology needed to mitigate and respond to natural disasters. They are equipped with telephone and fax lines and a functional Emergency Operations Center in case of disaster. Many key persons are equipped with cellular phones, which can act as a backup to land lines in case service is lost. The city is connected to the Internet, which is a valuable source of information on approaching hazards and mitigation measures. GIS (mapping) services are available and continue to be updated as GIS information.

Fiscal Capability

The stakeholders in this mitigation plan are not unique in the issues felt by small governments to retain the staff and resources necessary to accomplish the strategies necessary to mitigate the hazards in their area. However, they are aware of potential diverse funding sources available to communities for assisting in the fiscal needs required to implement local hazard mitigation plans, including both government and private programs. The City of Alamogordo has an economic plan that was adopted on August 13, 1996 and was last updated in 2018. The City also has an economic development plan and Capital improvement programs. All of these plans play a part in mitigating financial hardships that typically follow large disruptions.

While federal and state programs carry out the bulk of disaster relief programs that provide funds for mitigation, local governments can search for alternative funding sources to supplement the local hazard mitigation budget. The participants in the mitigation planning process are aware that before effective mitigation strategies can be applied, stable funding sources and effective incentives must be established on a per project basis to encourage participation by the private and public sectors. One way to insure financial stability are taxes and fees. The City of Alamogordo sees these as an opportunity to protect the City in a financial way. Some of the City fees and taxes include: Special purpose taxes, water and sewer fees, developmental fees, revenue and special tax bonds.

5.1.1 – Authorities & Regulations

General Authority

New Mexico State law provides the legal authority for local governments to implement regulatory measures. The basis for much of this authority is the local government power designed to protect public health, safety and welfare. This authority enables local government to enact and enforce ordinances, and to define and abate nuisances. Hazard mitigation is a form of protecting public health, safety, and welfare, and falls under the general regulatory powers of local government. This also extends to building codes and inspections, land use, acquisition, and floodplain development regulation.

Building Codes and Inspections

Building codes and inspections provide local governments with the means to maintain county structures that are resilient to natural hazards. City of Alamogordo has adopted the 2015 IBC (International Building Code, and IRC (International Residential Code). These codes prescribe minimum standards for building construction, which ensures that new buildings and structures are built to standards that are seismically sound, fire resistant and developed within flood-proofing measures. These codes also require appropriate hazard code updating and compliance when certain thresholds are met for remodel and renovation of existing buildings. These codes also authorize local governments to carry out building inspections to ensure local structures adhere to the minimum state building standards. The planning and zoning department has zoning and subdivision regulations that they also enforce and regulate. The fire department enforces the fire code to reduce the fire hazard City of Alamogordo faces.

The City of Alamogordo relies on the New Mexico Construction Industry Division, and currently has given them the primary role in the enforcement of the International Building Code structural regulations. The City of Alamogordo Planning and Zoning Department also take part in the inspection process for general public safety, construction, and building inspections. They enforce the appropriate codes both at the plan approval stage and the site inspection stage. The City of Alamogordo has subdivision regulations Ord. No. 1197 adopted on March 23, 2004. Among these regulations include: Zoning regulation Ord. No. 1234 adopted on March 22, 2005, building code originally adopted on July 10, 1979 but has been updated as of 2015. City of Alamogordo is committed to the high standards of building provided through the respective codes and requires that the same codes and the same enforcement procedures apply during routine permitting procedures as well as following a disaster

Land Use Planning

Through land use regulatory powers granted by the state, local governments can control the location, density, type and timing of land use and development in the community. Provisions of the land use plans are implemented through regulatory tools that include zoning and subdivision ordinances, and taxation. All participating municipal governments have direct land use planning programs through ordinances, codes, and zoning policies. The City of Alamogordo has a comprehensive land use plan and it was updated in 2018. In addition, the City has an open space management plan that was last update in 2012.

Taxation

Taxation can be a powerful mitigation tool by providing local governments with a way to guide development. Tax abatements may be used to encourage landowners and developers to integrate mitigation measures into the process of building new developments and retrofitting existing properties in the floodplain. These tools can be especially effective in encouraging the mitigation of existing structures.

5.1.2 – Floodplain Programs

City of Alamogordo is a participant in the National Flood Insurance Program (NFIP).

Floodplain management is the operation of a community program of measures for reducing flood damage. These measures take a variety of forms; and generally, include zoning, subdivision, or building requirements, and special-purpose floodplain ordinances. Each participating jurisdiction has codified floodplain development regulations in place.

Each NFIP participating community's floodplain program is administered by the city's floodplain administrator. NFIP Coordinators/Floodplain Administrators utilize by adoption federally created flood hazard maps to administer their programs and to actuarially rate new construction for flood insurance or development restrictions.

In City of Alamogordo development in a floodplain is restricted. This restriction is enforced through the building permit application process. When an individual or business applies for a construction permit, its location within or outside of an identified floodplain is noted and reviewed by City of Alamogordo's NFIP Coordinator/Floodplain Administrator. This process meets the minimum federal regulations set forth by the NFIP.

The established floodplain management measures have proven to be successful in restricting current and future construction within the planning area's identified floodplains. There is one repetitive loss structures associated with the hazard. The City of Alamogordo's NFIP Coordinators/Floodplain Administrator will maintain the rigorous standards that have been established to prevent future growth within the planning area's identified floodplains. They will accomplish this through the continued enforcement of the regulations and permitting process described above.

5.2 – Mitigation Goals

Goals for City of Alamogordo were established based upon results from the local and state risk assessments, stakeholder meetings, and input from non-planning team local jurisdiction and state officials. These goals represent City's long-term vision for the continued reduction of hazard risks and the enhancement of mitigation capabilities.

Goal 1: Reduce the impact of flood in the community

Goal 2: Procuring and developing alternative water sources

Goal 3: Minimize the effects of hazardous conditions that might cause loss of life and property. Reduce the economic impact of wildfires.

Goal 4: Protect structures from winter storm damage.

Goal 5: Maintain road system circulation capacity

5.3 – Mitigation Projects

To support the mitigation goals, the City of Alamogordo MPC identified a comprehensive range of 10 possible and unique mitigation projects and activities. The selected set carefully takes an all-hazards approach to mitigation while simultaneously addressing each of the plan′s profiled hazards.

The new plan's list of projects and actions were selected based upon their potential to reduce the risk to life and property with an emphasis on new and existing infrastructure, ease of implementation, community and agency support, consistency with local jurisdiction(s)' plans and capabilities, available funding, vulnerability, and total risk. The new plan does include a few "carryover" projects (listed below) from City of Alamogordo's previous hazard mitigation plan, as they are still relevant, in progress or ongoing.

For further information on evaluation criteria, please see Section 5.4.1. The full list of mitigation projects, their descriptions, and prioritization per jurisdiction and stakeholder can be found in Appendix C.

For the status of mitigation projects since the development of City of Alamogordo's previous hazard mitigation plan, see Section 5.3.2.

The table on the following page summarizes the hazards addressed by each mitigation project and activity.

Note: *Some projects and actions mitigate risk and vulnerability to multiple hazards.*

5.3.1 – Mitigation Project Summary

Table 25: STAPLE+E Criteria

Table 25 - Mitigation Projects Summary		
Mitigation Project or Activity	**Hazards**	**Jurisdiction**
Development of Desalination plant	Drought	City of Alamogordo
Hire floodplain Manager	All Hazards	City of Alamogordo
North diversion project	Flood	City of Alamogordo
McKinley ditch improvement project	Flood	City of Alamogordo
Alternate water source through reclaimed water	Drought	City of Alamogordo
Develop comprehensive education process that includes fire safety education/prevention and organize community	Wildfire	City of Alamogordo
Hire Emergency Manager	All Hazards	City of Alamogordo
Water Shed Thinning Project	Drought, Flood, Wildfire	City of Alamogordo
Re-Design and Construction of Coffer Dam	All Hazards	City of Alamogordo

5.3.2 – Mitigation Project Updates

Table 26: Mitigation Project Updates

Table 26 – Mitigation Project Updates		
Project	**Status**	**Justification**
Development of Desalination plant	Included, Ongoing	Project has not yet been completed but ongoing
Hire floodplain Manager	Included, Ongoing	The City of Alamogordo needs to create and budget for this position in the future.
Construction of drainage channels within the jurisdiction	Not Included	Project has been combined with the north diversion project and the McKinley ditch improvement plan
Development of critical facilities outside of the flood prone areas	Not Included	Not feasible
North diversion project	Included, Ongoing	Project is necessary for mitigation, no funding available
McKinley ditch improvement project	Included, New Ongoing	Has been separated from the north diversion project, into its own project.
Increase number of sirens and radios/televisions with warning capabilities in public buildings, parks, and recreational areas to announce alerts from the emergency alert system	Not Included	The warning systems that currently exist are enough
Lining and covering of the raw water storage reservoirs and reclaimed water storage reservoirs	Not included, Completed	This project has been completed
Desalination of the vast reserves of brackish ground water	Not included	Similar to the first project
Select a city official to participate in the state drought management plan work group	Not included, Completed	The city currently participates and is ongoing
Alternate water source through reclaimed water	Included, Ongoing	Necessary mitigation project, waiting for funding
Secure additional sources of water for emergency use	Not Included	This mitigation action item has been combined with the action item above.
Develop comprehensive education process that includes fire safety education/prevention and organize community cleanups in high fuel areas	Included, Ongoing	This project has begun and will continue to be ongoing
Educate the community on firewise	Not Included	This project has been combined with the project above
Identify structures susceptible to extreme cold	Not included, Completed	The city has completed an assessment of the susceptible structures
Extend emergency management outreach program	Not Included	This project has been combined with a new mitigation project

5.4 – Mitigation Project Evaluations & Prioritization

5.4.1 – STAPLE+E

City of Alamogordo primary hazard risks, and thus priorities are drought, flooding, severe storms, wildfire and winter storms.

A composite evaluation matrix was used to prioritize City of Alamogordo mitigation projects and activities. The evaluation was conducted for each mitigation project and activity. The composite evaluation matrix is comprised of the three factors detailed below.

The first factor is the STAPLE+E evaluation which is best for measuring feasibility and ease of implementation. The tables in Section 5.4.1 provide the STAPLE+E evaluation criteria and the evaluation itself.

The second factor is the effectiveness of the mitigation project. How well does it mitigate the impact of a particular hazard? This is determined by its ability to protect citizens, property, and systems. For instance, wires installed to pin down trees and other objects will reduce their ability to become uprooted or take flight during hazards of high wind but are not as effective at reducing impacts from tornadoes or strong winds as are properly constructed and reinforced buildings. This factor is rated as: Low = 0.5, Medium = 1, and High = 1.5.

The third factor is a hazard risk-based evaluation. It draws on the hazard risk summary found in Section 4.4 of this plan. Each risk rating is assigned a value based on the assessment (None = 0, Low = 5, Medium = 10, and High = 15). A summary of these results is displayed in Table 28 while the full, per jurisdiction per hazard tables are located in Appendix D.

$$(HRT) = (HR_1 + HR_2 + HR_n)$$

The total evaluation score is based on the hazard risk total multiplied by the effectiveness factor, added to the STAPLE+E score.

- ***Hazard Risk Total (HRT):*** The sum of values (low through high) of each hazard the project is designed to mitigate.
- ***Mitigation Project Effectiveness (MPE):*** A multiplier based on the project's effectiveness to mitigate against a chosen hazard.
- ***STAPLE+E Evaluation:*** A raw score comprised of positive and negative feasibility.

$$(Priority) = (STAPLE+E) + (MPE * HRT)$$

Upon completing the evaluations, a composite score is calculated and prioritized based on their total score (Low = 0 – 25, Medium = 26 – 50, High = > 50).

Table 27: STAPLE+E Criteria

Table 27 - STAPLE+E Criteria	
Evaluation Category	**Sources of Information**
Social	Mitigation actions are acceptable to the community if they do not adversely affect a particular segment of the population, do not cause relocation of lower income people, and if they are compatible with the communities' social and cultural values.
Technical	Mitigation actions are technically most effective if they provide long-term reduction of losses and have minimal secondary adverse impacts.
Administrative	Mitigation actions are easier to implement if the jurisdiction has the necessary staffing and funding.
Political	Mitigation actions can truly be successful if all stakeholders have been offered an opportunity to participate in the planning process and if there is public support for the action.
Legal	It is critical that the jurisdiction or implementing agency have the legal authority to implement and enforce a mitigation action.
Economic	Budget constraints can significantly deter the implementation of mitigation actions. Hence, it is important to evaluate whether an action is cost-effective, as determined by a cost-benefit review, and possible to fund.
Environmental	Sustainable mitigation actions that do not have an adverse effect on the environment, that comply with Federal, State, and local environmental regulations, and that are consistent with the community's environmental goals, have mitigation benefits while being environmentally sound.

Table 28: STAPLE+E Rankings

Table 28 - STAPLE+E Rankings																							
X = N/A - Even Impact	+ = Positive Influence										- = Negative Influence												
STAPLE+E Criteria	Social		Technical			Administrative			Political			Legal			Economic				Environmental					
Considerations	Community Acceptance	Effect on Segment of Population	Technical Feasibility	Long-term Solution	Secondary Impacts	Staffing	Funding Allocated	Maintenance/Operations	Political Support	Local Champion	Public Support	State Authority	Existing Local Authority	Potential Legal Challenge	Benefit of Action	Cost of Action	Contribute to Economic Goals	Outside Funding Required	Effect on Land/Water	Effect on Endangered Species	Effect on HAZMAT/Waste Sites	Consistent with Community Goals	Consistent with Federal Laws	Total Impact
Desalination plant	+	+	+	+	+	+	-	-	+	X	X	+	+	+	+	-	+	-	X	X	X	+	+	14
Hire Floodplain Manager	+	+	+	+	+	+	+	+	+	X	+	+	+	+	+	+	+	+	X	X	X	+	+	19
North diversion project	+	+	+	+	+	+	-	-	X	X	X	+	+	+	+	-	+	-	X	X	X	+	+	13
McKinley ditch project	+	+	+	+	+	+	+	-	X	X	X	+	+	+	+	-	+	-	X	X	X	+	+	14
Alternate water source	+	+	+	+	+	+	+	-	+	X	X	+	+	+	+	-	+	-	X	X	X	+	+	15
Community involvement projects	+	+	+	+	+	+	-	+	+	X	+	+	+	+	+	+	+	-	X	X	X	+	+	17
Hire Emergency Manager	+	+	+	+	+	+	+	+	+	X	+	+	+	+	+	+	+	+	X	X	X	+	+	19
Water Shed Thinning Project	+	+	+	+	+	+	-	-	X	X	X	+	+	+	+	-	+	-	X	X	X	+	+	13
Re-Design and Construction of Coffer Dam	+	+	+	+	+	+	-	-	X	X	X	+	+	+	+	-	+	-	X	X	X	+	+	13

5.5 – Planning Integration

Mitigation doesn't end at plan approval. Plan approval is only the beginning. The successful implementation of any number of mitigation activities and projects requires the coordination and collaboration of several local agencies, departments, and organizations. Each group has varying decision-making processes and authorities governing their actions. This plan, once approved, must be integrated into their decision-making processes as a tool for improving their respective resiliencies.

This plan is not only useful for implementing mitigation activities and projects but is also critical in making development plans and capital improvement projects. The risk assessment in this plan can prevent unmanaged and dangerous development into identified hazard areas or other portions of the planning area that decrease a community's overall resiliency.

Democratic Governments and Boards
These organizations rely on agenda proposals, deliberation and discussion, and voting to solidify their decision-making. This type of decision-making makes up the majority of City of Alamogordo and stakeholders.

This plan should be integrated into agenda proposal's designs and cross-referenced during deliberation and discussion of the proposed activity. By using this plan's risk assessment, development and capital improvement projects can be appropriately implemented taking into consideration a community's resiliency.

The City of Alamogordo HMP will be incorporating into existing planning mechanisms in varying processes. These processes will be tailored to the unique characteristics of the planning mechanism and the governing structure of City of Alamogordo.

Budget Reviews
The local governments conducts an annual budget review for a period of two months (although the dates are not rigid from year to year). Typically, they begin in the summer months. During this period, each adopting jurisdiction will review this and future hazard mitigation plans and conduct a feasibility and resiliency review of the suggested mitigation actions and projects. The City of Alamogordo City Manager and Fire Chief will assist in the process as needed.

Emergency Management Planning
The City of Alamogordo HMP, have deferred their emergency management authority to the City of Alamogordo Fire Chief and City Manager until an Emergency Manager has been hired.

Emergency Operations Plans – The City of Alamogordo EOP's next update will reflect the most probable and dangerous hazard event scenarios from the HMP's risk assessment. Additionally, the HMP will be added in its entirety as an Appendix to the EOP. This revision is the responsibility of the City of Alamogordo. Upon revision completion all appropriate emergency services will be notified of the revisions and sent out new copies of the EOP.

State of New Mexico Multi-Hazard Mitigation Plan – The state's HMP is required by FEMA regulations to include assessments and integration of local and tribal HMPs. The process of integrating the City of Alamogordo HMP into this plan is already an established process and is managed by NMDES

Infrastructure, Development & Construction Projects

All jurisdictions in City of Alamogordo approach infrastructure, development, and construction projects in the same way. The demographics City of Alamogordo allows for planning to exist only through collaboration with their AEPC.

City of Alamogordo Local Emergency Planning Committee (AEPC)

The City of Alamogordo AEPC is a conduit for all mitigation actions and projects. It is headed by the City of Alamogordo Fire Chief and meets monthly, although there is flexibility in their schedule.

Their meetings are held in the City of Alamogordo Annex/EOC. Members of the AEPC come from all jurisdictions and a wide variety of local agencies and departments.

Mitigation Projects & Actions Implementation

Upon adoption of an HMP or other EM related plans, the City of Alamogordo will notify all stakeholders when the next AEPC meeting topic will be reviewing mitigation project and action selections. Each jurisdiction then approves a list of mitigation actions and projects they want to pursue according to the mechanism listed in the table on the following page. During the AEPC meeting, the City of Alamogordo will assist in determining which grant program and path will be appropriate for the project. If additional funding is necessary, the stakeholder will have to return to their community and pass a resolution to secure the funding.

The City of Alamogordo may assist in every facet from project inception to completion as well as working with other external organizations for tasks such as grant writing, project monitoring, and project management where appropriate.

Capital Improvement & Economic Development Planning

The City has an existing Capital Improvement and Economic Development plan.

All economic development plans initiated or supported by a jurisdiction, will undergo a hazard application process in which all hazard risk assessments from the HMP will be weighed into the benefit cost analysis. This can be done at the local level prior to working with the City of Alamogordo AEPC or exist as a known future consideration and requirement. However, if done at the local level, it must be reviewed and approved by the City of Alamogordo AEPC.

Infrastructure, Development & Construction Projects

The City of Alamogordo approaches infrastructure, development, and construction projects in the same way the state of New Mexico does. The demographics of the City of Alamogordo allows for planning to exist only through collaboration with their AEPC.

Appendix A – Public Participation

ALAMOGORDO FIRE DEPARTMENT

619 Texas Avenue
Alamogordo, NM 88310
(575) 439-4298

CITY VOLUNTEERS
TRAINING REPORT

DATE: 9-23-14 TIME: 1500 TOTAL HOURS: ________

SUBJECT: MEETING ☑ DAY ☐ NIGHT

SUB-GROUP: (check one)

- ☐ ISO Live Training
- ☐ Multi-Company Training
- ☐ ISO New Driver Operator
- ☐ Pre-Fire Planning
- ☐ ISO Company
- ☐ ISO Officer Continue Ed (Leadership)
- ☐ ISO HAZ-MAT
- ☐ Pump Testing
- ☐ COA Safety Training
- ☐ ISO Existing Driver/Operator
- ☐ ISO Recruit Training 1st Year
- ☐ Hose Testing
- ☑ Other(Explain): MEETING W/ MAJOR PLAYERS/CONSULTANT/STATE ANHMP

INSTRUCTOR(S): N/A **(DO NOT SIGN IN BELOW)**

TOTAL STUDENTS: ______ **TOTAL STUDENT HRS:** ______ **TOTAL INSTRUCTOR HRS:** ______

NAME	ID#	SIGNATURE	NAME	ID #	SIGNATURE
J LECLAIR		J LeClair –	City		
B CESAR		[signature] –	City		
Tony Pistilli		[signature] –	City		
Marc South		[signature] –	City		
Nancy Beshalen		Nancy Beshalen –	City		
Nancy Jacobs		Nancy Jacobs (recording secretary) –	City		
Mikel Ward		Mikel Ward Fire Chief –	City		
Kevin Dodge		[signature]	NM State		
Raymond Lopez		[signature]	Consultant		
Mark ...		[signature]	COA		
J Stahle		[signature]	City		
Robert Duncan		Robert A. Duncan	City		

________________ Supervisor ________________ Trainer

Revised 3/24/2011

City of Alamogordo
Alamogordo Fire Department
619 Texas Avenue, Alamogordo, New Mexico 88310
Administration 575-439-4119, Code Enforcement 575-439-3337

Agenda

For

City of Alamogordo

Natural Hazard Mitigation Plan Meeting

When: May 14th 2015, 1300-1500hrs
Where: Alamogordo Fire Station #5
1492 South Florida
Alamogordo, NM 88310

- Welcome & Introductions
- Review Purpose/Goals
- Summary of Work/Tasks Completed to date
- Discuss/Review Identified Hazards, Risk Assessment, & Analysis of Risks
  - Review Current Hazards
  - Review Hazard Events Profile
  - Review Community Asset Inventory
  - Review Risk Assessment/loss estimations
  - Identify and discuss know Gaps
- Discuss/Review Capability Assessment
  - Identify and discuss new/updated plans
  - Identify and discuss complete mitigation activities
  - Identify and discuss new/future mitigation activities
  - Discuss and identify mitigation resources
- Public Input/Comments
- Adjournment

DATE: 5-14-15 TIME: 1300 TOTAL HOURS: 2 Hrs.

SUBJECT: REVIEW of ALL NATURL HAZARD PLAN ☑ DAY ☐ NIGHT

SUB-GROUP: (check one)

☐ Multi-Company Training	☐ Officer Training (Leadership)	☐ Driver/Operator
☐ New Driver Operator	☐ HAZ-MAT	☐ Recruit Training
☐ Pre-Fire Planning	☐ Pump Testing	☐ Hose Testing

☑ MEETING: W/ CONTRACTOR/INPUT W/ MAJOR PLAYERS FOR THE ALL NATURAL HAZARD Mitigation PLAN.

TOTAL IN ATTENDANCE: _____

NAME	ID#	SIGNATURE
J LECLAIR	FDZ	
R. Lopez	ICA	
J. RAEL	COA.	
R. Duncan	APD	
MILLARD	FD1	FIRE CHIEF
Ruben Sapp	COA	City Planner
J. Santana	FD	
Matt McNeil		
Julia Garza		

NAME	ID #	SIGNATURE

N/A –
Trainer

Supervisor

City of Alamogordo
Alamogordo Fire Department
619 Texas Avenue, Alamogordo, New Mexico 88310
Administration 575-439-4119, Code Enforcement 575-439-3337

Agenda

For

City of Alamogordo

Natural Hazard Mitigation Plan Meeting

When: May 26th 2015, 1300-1500hrs
Where: Alamogordo Fire Station #5
1492 South Florida
Alamogordo, NM 88310

- Welcome & Introductions
- Review Purpose/Goals
- Summary of Work/Tasks Completed to date
- Discuss/Review Assessment of Alternative Hazard Mitigation Measures
  - Review Goals/Objectives
  - Review Mitigation Alternatives
  - Review Mitigation Strategies and develop measures
- Discuss/Review Plan Needs and discuss Implementation Strategies
  - Discuss document review and comment period
  - Discuss Plan update cycle and process
- Public Input/Comments
- Adjournment

DATE: 5-26-15 TIME: 1300 HRS TOTAL HOURS: 1 HR.

SUBJECT: PUBLIC MEETING / ALL NATURL HAZARD MITIGATION PLAN- ☑ DAY ☐ NIGHT

SUB-GROUP: (check one)

☐ Multi-Company Training	☐ Officer Training (Leadership)	☐ Driver/Operator
☐ New Driver Operator	☐ HAZ-MAT	☐ Recruit Training
☐ Pre-Fire Planning	☐ Pump Testing	☐ Hose Testing
☑ MEETING:		

REVIEW of the ALL NATURAL HAZARD mitigation PLAN-

TOTAL IN ATTENDANCE: 7

NAME	ID#	SIGNATURE
J LECLAIR	#2	J Leclair
R Lopez	ICA	
Schakraft	5348	
Julia Garza		
Ruben Segura		
Tony Pistina		
WARD	FD1	

NAME	ID #	SIGNATURE

N/A
Trainer

J Leclair
Supervisor

Appendix B – Critical Facilities

Table 29: Critical Facilities

Table 29 - Critical Facilities, City of Alamogordo	
Name	**Type**
City of Alamogordo	
Fire Station 1	Government
Alamogordo Police Department	Government
Fire Station 2	Government
Fire Station 3	Government
Fire Station 4	Government
Fire Station 5	Government
Fire Station 6	Government
Fire Station 7	Government
City Hall	Government
Alamogordo Senior Center	Government
Alamogordo Civic Center	Government
Alamogordo Recreational Center	Government
Alamogordo Regional Airport	Commercial
Water Treatment Plant 1	Government
Water Treatment Plant 2	Government
Public Works Yard	Government
Waste Water Treatment Plant 3	Government
Desal Plant	Government
Alamogordo High School	Government
Mountain View Middle School	Government
Oregon Elementary	Government
Otero County Sheriff's Office	Government
Hospital	Commercial
Critical Facilities, Wildfire	**Risk Zone**
Fire Station 1	High Risk
Alamogordo Police Department	High Risk
Fire Station 2	Medium Risk
Fire Station 3	Very Low Risk
Fire Station 4	High Risk
Fire Station 5	High Risk
Fire Station 6	High Risk
Fire Station 7	Medium Risk
City Hall	High Risk
Alamogordo Senior Center	High Risk
Alamogordo Civic Center	Medium Risk
Alamogordo Recreational Center	Medium Risk
Alamogordo Regional Airport	Very Low Risk
Water Treatment Plant 1	Not in Risk Zone
Water Treatment Plant 2	Very Low Risk
Public Works Yard	High Risk
Waste Water Treatment Plant 3	Very Low Risk
Desal Plant	Not in Risk Zone
Alamogordo High School	Not in Risk Zone
Mountain View Middle School	Medium Risk
Oregon Elementary	High Risk
Otero County Sheriff's Office	High Risk
Hospital	Medium

Critical Facilities, City of Alamogordo	
Name	
City of Alamogordo	**Flood Zone**
Fire Station 1	AH
Alamogordo Police Department	AH
Fire Station 2	AH
Fire Station 3	AH
Fire Station 4	X
Fire Station 5	AH
Fire Station 6	AH
Fire Station 7	AH
City Hall	AH
Alamogordo Senior Center	AH
Alamogordo Civic Center	AH
Alamogordo Recreational Center	AH
Alamogordo Regional Airport	AH
Water Treatment Plant 1	AH
Water Treatment Plant 2	AE
Public Works Yard	AH
Waste Water Treatment Plant 3	AH
Desal Plant	AH
Alamogordo High School	AH
Mountain View Middle School	A
Oregon Elementary	AH
Otero County Sheriff's Office	X
Hospital	X

Appendix C – Mitigation Projects

#1 – Development of Desalination Plant			
Description	This mitigation project will be for the design and build of a desalination plant for the City of Alamogordo. This facility will provide an additional 1 (one) million gallons of potable water daily to help offset the current demands for water consumption and/or fire protection activities.		
Hazard/s Addressed	Drought, Wildfire		
Status	On-going	**Infrastructure Emphasis**	New & Existing
Funding Source/s	Local Budgets, State and Federal	**Cost Estimate**	$8,000,000
Lead Department/s	City of Alamogordo Planning and engineering, Army Corps	**Effectiveness**	High
Jurisdictional Priority			
City of Alamogordo	High		

#2 – Hire Floodplain Manager			
Description	This mitigation project is to create a new position (Flood Plain Manager) for the City of Alamogordo. This position will be directly responsible for the management of floodplain resources and flood mitigation.		
Hazard/s Addressed	Flood		
Status	Proposed	**Infrastructure Emphasis**	New & Existing
Funding Source/s	City Funds	**Cost Estimate**	$78,046.26
Lead Department/s	City of Alamogordo Engineering	**Effectiveness**	High
Jurisdictional Priority			
City of Alamogordo	High		

#3 – North Diversion Project			
Description	This mitigation project will be for the design and build of a detention basin along with drainage improvements to safely contain and control the release of flood waters in respect to a 100-hundred-year flood event on the Northern portion of the City of Alamogordo.		
Hazard/s Addressed	Flood		
Status	On-going & Proposed	**Infrastructure Emphasis**	New
Funding Source/s	Local Budgets, Army Corps of Eng.	**Cost Estimate**	$55,000,000
Lead Department/s	City of Alamogordo, public works, Engineering & Army Corps of Eng.	**Effectiveness**	High
Jurisdictional Priority			
City of Alamogordo	High		

#4 – South Diversion Project			
Description	This mitigation project will be for the design and build and completion of the Southern diversion project. At the completion of the project, channels will be concrete lined allowing flood waters and debris to be controlled safely away from the Southern portions of the City into the desert basin.		
Hazard/s Addressed	Flood		
Status	On-going	**Infrastructure Emphasis**	Existing
Funding Source/s	Local Budgets, Army Corps of Eng.	**Cost Estimate**	$10,000,000
Lead Department/s	City of Alamogordo Public works, engineering, and Army Corps	**Effectiveness**	High
Jurisdictional Priority			
City of Alamogordo	High		

#5 – Alternate Water Source			
Description	This mitigation project will be for the purchase, design and development of surface water sources in the Snow Smith Spring area. Once completed, it will allow the City of Alamogordo to introduce an additional water source to help offset the current demands for consumption and/or fire protection activities.		
Hazard/s Addressed	Drought, Wildfire		
Status	Proposed	**Infrastructure Emphasis**	Existing, On-going
Funding Source/s	Local Budgets, State, Federal	**Cost Estimate**	$1,500,000-3,000,000
Lead Department/s	City of Alamogordo Public works and Engineering and Legal	**Effectiveness**	High
Jurisdictional Priority			
City of Alamogordo	High		

#6 – Community Involvement Projects			
Description	This mitigation project will be for the design and restoration in respect to thinning the South Sacramento area. Once this NEPA project is completed, it will allow lost water resources to be utilized once again to supplement the current demands for consumption and/or fire protection activities.		
Hazard/s Addressed	Drought, Wildfire		
Status	Proposed	**Infrastructure Emphasis**	Existing, On-going
Funding Source/s	Local Budgets, Federal	**Cost Estimate**	$350,000
Lead Department/s	Public Works, Forest Service	**Effectiveness**	High
Jurisdictional Priority			
City of Alamogordo	High		

#7 – Hire Emergency Manager			
Description	This mitigation project is to create a new position (Emergency Manager) for the City of Alamogordo. This position will be directly responsible for the direct management of all disasters, manmade or natural, plan creations, up-dates, review and grant writing.		
Hazard/s Addressed	Drought, Flood, Wildfire, Winter Storm		
Status	Proposed	**Infrastructure Emphasis**	New
Funding Source/s	Local Budgets	**Cost Estimate**	$78,046.26
Lead Department/s	City of Alamogordo Fire Department	**Effectiveness**	High
Jurisdictional Priority			
City of Alamogordo	High		

#8 – Water Shed Thinning Project			
Description	This mitigation project is to design and implement a thinning program in respect to the Bonito Lake water shed for the City of Alamogordo. Once this project has been implemented, it will better protect the City of Alamogordo water shed regarding structures and infrastructure related to defensible space. In addition, with the thinning efforts it will allow existing ground litter (pine needles, dead grass, etc.) to be removed allowing new growth thus preventing erosion.		
Hazard/s Addressed	Drought, Flood, Wildfire		
Status	Proposed	**Infrastructure Emphasis**	New
Funding Source/s	Local Budgets, Federal	**Cost Estimate**	$260,000
Lead Department/s	City of Alamogordo Fire Department, Public Works, Forest Service	**Effectiveness**	Medium
Jurisdictional Priority			
City of Alamogordo	High		

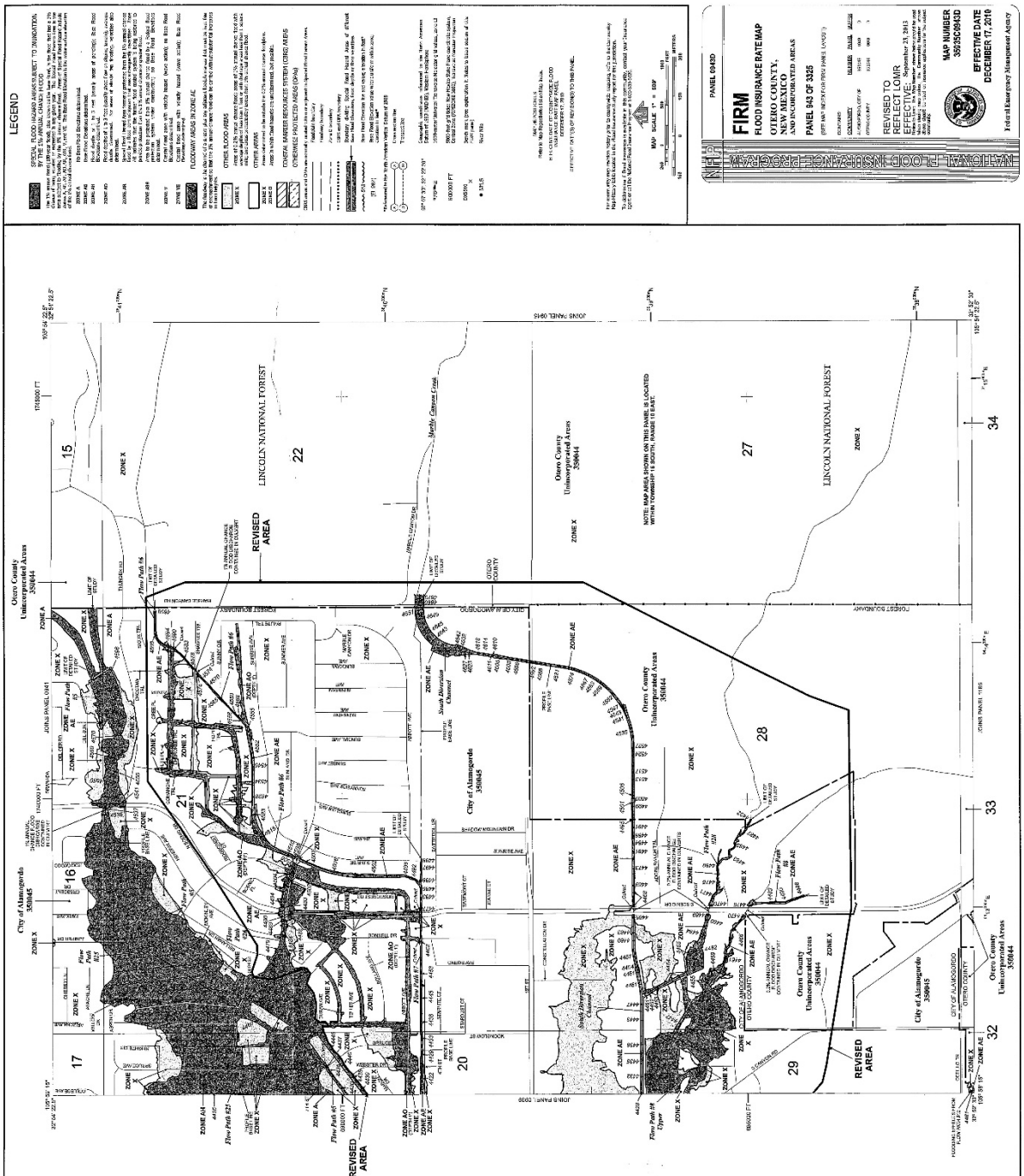
#9– Re-design and Construction of Coffer Dam			
Description	This mitigation project is to re-design and construct the Coffer Dam above Bonito Lake and finish the dredging efforts that are currently taking place. Once this project is completed, the Coffer dam will prevent downstream flooding, preventing debris and other material from entering the Bonito Lake intake tower thus preventing the intake from being plugged. In addition to the above, the dredging efforts will allow the City of Alamogordo to contain more of the water shed runoff which will help during drought and high consumption periods.		
Hazard/s Addressed	Drought, Flood, Wildfire, Winter Storm		
Status	Proposed	**Infrastructure Emphasis**	New, Existing and On-going
Funding Source/s	Local Budgets, State, Federal	**Cost Estimate**	$9,200,000
Lead Department/s	Public Works, Army Corps of ENG, New Mexico Dam Safety Bureau, FEMA, and the Office of the State Engineer	**Effectiveness**	High
Jurisdictional Priority			
City of Alamogordo	High		

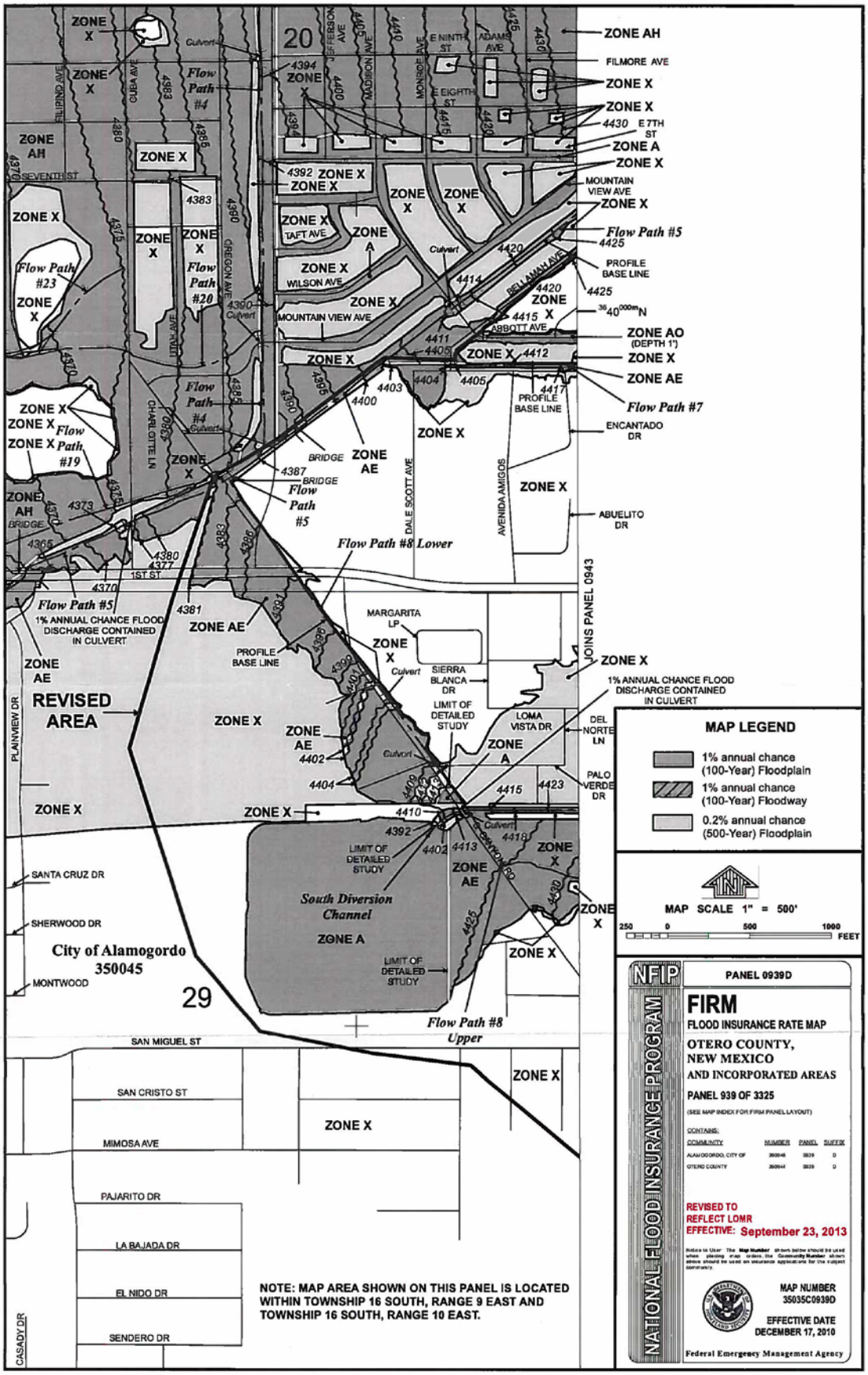
Appendix D – Mitigation Project Prioritization

Table 30: Mitigation Project Prioritization, City of Alamogordo

Table 30 - Mitigation Project Prioritization, City of Alamogordo								
Mitigation Project or Activity	**STAPLE+E**	**Effectiveness Multiplier**	**Hazard**				**Total**	**Priority**
			Droughts	**Flood**	**Wildfire**	**Winter Storms**		
Desalination plant	14	0.5	-	15	-	-	29.5	Medium
Hire Floodplain Manager	19	1.5	15	15	10	5	86.5	High
North diversion project	13	1.5	-	15	-	-	35.5	Medium
McKinley ditch project	14	1.5	-	15	-	-	36.5	Medium
Alternate water source	15	1.5	15	-	-	-	37.5	Medium
Community involvement projects	17	0.5	-	-	10	-	22	Low
Hire Emergency Manager	19	1.5	15	15	10	5	86.5	High
Watershed Thinning Project	13	1.0	15	15	10	-	53	High
Re-Design and Construction of Coffer Dam	13	1.0	15	15	15	15	73	High

Appendix E – FEMA Firm Maps




ZONE AH
FILMORE AVE
ZONE X
ZONE A
MOUNTAIN VIEW AVE
Flow Path #5
PROFILE BASE LINE
ZONE AO
(DEPTH 1')
ZONE AE
Flow Path #7
ENCANTADO DR
ABUELITO DR
Flow Path #8 Lower
JOINS PANEL 0943
1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CULVERT
REVISED AREA
LIMIT OF DETAILED STUDY
South Diversion Channel
Flow Path #8 Upper
City of Alamogordo
350045
29
NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 16 SOUTH, RANGE 9 EAST AND TOWNSHIP 16 SOUTH, RANGE 10 EAST.
MAP LEGEND
1% annual chance (100-Year) Floodplain
1% annual chance (100-Year) Floodway
0.2% annual chance (500-Year) Floodplain
MAP SCALE 1" = 500'
250 0 500 1000 FEET
NFIP
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 0939D
FIRM
FLOOD INSURANCE RATE MAP
OTERO COUNTY, NEW MEXICO
AND INCORPORATED AREAS
PANEL 939 OF 3325
REVISED TO REFLECT LOMR
EFFECTIVE: September 23, 2013
MAP NUMBER 35035C0939D
EFFECTIVE DATE DECEMBER 17, 2010
Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the "Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0 North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures in this jurisdiction.

The **projection** used in the preparation of this map was New Mexico State Plane Central Zone (FIPS 3502). The horizontal datum was GCS North American Datum of 1983 using the GRS_1980 spheroid. Differences in datum, spheroid, projection or FIPS zone used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, NNGS12
National Geodetic Survey, SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 209 0-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for bench marks shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242** or visit their website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from multiple sources. Base map files were provided in digital format by the Otero County Assessor's Office, the United States Geological Survey and United States Census Bureau. This information was compiled from orthophotography and field reconnaissance. Additional information was compiled at scales of 1:4,000 and 1:12,000 from aerial photography and the 7.5 minute quadrangles (see 2009).

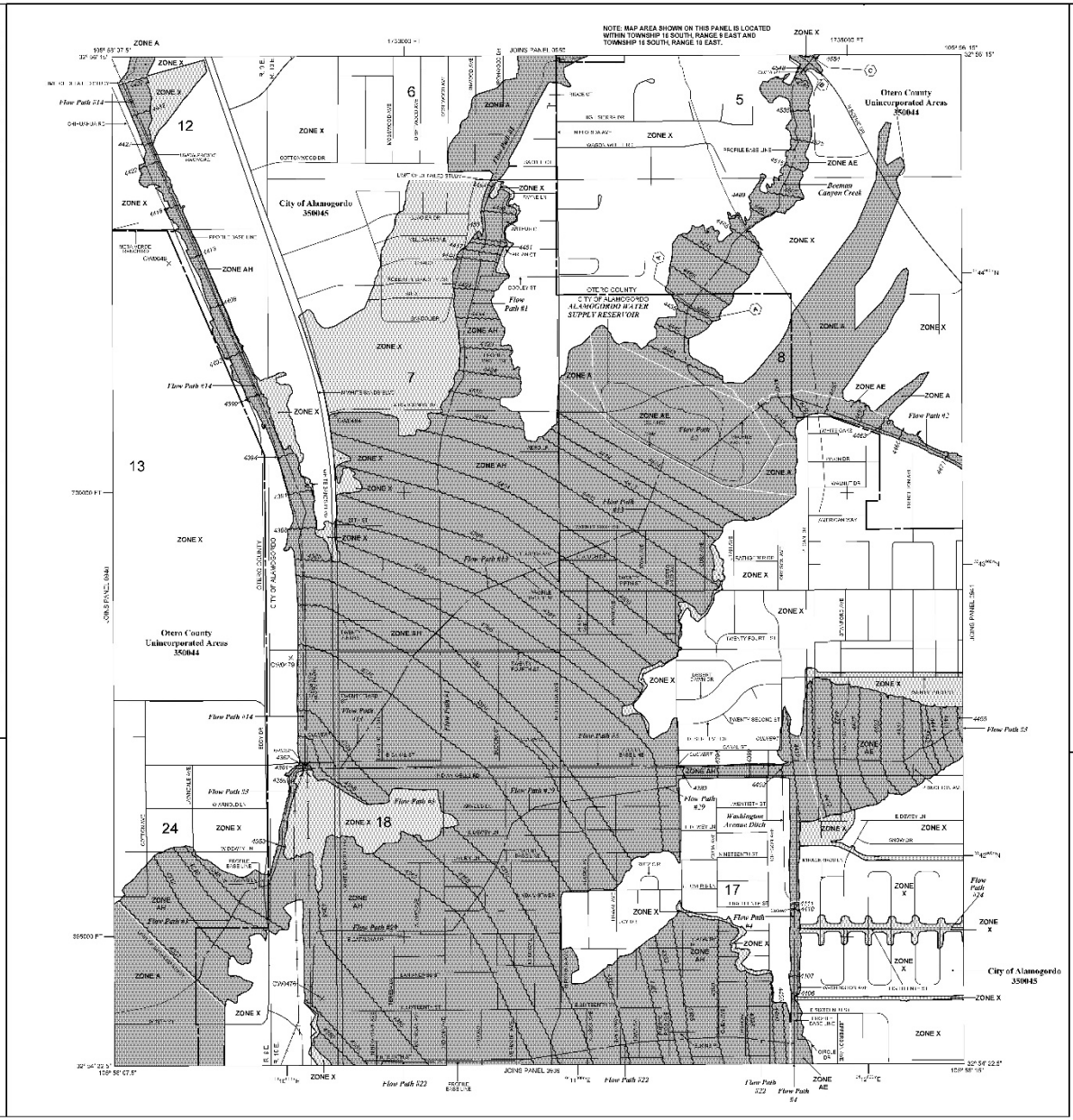
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been redefined to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the accessory product **Map Index** for an overview map of the county showing the exact map panel configuration of this jurisdiction, a Community Map Repository address, and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and their website at http://www.msc.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call 1- 877- **FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A — No Base Flood Elevations determined.
ZONE AE — Base Flood Elevations determined.
ZONE AH — Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR — Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99 — Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V — Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE
The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS
ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
OTHER AREAS
ZONE X — Areas determined to be outside 0.2% annual chance floodplain
ZONE D — Areas in which flood hazards are undetermined, but possible.
COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS
OTHER-MAP-THOMAS-HAMPSHIRE

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPAs boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- Base Flood Elevation line and value; elevation in feet*
- Base Flood Elevation value where uniform within zone; elevation in feet*
- *Referenced to the North American Vertical Datum of 1988
- (A) Cross section line
- (23) Transect line
- 97° 07' 30", 32° 22' 30" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 5279000 FT — 1000-meter Universal Transverse Mercator grid values, zone 13
- 500000 FT — 1000-foot grid values, New Mexico State Plane coordinate system, Central Zone (FIPS ZONE 3502), Transverse Mercator projection
- DX5510 — Bench mark (see explanation in profile to Flood Insurance Study report for this jurisdiction)
- M1.5 — River Mile

MAP REPOSITORY
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
DECEMBER 17, 2010

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
500 0 1000 FEET
150 0 300 METERS

PANEL 0937D

FIRM

FLOOD INSURANCE RATE MAP

OTERO COUNTY, NEW MEXICO AND INCORPORATED AREAS

PANEL 937 OF 3325

SEE MAP INDEX FOR FIRM PANEL LAYOUT

CONTAINS

COMMUNITY	NUMBER	PANEL	SUFFIX
ALAMOGORDO, CITY OF	350045	0937	D
OTERO COUNTY	350044	0937	D

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
35035C0937D

EFFECTIVE DATE
DECEMBER 17, 2010

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the "Profile Baseline and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0 North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures in the jurisdiction.

The **projection** used in the preparation of this map was New Mexico State Plane Central Zone (FIPS 3002). The horizontal datum was GCS North American Datum of 1983 using the GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight, positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey, SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for bench marks shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit their website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from multiple sources. Base map files were provided in digital format by the Otero County Assessors Office, the United States Geological Survey, and United States Census Bureau. This information was compiled from orthorectified color infrared imagery. Additional information was compiled at scales of 1:6,000 and 1:12,000 from aerial photography and the 7.5 minute quadrangles dated 2006.

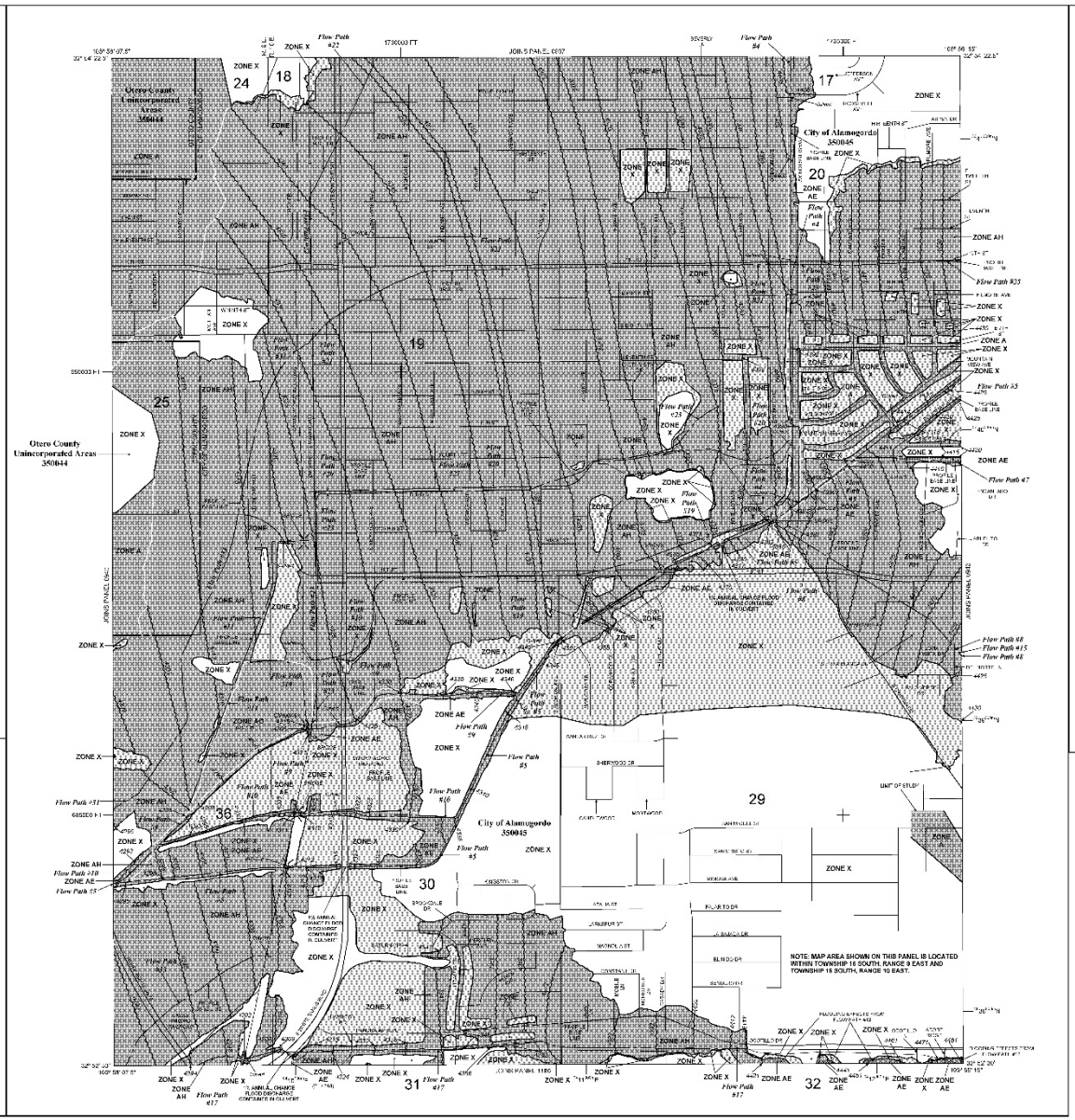
This map reflects more detailed and updated stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; any map revisions and/or amendments; and a listing of Communities Participating in the National Flood Insurance Program (NFIP) dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620, and their website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call 1-877-**FEMA MAP** (1-877-336-2627) or visit the FCIA website at http://www.fema.gov/.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood.

ZONE A — No Base Flood Elevations determined.

ZONE AE — Base Flood Elevations determined.

ZONE AH — Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR — Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 — Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V — Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain

ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- Floodway Boundary
- Zone D Boundary
- CBRS and OPA Boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- Base Flood Elevation value where uniform within zone; elevation in feet*
- Base Flood Elevation value where uniform within zone; elevation in feet* (EL 987)
- Cross section line
- Transect line
- Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 1000-meter Universal Transverse Mercator grid values, zone 13
- 5000-foot grid ticks: North American Datum 1983 (NAD 83), Central Zone (FIPS 0202), Transverse Mercator projection
- Bench mark (see explanation in Notes to Users section of this FIRM panel)
- MAP REPOSITORY
- Refer to listing of Map Repositories on Map Index
- EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
- DECEMBER 17, 2010
- EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For communities with multiple panels, see the Map Index to determine the initial effective date for the current map. For communities with a single panel, see the Publication Info to determine the initial effective date for the current map.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

PANEL 0939D

FIRM

FLOOD INSURANCE RATE MAP

OTERO COUNTY, NEW MEXICO AND INCORPORATED AREAS

PANEL 939 OF 3325

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

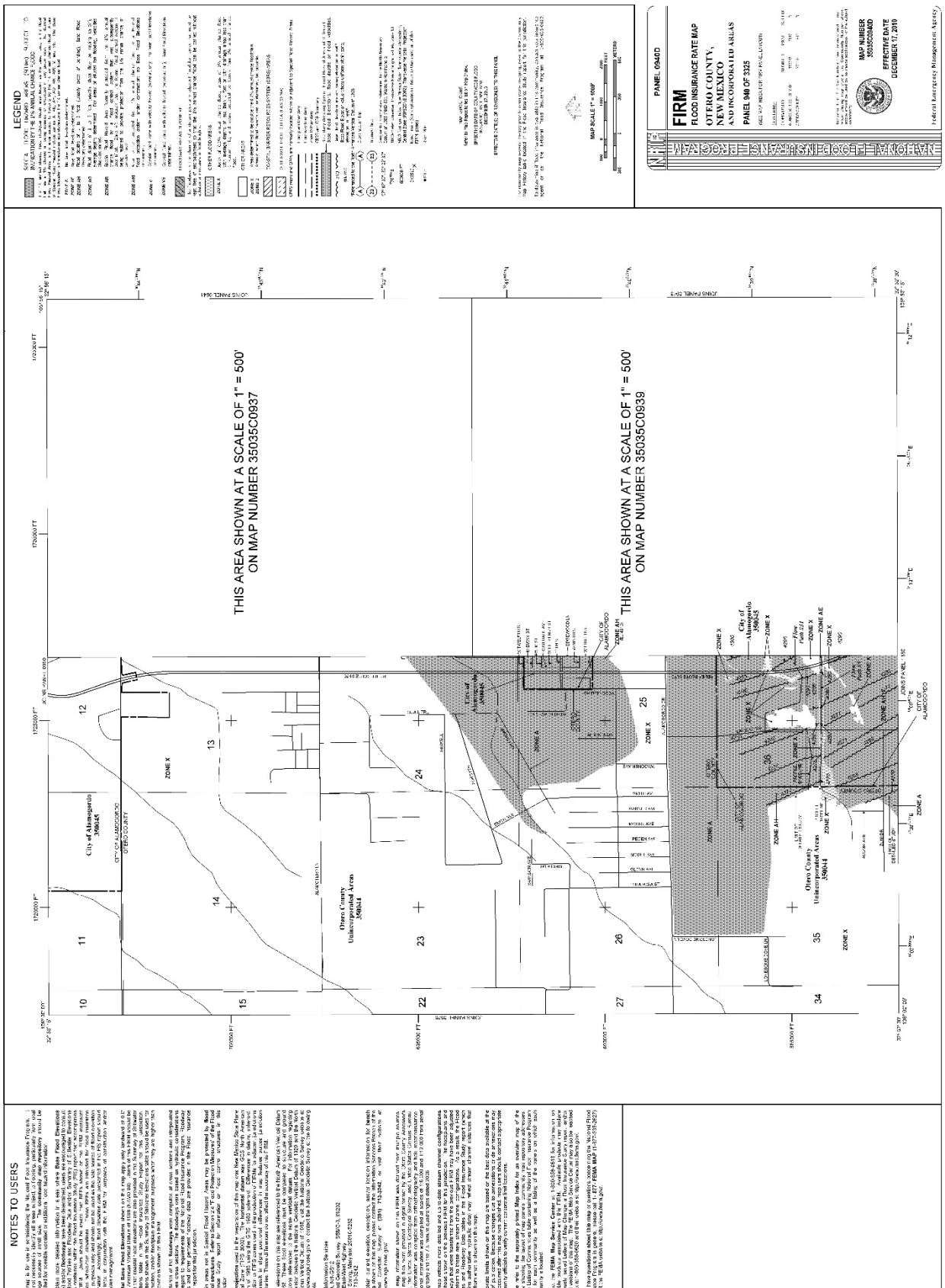
COMMUNITY	NUMBER	PANEL	SUFFIX
ALAMOGORDO, CITY OF	350044	0939	D
OTERO COUNTY	350044	0939	D

Notice to User: The Map Number must be used when ordering flood insurance for this community. Insurance agents will need to know the entire map number for each community in order to obtain the correct flood insurance premium rate.

MAP NUMBER
35035C0939D

EFFECTIVE DATE
DECEMBER 17, 2010

Federal Emergency Management Agency


NOTES TO USERS
LEGEND
THIS AREA SHOWN AT A SCALE OF 1" = 500'
ON MAP NUMBER 35035C0937
THIS AREA SHOWN AT A SCALE OF 1" = 500'
ON MAP NUMBER 35035C0939
PANEL 0940D
FIRM
FLOOD INSURANCE RATE MAP
OTERO COUNTY,
NEW MEXICO
AND INCORPORATED AREAS
PANEL 940 OF 3325
MAP NUMBER
35035C0940D
EFFECTIVE DATE
DECEMBER 17, 2010
Federal Emergency Management Agency

NOTES TO USERS

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To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0 North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures in this jurisdiction.

The **projection** used in the preparation of this map was New Mexico State Plane Central Zone (FIPS 3002). The horizontal datum was NAD 83 North American Datum of 1983 using the GRS_1980 spheroid. Differences in datum, spheroid, projection or FIRS zones used in the production of FIRMs for adjacent jurisdictions may result in a slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

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NGS Information Services
NOAA, N/NGS12
National Geodetic Survey, SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

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Base map information shown on this FIRM was derived from multiple sources. Base map files were provided in digital format by the Otero County Assessor's Office, the United States Geological Survey, and United States Census Bureau. This information was compiled from orthophotography and field reconnaissance. Additional information was compiled at scales of 1:3,000 and 1:12,000 from aerial photography and the 7.5 minute quarangles called 2003.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were delineated from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a listing of Communities Participating in National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

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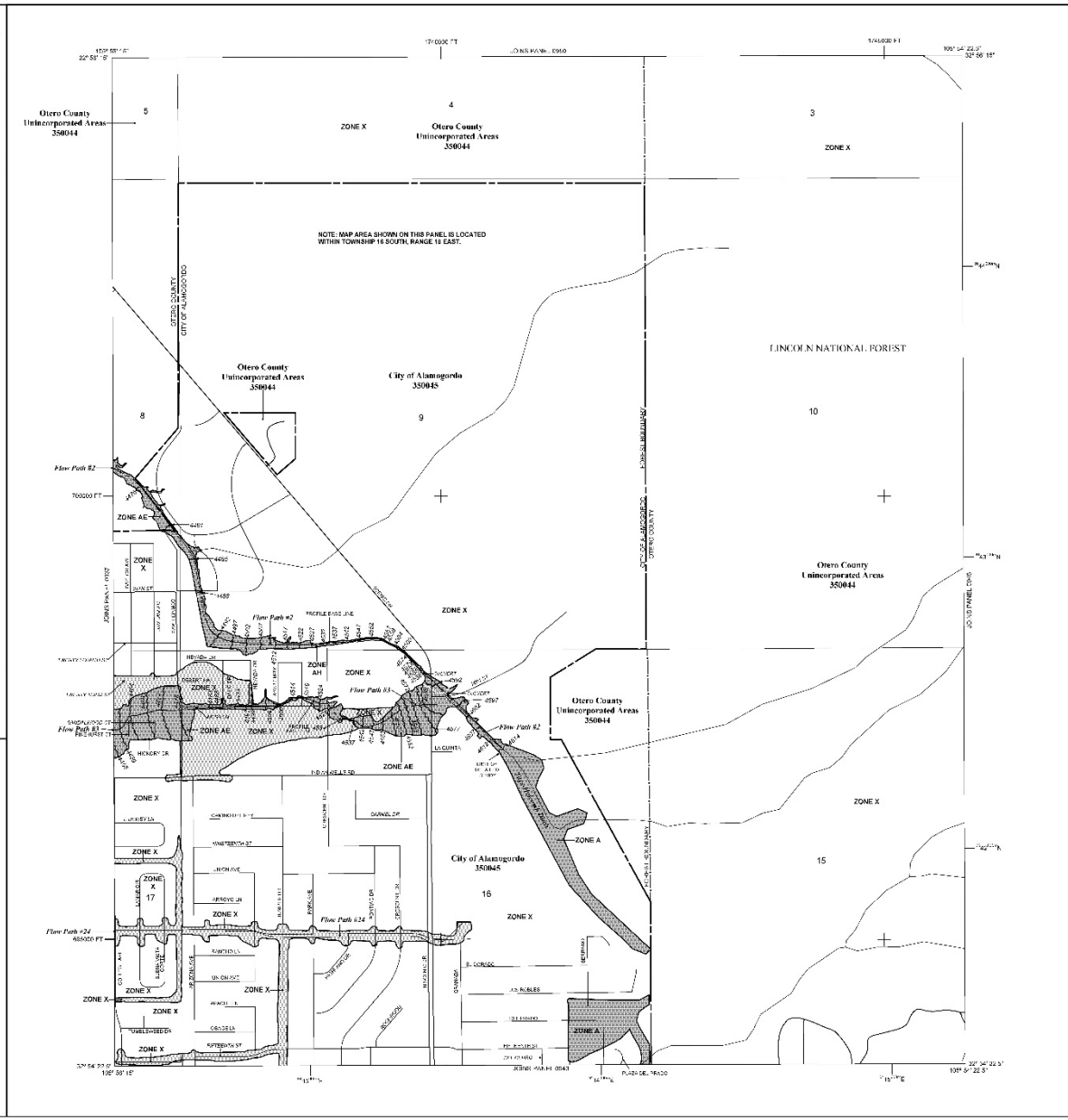
If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877- FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A1-A30, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A — No Base Flood Elevations determined.

ZONE AE — Base Flood Elevations determined.

ZONE AH — Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR — Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 — Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V — Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are typically located on adjacent or nearby Flood Insurance Rate Maps (FIRMs).

- Floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

- (A) — Cross section line
- (23) — Transect line
- 97° 07' 30", 32° 22' 30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 1000-meter Universal Transverse Mercator grid values, zone 12
- 5000-foot grid values: New Mexico State Plane coordinate system, Central zone (FIPS zone 3002), Lambert Conformal Conic projection
- Bench mark (see explanation in Notes to Users section of this FIRM panel)
- River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FIRM
DECEMBER 17, 2010

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
125 0 125 250 METERS

PANEL 0941D

FIRM
FLOOD INSURANCE RATE MAP
OTERO COUNTY, NEW MEXICO AND INCORPORATED AREAS
PANEL 941 OF 3325
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALAMOGORDO, CITY OF	[illegible]	[illegible]	D
OTERO COUNTY	[illegible]	[illegible]	D

MAP NUMBER
35035C0941D
EFFECTIVE DATE
DECEMBER 17, 2010

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** shown below should be consulted for possible updated or additional flood hazard information.

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Coastal Base Flood Elevations shown on this map apply only landward of 0.0 North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross-sections and interpolated between cross-sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures in this jurisdiction.

The **projection** used in the preparation of this map was New Mexico State Plane Central Zone (FIPS 3002). The **horizontal datum** was NAD83 North American Datum of 1983 using the GRS_1980 spheroid. Differences in datum, spheroid, projection or FIPS zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey, SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for bench marks shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit their website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from multiple sources. Base map files were provided in digital format by the Otero County Assessors Office, the United States Geological Survey, and the United States Census Bureau. This information was compiled from photogrammetry and field reconnaissance. Additional information was compiled at scales of 1:4,800 and 1:24,000 from aerial photography flown the 7.5 minute exchanges flown 2006.

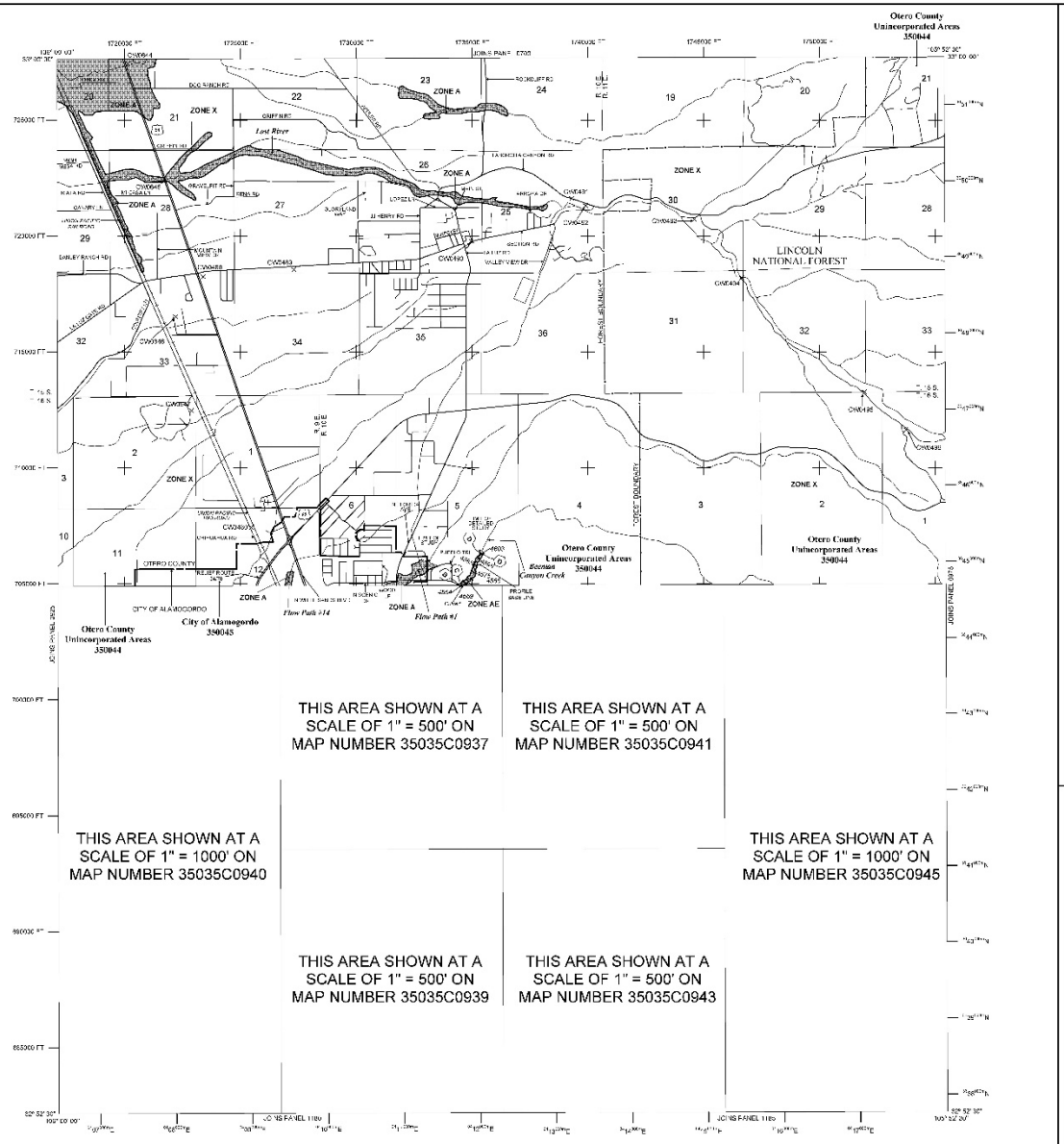
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a listing of communities inside and outside the County. Information on Flood Insurance Rate Maps for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call 1-**877- FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.



LEGEND

SPECIAL FLOOD HAZARD AREAS (S fes) SUBJECT TO INUNDA ION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Areas is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, A1-A30, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A — No Base Flood Elevations determined.

ZONE AE — Base Flood Elevations determined.

ZONE AH — Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR — Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 — Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

ZONE VE — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- Base Flood Elevation line and value; elevation in feet*
- Cross section line
- Transect line
- 97° 07' 30", 32° 22' 30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4275000m N — Universal Transverse Mercator grid values, zone 13
- 1000-meter Universal Transverse Mercator grid ticks, New Mexico State Plane coordinate system, Central Zone (FIPS ZONE 3002)
- 5000-foot grid ticks: New Mexico State Plane coordinate system, Central Zone (FIPSZONE 3002)
- Bench mark (see explanation in 6.0 in the Flood Insurance Study report)
- River Mile

*Referenced to the North American Vertical Datum of 1988 (NAVD 88)

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
DECEMBER 17, 2010

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 2000'

PANEL 0950D

FIRM
FLOOD INSURANCE RATE MAP
OTERO COUNTY, NEW MEXICO AND INCORPORATED AREAS
PANEL 950 OF 3325

INDEX MAP INDEX FOR FIRM PANEL LAYOUT

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALAMOGORDO, CITY OF	[illegible]	0950	D
OTERO COUNTY	[illegible]	0950	D

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
35035C0950D
EFFECTIVE DATE
DECEMBER 17, 2010

Federal Emergency Management Agency

NOTES TO USERS

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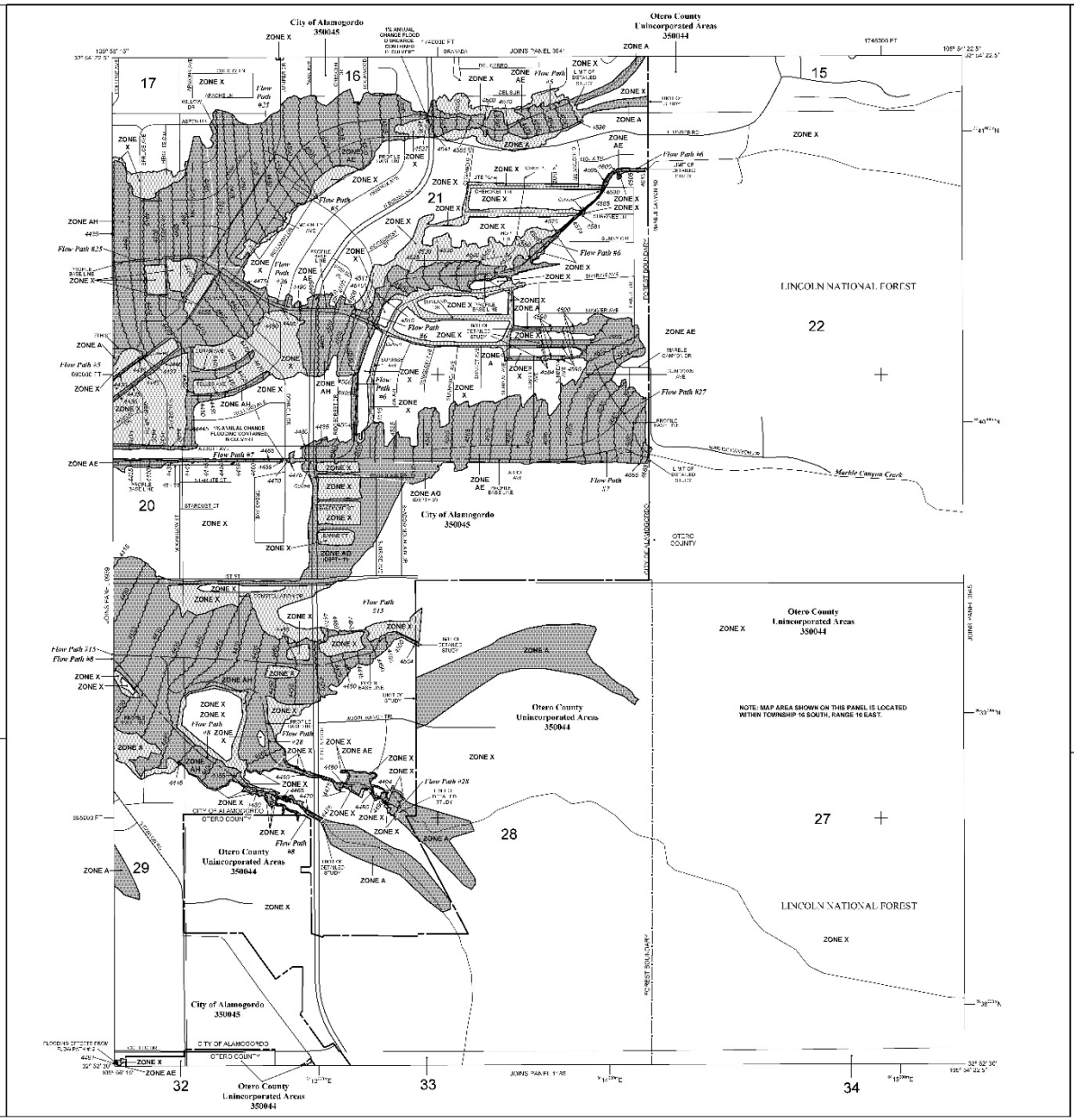

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood.

ZONE A — No Base Flood Elevations determined.

ZONE AE — Base Flood Elevations determined.

ZONE AH — Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR — Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 — Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V — Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are typically shown within or adjacent to Special Flood Hazard Areas.

- Floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

- (A) — Cross section line
- 23 — Transect line
- 97° 07' 30", 32° 22' 30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 3276000 FT — 1000-meter Universal Transverse Mercator grid ticks, zone 13
- 6000000 FT — 5000-foot grid ticks: New Mexico State Plane coordinate system, Central zone (FIPS ZONE 3002), Transverse Mercator projection
- DX5510 — Bench mark (see explanation in Table 2 and accompanying text)
- M1.5 — River mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index.

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 600'
0 300 600 1200 FEET
0 150 300 600 METERS

PANEL 0943D

FIRM

FLOOD INSURANCE RATE MAP

OTERO COUNTY, NEW MEXICO AND INCORPORATED AREAS

PANEL 943 OF 3325

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALAMOGORDO, CITY OF	350047	0943	D
OTERO COUNTY	350044	0943	D

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
35035C0943D

EFFECTIVE DATE
DECEMBER 17, 2010

Federal Emergency Management Agency

NOTES TO USERS

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Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures in this jurisdiction.

The **projection** used in the preparation of this map was New Mexico State Plane Central Zone (NAD 83) (FIPSZONE 3002). The **horizontal datum** was GCS North American Datum of 1983 using the GRS_1980 spheroid. Differences in datum, spheroid, projection or FIRM zones used in the production of FIRMs for adjacent jurisdictions may result in a slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

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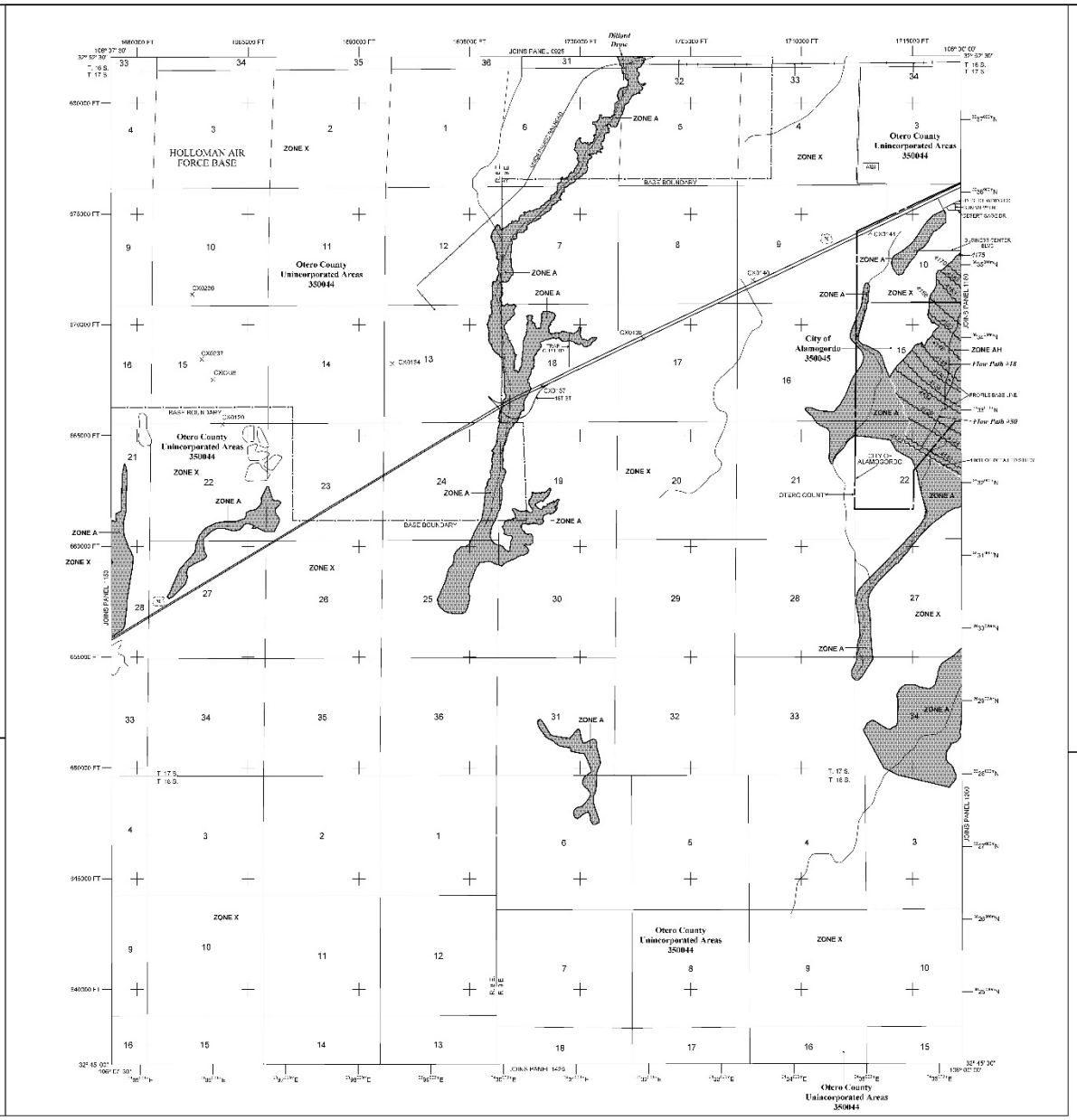

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

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ZONE A — No Base Flood Elevations determined.

ZONE AE — Base Flood Elevations determined.

ZONE AH — Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR — Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 — Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V — Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.

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COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are typically located within undeveloped Special Flood Hazard Areas.

- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- EL 987 — Base Flood Elevation value where uniform within zone; elevation in feet*
- (A) — Cross section line
- 23 — Transect line
- 97° 30' 00", 32° 22' 30" — Geographic coordinates, referenced to the North American Datum of 1983 (NAD 83), western hemisphere
- 1000-meter Universal Transverse Mercator grid ticks, zone 13
- 5000-foot grid ticks: New Mexico State Plane coordinate system, Central Zone (FIPSZONE 3002). Transverse Mercator Projection
- DX5510 — Bench mark (see explanation in Panel Layout and Publication Info)
- M1.5 — River mile

*Referenced to the North American Vertical Datum of 1988

FIRM Panel Locator
Refer to Map Repository or Map Index

EFFECTIVE DATE OF COUNTYWIDE FIRM
DECEMBER 17, 2010

EFFECTIVE DATES OF REVISION(S) TO THIS PANEL

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MAP SCALE 1" = 2000'

PANEL 1175D

FIRM

FLOOD INSURANCE RATE MAP

OTERO COUNTY, NEW MEXICO AND INCORPORATED AREAS

PANEL 1175 OF 3325

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALAMOGORDO, CITY OF	350044	1175	D
OTERO COUNTY	350044	1175	D

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MAP NUMBER
35035C1175D

EFFECTIVE DATE
DECEMBER 17, 2010

Federal Emergency Management Agency

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1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for bench marks shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit their website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from multiple sources. Base map files were provided in digital format by the Otero County Assessor's Office, the United States Geological Survey, and United States Census Bureau. This information was compiled from orthophotography and field reconnaissance. Additional information was compiled at scales of 1"=500' and 1"=2,000' from aerial photography and the 7.5 minute quadrangles dated 2000.

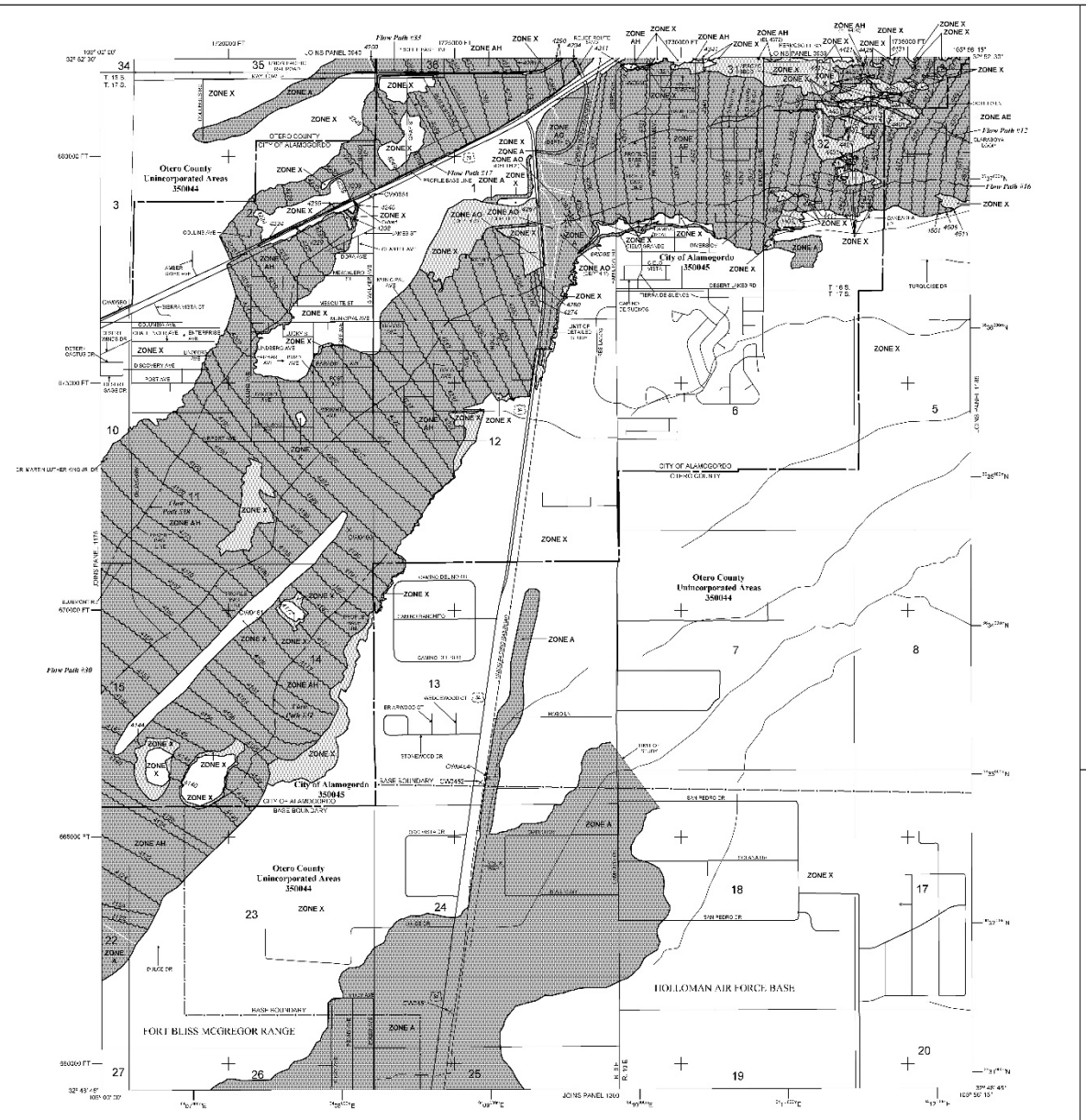
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The topographic and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed Map Index for an overview map of the county showing the layout of map panels; community map repository addresses; and a listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call 1-877-**FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood.

ZONE A — No Base Flood Elevations determined.

ZONE AE — Base Flood Elevations determined.

ZONE AH — Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR — Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 — Area to be protected from the 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V — Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from the 1% annual chance flood

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain

ZONE D — Areas in which flood hazards are undetermined, but possible

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas

- Floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary

Boundaries dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

Base Flood Elevation value where uniform within zone; elevation in feet*

Special Flood Hazard Area Formerly Protected from the 1% Annual Chance Flood

*Referenced to the North American Vertical Datum of 1988

- Cross section line
- Transect line

Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere

1000-meter Universal Transverse Mercator grid values, zone 12

5000-foot ticks: New Mexico State Plane coordinate system, Central zone (FIPS zone 3002), Transverse Mercator projection

Bench mark (see explanation in Notes to Users section of this FIRM panel)

River mile

MAP REPOSITORY
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
DECEMBER 17, 2010

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'

PANEL 1180D

FIRM
FLOOD INSURANCE RATE MAP

OTERO COUNTY, NEW MEXICO
AND INCORPORATED AREAS

PANEL 1180 OF 3325

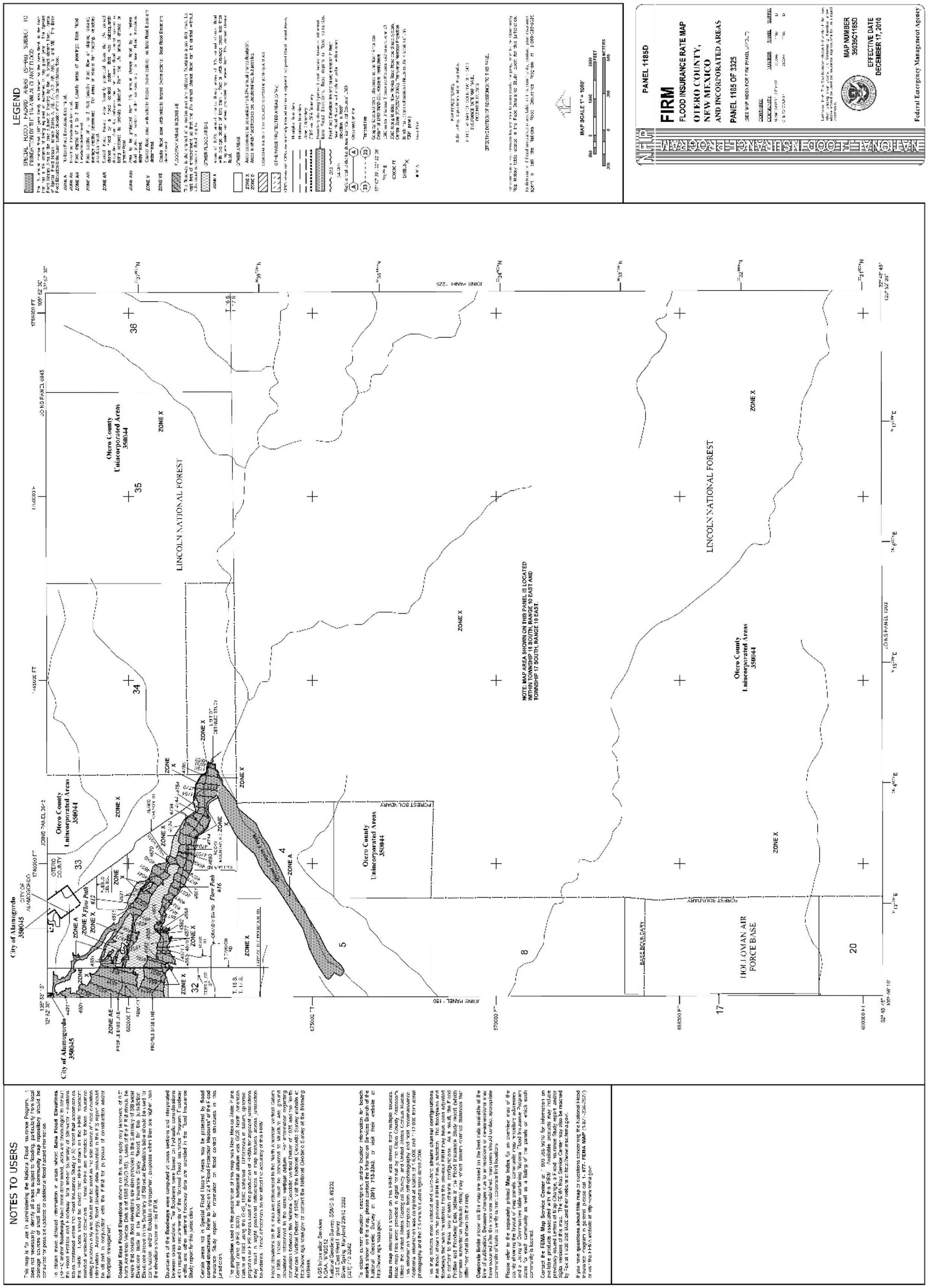
CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALAMOGORDO, CITY OF	350045	1180	D
OTERO COUNTY	350044	1180	D

MAP NUMBER
35035C1180D

EFFECTIVE DATE
DECEMBER 17, 2010

Federal Emergency Management Agency


LEGEND
NOTES TO USERS
City of Alamogordo
350045
Otero County
Unincorporated Areas
350044
LINCOLN NATIONAL FOREST
ZONE X
ZONE A
HOLLOMAN AIR FORCE BASE
NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 16 SOUTH, RANGE 10 EAST AND TOWNSHIP 17 SOUTH, RANGE 10 EAST.
PANEL 1185D
FIRM
FLOOD INSURANCE RATE MAP
OTERO COUNTY,
NEW MEXICO
AND INCORPORATED AREAS
PANEL 1185 OF 3325
MAP NUMBER
35035C1185D
EFFECTIVE DATE
DECEMBER 17, 2010
NATIONAL FLOOD INSURANCE PROGRAM
Federal Emergency Management Agency

Appendix F – Plan Adoption Resolutions

Resolution, City of Alamogordo

RESOLUTION NO._____

AT A MEETING OF THE BOARD OF COMMISSIONERS OF CITY OF ALAMOGORDO HELD ON_____

RESOLUTION OF THE BOARD OF COMMISSIONERS OF CITY OF ALAMOGORDO; ADOPTING THE FINALIZED CITY OF ALAMOGORDO HAZARD MITIGATION PLAN; PROVIDING AND EFFECTIVE DATE; AND FOR OTHER PURPOSES:

WHEREAS, the participating jurisdiction(s) of City of Alamogordo have worked together to develop a strategy known as the City of Alamogordo Hazard Mitigation Plan to improve disaster resistance in the planning area; AND

WHEREAS, the Federal Disaster Mitigation Act of 2000 (DMA2000) and the Federal Emergency Management Agency (FEMA) require communities to adopt an approved hazard mitigation plan in order to be eligible to receive hazard and post disaster federal funding for mitigation purposes; AND

WHEREAS, the participating jurisdiction(s), including the City of Cut Bank, has participated in the hazard mitigation plan by the formation of a Hazard Mitigation Planning Team (HMPT); AND

WHEREAS, the HMPT recommends the formal adoption of the City of Alamogordo Hazard Mitigation Plan by the passing of this resolution.

THEREFORE, BE IT RESOLVED BY THE BOARD OF COMMISSIONERS OF CITY OF ALAMOGORDO THAT:

Section 1: The participating jurisdiction(s) hereby approves and adopts the hazard mitigation plan in its entirety with projects as adopted by the HMPT; AND agree to be governed by the Hazard Mitigation Plan attached hereto and incorporated. (Set forth on CD-ROM and titled: City of Alamogordo Hazard Mitigation Plan).

Section 2: The participating jurisdiction(s) authorizes the appropriate participating officials to pursue funding opportunities for implementation of proposals designated therein; AND will upon receipt of such funding or other necessary resources, seek to implement the actions contained in the hazard mitigation plan.

Section 3: The participating jurisdiction(s) will continue to cooperate and participate in the hazard mitigation planning process, holding regular meetings, including reporting of progress as required by FEMA, the New Mexico Disaster and Emergency Services Division and the HMPT.

The resolution was offered for adoption by_____
The motion to adopt was seconded by_____

And upon being put to a successful vote; City of Alamogordo Board of Commissioners' signatories:

_____

_____

_____

Appendix G – State of New Mexico Approval Letter

Pending approval.

Appendix H – FEMA Approval Letter

Pending approval.